A qualitative analysis of psychosocial stressors and health impacts of the COVID-19 pandemic on frontline healthcare personnel in the United States

Aarushi H. Shah [a,*], Iris A. Becene [b], Katie Truc Nhat H. Nguyen [c], Jennifer J. Stuart [b,d], Madeline G. West [e], Jane E.S. Berrill [b,f], Jennifer Hankins [f], Christina P.C. Borba [g,1], Janet W. Rich-Edwards [b,d,1]

[a] Columbia University Irving Medical Center, Sociomedical Sciences, 722 West 168th Street, New York, NY, 10032-3784, USA
[b] Division of Women's Health, Department of Medicine, Brigham and Women's Hospital and Harvard Medical School, USA
[c] Harvard College, Cambridge, MA, USA
[d] Department of Epidemiology, Harvard T.H. Chan School of Public Health, USA
[e] New York University School of Global Public Health, New York, NY, USA
[f] Channing Division of Network Medicine, Department of Medicine, Brigham and Women's Hospital and Harvard Medical School, USA
[g] Boston University School of Medicine Boston, MA, USA

ARTICLE INFO

ABSTRACT

There is a dearth of qualitative studies exploring the lived experiences of frontline healthcare personnel (HCP) during the coronavirus disease (COVID-19) pandemic. We examined workplace stressors, psychological manifestations of said stressors, and coping strategies reported through coded open-text responses from 1024 online surveys completed over two months by 923 HCP participating in three nationwide cohorts from Spring 2020. Our findings suggest that risk, job insecurity, frustration with hospital administration, inadequate access to personal protective equipment, and witnessing patient suffering and death contributed to deteriorating mental and physical health. Negative health impacts included the onset or exacerbation of anxiety, depression, and somatic symptoms, including weight fluctuation, fatigue, and migraines. Coping mechanisms included substance use and food consumption, meditation and wellness, fitness, socializing with loved ones, and religious activities. Insights garnered from participants' responses will enable more personalized and effective psychosocial crisis prevention and intervention for frontline HCP in future health crises.

1. Introduction

Since the first case in 2019, the coronavirus disease (COVID-19) pandemic has posed unprecedented challenges across the globe, resulting in the devastating loss of human life. As of early October 2021, over 713,000 Americans and 4.55 million individuals globally have lost their life to the coronavirus, with millions more shattered by the grief of lost relatives, loss of employment, physical and psychosocial morbidity, and systemic sociopolitical disruption (Centers for Disease Control and Prevention, 2021) While the extent of devastation precipitated by the pandemic is immeasurable, previous and ongoing public health emergencies, such as the severe acute respiratory syndrome (SARS) outbreak in 2003, H1N1 pandemic in 2009, and ongoing Ebola and Middle East Respiratory Syndrome (MERS) outbreaks, can offer lessons applicable to the current COVID-19 pandemic (Cabarkapa, Nadjidai, Murgier, & Ng, 2020; Q. Cai, Tu, et al., 2020; Gunnell et al., 2020).

Research from prior epidemics reveals that frontline medical workers are among the most vulnerable populations for physical and psychological consequences engendered by the pandemic due to their proximity to infected patients (Gavin, Lyne, & McNicholas, 2020). Health workers at the forefront of treatment and management of the pandemic are forced to remain vigilant as they are at increased risk of nosocomial infections and exposure to contagious patients (Ali, Noreen, Farooq, Bugshan, & Vohra, 2020). Furthermore, the rapidly changing information – on a near daily basis in the early stages of the pandemic - from the Centers for Disease Prevention and Control (CDC), compounded by the increased workload and irregular supply of personal protective equipment (PPE), acutely positions frontline health workers in precarity (H. Cai, Tu, et al., 2020).

This precarity results in not only physical health sequelae, but heightened emotional and psychological distress as well (Zaka, Shamloo, Fiorente, & Tafuri, 2020). Psychological morbidities are a frequently cited consequence of frontline work during public health crises, including the COVID-19 pandemic (Khalid, Khalid, Qabajah, Barnard, & Qushmaq, 2016). An extensive systematic review investigating the psychological impact of healthcare personnel (HCP) facing health emergencies from 2002 to 2020 attributed the higher physical and psychological morbidities among acting health workers to witnessing the suffering and death of patients, excessive workloads, increased exposure and higher infection rates, fear of uncertainty and infecting loved ones, and insufficient access to protective equipment. In comparison to non-clinical frontline workers, active frontline HCP developed and experienced significantly higher levels of sleep disorders, exhaustion, burnout, anxiety, loneliness, post-traumatic stress symptoms, and depression (Galehdar, Kamran, Toulabi, & Heydari, 2020; Norful, Rosenfeld, Schroeder, Travers, & Aliyu, 2021). Furthermore, on an emotional level, frontline workers have grappled with conflicting emotions of stress, sadness, guilt, and devaluation (Elbay, Kurtulmuş, Arpacıoğlu, & Karadere, 2020). Thus, addressing the risk factors of burnout and other psychological sequelae becomes imperative and urgent. However, this first requires a thorough understanding of the lived experiences of psychosocial stressors, coping mechanisms, and support needs of frontline health workers.

In the past year alone, a multitude of studies have been conducted globally across China (Z.-Q. Dong et al., 2020), Iran (Galehdar, Aziz, Toulabi, & Heydari, 2020), Turkey (Elbay et al., 2020), Pakistan (Arshad et al., 2020), Egypt (Aly, Nemr, Kishk, & Elsaid, 2021), Netherlands (Pan et al., 2020), Portugal (Duarte et al., 2020), Italy (Trumello et al., 2020), India (Dubey et al., 2020; Khasne, Dhakulkar, Mahajan, & Kulkarni, 2020), the United Kingdom (Spiers et al., 2021) and the United States (Ripp, Peccoralo, & Charney, 2020) examining both the drivers and psychological manifestations of stress in frontline HCP during the COVID-19 pandemic (Vizheh et al., 2020; Xiong et al., 2020). However, only a few studies have been qualitative or have utilized participants' own words regarding the stressors engendered by the pandemic in the workplace.

The current study sought to address this gap by analyzing free-text responses from a survey of thousands of frontline HCP across the United States. An analysis of HCP's own words permits a nuanced examination of the specific challenges, highs and lows, and general experiences of HCP regarding psychosocial stressors and their impact on HCP mental and physical health. This analysis sought to delineate the psychosocial stressors experienced by frontline HCP in the workplace, to examine the impacts of the stressors on emotional and mental health, and to ascertain stress management and coping strategies employed by HCP.

2. Methods

2.1. Study design

A series of online surveys were designed and launched in April 2020 to investigate participants' experiences during the COVID-19 pandemic within three longitudinal national cohorts: Nurses' Health Study 2 (NHS2), Nurses' Health Study 3 (NHS3), and the Growing Up Today Study (GUTS). Between April 21, 2020 and May 16, 2020, participants who had returned the most recent, respective primary cohort questionnaires were invited to complete a supplemental COVID-19 baseline survey. Invitations were emailed with a link to complete the COVID-19 surveys. Study data were collected and managed using REDCap electronic data capture tools hosted at Brigham and Women's Hospital (Harris et al., 2009). Specific inclusion and exclusion criteria are detailed elsewhere (Rich-Edwards et al., 2021). Of a total of 105,662 invited participants across the three cohorts, 58,614 (55%) completed the baseline COVID-19 survey. The survey series was ongoing for one year, scheduled on a weekly, monthly, or quarterly basis depending on whether respondents were active healthcare personnel.

2.2. Survey instrument

The COVID-19 survey series employed close-ended questions and scales regarding occupational physical and psychosocial stressors, health behaviors, and symptoms and diagnoses of COVID-19, among other variables. In addition to the quantitative questions, each survey incorporated several open-text responses, some of which included specific prompts. For example, the comment boxes used in the baseline survey included: 1) an undirected box following questions regarding COVID-19 symptoms; 2) an undirected box following the dietary questionnaire; 3) a directed box requesting the participants to 'Please include any information about your use of improvised, non-standard PPE.'; and 4) a directed box at the conclusion of the survey stating 'We are interested in learning more about your experiences during this pandemic. Please add anything else you would like to tell us here.' Comment boxes were unlimited in length. For the purposes of this paper, we analyzed responses from all four questions. Responses regarding COVID-19 symptoms; changes and continuities and dietary patterns; and non-standard PPE use elicited important findings about occupational hazards and exposure concerns; food and substance consumption for coping and recreational use; and strategies to overcome PPE shortages, respectively. The final, open-ended question provided participants the opportunity to disclose what was most important to them by reiterating earlier sentiments or providing novel glimpses into their lives that remained uncaptured by the quantitative surveys alone. An initial, cursory glance at the responses to the aforementioned four questions changed our methodologies from a solely quantitative focus to one that would incorporate qualitative analysis. Amidst the COVID-19 pandemic, healthcare workers were overburdened with their occupational and personal lives, rendering in-depth interviews unfeasible. We delineate our justifications for these novel methods of qualitative data collection and analysis further in Nguyen et al. (in press).

2.3. Study sample

Of the 58,614 respondents to the baseline survey, 32,941 (56%) entered text into one or more of the comment boxes. Of 47,298 respondents to the month 1 survey, 20,355 (43%) provided free-text comments. We sampled and analyzed comments from baseline and Month 1 surveys until we reached theoretical saturation with variability on age, gender and occupation. The study team coded all comments from 3903 participants (7% of all surveys that included comments), including 2218 baseline and 1685 month 1 surveys. The current analysis was restricted to 1024 coded baseline and month 1 surveys completed by 923 frontline HCP working in person at clinical sites that served patients in the United States; we coded both baseline and month 1 surveys for 126 HCP. A little over half of the HCP sample was comprised of nurses (53%); other HCP in the sample included medical doctors, medical assistants, dentists, emergency medical technicians, paramedics, and other clinicians. The vast majority (n = 836, 91%) self-identified as female, consistent with the gender of the U.S. nurse workforce (Smiley et al., 2018). Of this sample, originally recruited to the parent cohorts between 1989 and 2020, 96% identified as non-Hispanic White; today's nursing workforce is 81% non-Hispanic White (Smiley et al., 2018). Further demographic information can be found in Table 1.

2.4. Data analysis

To complete a thematic analysis of the free-text data, we utilized the Framework Method, which involved the following five stages: familiarization with data, open-coding, development of analytical framework, application of framework, and interpretation of data (Pope, Ziebland, & Mays, 2000; Ritchie et al., 2013). In an inductive process, five coders independently derived codes representing recurrent themes in a preliminary set of 200 records. These were defined, debated, and

Table 1

Age-adjusted[a] characteristics of 923 participants of Nurses' Health Study II, Nurses' Health Study 3 and the Growing Up Today Study, whose text comments were analyzed from 1024 baseline and month 1 COVID-19 surveys.

	Coded HCP at baseline and month 1 (n = 923)
Age, n (%)[b]	
<26 years	11 (1.2)
26–35 years	455 (49.3)
36–45 years	263 (28.5)
46–55 years	145 (15.7)
56–65 years	49 (5.3)
First comment is from which questionnaire, n (%)	
Baseline	705 (76.4)
Month 1	218 (23.6)
Cohort, n (%)	
GUTS	495 (53.6)
NHS2	55 (6.0)
NHS3	373 (40.4)
Sex, race, and ethnicity, n (%)	
Women	836 (90.6)
Caucasian	884 (95.8)
Hispanic	4 (0.4)
Black	9 (1.0)
Asian	14(1.5)
Others	12 (1.3)
Clinical site of frontline healthcare personnel (HCP), n (%)	
Inpatient	513 (55.6)
Outpatient/clinic	232 (25.1)
Nursing home, group care, or home health	81 (8.8)
Other healthcare facility	97 (10.5)
Current or most recent occupation[c], n (%)	
LPN or ADN	3 (0.3)
BSN or RN	278 (30.1)
NP or CNM	79 (8.6)
Nurse, unknown type	131 (14.2)
MD, DDM, PA, or other clinician	110 (11.9)
MA, EMT, EMR, paramedic, or other HCW	322 (34.9)
Residential county COVID-19 mortality/10,000, n (%)[d]	
0	161 (17.4)
>0–<0.25	328 (35.5)
0.25–<0.75	230 (24.9)
0.75–7.9	189 (20.5)
Missing	15 (1.6)
Census region, n (%)	
Northeast	237 (25.7)
Midwest	277 (30.0)
South	195 (21.1)
West	209 (22.6)
Missing	5 (0.5)
Interaction of frontline HCP with patients with COVID-19 infection, n (%)	
Patients with documented infection	1112 (12.1)
Patients with presumed infection	226 (24.5)
Not that I know of	508 (55.0)
Don't work directly with patients	70 (7.6)
Missing	7 (0.8)
Adequacy of Personal Protective Equipment[e], n (%)	
Adequate PPE	634 (68.7)
Inadequate PPE	187 (20.3)
Not applicable	65 (7.0)
Missing	37 (3.0)

[a] Percentages are standardized to the age distribution of the study population.

[b] Value is not age-adjusted.

[c] Acronyms: LPN (Licensed Practical Nurse), ADN (Associate Degree in Nursing), BSN (Bachelor of Science in Nursing), RN (Registered Nurse), NP (Nurse Practitioner), CNM (Certified Nurse-Midwife), MD (Doctor of Medicine), DDM (Doctor of Dental Medicine), PA (Physician Assistant), MA (Medical Assistant), EMT (Emergency Medical Technician), EMR (Emergency Medical Responder), HCW (Healthcare Worker).

[d] County- and date-specific COVID-19 mortality data from the COVID-19 Data Repository by the Center for Systems Science and Engineering at Johns Hopkins University were used to derive a measure of local COVID-19 burden (Rich-Edwards et al., 2021).

[e] Data on access to and use of specific PPE items (gloves, gowns, surgical masks, respirators, PAPRs) was combined to derive a summary variable representing PPE adequacy: 'Adequate PPE if no PPE item was lacking and 'Inadequate PPE' if any item was used inconsistently because it was lacking or if any item was never used because it was lacking.

incorporated into a codebook that was then applied to and tested within increasingly larger sets of records. As new themes emerged from each new sample, additional codes were added to the codebook; conversely, rarely used codes were dropped or merged with other codes. Each version of the codebook was tested for inter-rater reliability using Cohen's kappa; kappa values ≤ 0.60 triggered reevaluation and modification of the codebook. This iterative process led to the establishment of seven versions of the codebook, and it was concluded only when data saturation was reached and no new codes emerged from the data; the final codebook included 165 codes (Nguyen et al., in press). For this analysis, we analyzed 13 parent codes and 70 child codes. Our final kappa and percent agreement were 0.54 and 0.99, respectively.

2.5. Ethical considerations

The study protocol was approved by the institutional review boards (IRBs) of the Brigham and Women's Hospital and Harvard T.H. Chan School of Public Health (protocol: 2020P001020); the IRBs allowed participants' completion of questionnaires to be considered as implied consent.

3. Results

We summarized findings from over fifty qualitative codes that fell into three broad themes/categories: 1) psychosocial stressors emerging specifically from the workplace, 2) psychological and somatic consequences of said stressors, and 3) coping strategies implemented by frontline HCP in response to work-induced stress.

3.1. Workplace stressors

Frontline HCP reported a myriad of work-related stressors resulting from the pandemic. Six predominant sources of concern arose: heightened fear of being exposed to and contracting the coronavirus; job and financial insecurity; frustrations with unexpected work reassignment; rapidly changing PPE donning and doffing protocols; a lack of acknowledgement and humanization; stigmatization surrounding the healthcare profession; and witnessing the suffering and death of patients.

3.1.1. Exposure to COVID at the workplace

One of the most cited workplace stressors involved anxiety stemming from potential exposure to the coronavirus at work. In the early stages of the pandemic, there was limited accessibility to testing and an extreme shortage of PPE across the nation, compounded by rapidly changing information regarding coronavirus transmission, symptoms, and protective measures (Rich-Edwards et al., 2021).

"I am PRN in the hospital while being a full time student. Since the hospital began seeing COVID patients and not providing adequate PPE I have not worked there. I am financially stable enough to afford not to work in the hospital and I do not want to contract COVID and bring it home to my family. My husband and I decided that I will not work in the hospital again until there is sufficient PPE or more testing to identify all patients as COVID −/+. My coworkers are bringing their own fabric masks to work and we are being asked to use less PPE when caring for COVID patients and 'not to panic and overuse' supplies. But I know of co-workers who have contracted COVID from the hospital."

"I work as an ophthalmic technician. Our office has been "winging it" with figuring out best practices. Technicians in the clinic figured out

how to schedule patients to decrease wait times and prevent crowding, with no support from management. I got exposed to covid-19 at work because of poor screening of emergency patients."

Cumulatively, these factors produced substantial anxiety amongst frontline health workers, who described the fear from uncertainty from working with potentially infectious patients.

"I obsessively watch the news and the death count. I am scared to work with my patients."

"Anxiety and fear increased significantly for fear of virus. Working in healthcare fulltime has been scary they seemed reluctant to give facemasks initially for employees I think in fear of shortages. They finally enforced masks everyday at work before that it was like taking a gamble people would say no to having a cough or fever when they were screened and would have to be asked to leave for coughing or not feeling well during sessions."

One HCP poignantly marshaled a war metaphor to describe their hazardous work conditions.

"I work for a hospice … I'm frankly horrified and down right [sic] scared that I'm sending my staff into battle without armor and they may become sick because we don't have the PPE we need. I come home after 12–16 hour days and I'm sewing masks and putting buttons on headbands to protect ears and when I can get isopropyl I'm making homemade hand sanitizer for staff to use … 20 years in healthcare and 15 as a nurse and I've never felt like this."

In addition to expressing concern for their own personal health, HCP more commonly reported a sustained fear of unwittingly exposing their loved ones to the coronavirus. This was especially the case for participants whose immediate relatives suffered from compromised immunity, rendering them more susceptible to infection and placing them at higher risk for coronavirus-related morbidity and mortality.

"My main life concern is that my wife's pre-existing health problems (heart palpitations, low blood pressure, PCOS, chronic migraines) put her at extremely high risk. If she gets the virus, she'll probably die. That honestly has me afraid."

"I feel invincible while I am working. But the anxiety and fear of giving this crap to a family member is very high. The fear that you could be the one who gives a deadly version of this to a loved one is unreal. I have not been in my in laws house or seen my family besides my husband and daughter for 6 weeks now."

"As an inpatient pharmacist, we interact with patients daily … Stress levels are a bit higher, and my family has limited/stopped all in person interactions with local family so that my increased exposure risk is not passed on to my older parents."

3.1.2. Job insecurity

A second source of stress involved job insecurity. Participants noted that elective surgeries – the primary method of earning revenue for private hospitals – were frequently canceled or postponed and, thus, even frontline HCP were subject to pay cuts, reduced hours, temporary furloughs, and unemployment.

"Working as a charge nurse on a dedicated COVID icu. Hospital took a partially abandoned floor and converted it to an ICU in a few weeks. We have no idea how long we will be open, but rumors are that we will likely be open for the rest of 2020. It's stressful to not know how long I will be in this position."

"I am an ER nurse who was furloughed the middle of April due to decreased volumes in the ER. I have no idea when I'll be returning to work."

Such financial uncertainty in a time of general precarity prompted daily concern, anxiety, and fear, as even those who were employed worried what the next day and weeks would bring. Quite a few participants noted that, the loss of healthcare employment meant the loss of their health insurance. In the midst of a public health emergency, the resulting loss of access to healthcare could be the difference between life and death for not just the individual, but also their immediate relatives dependent on their insurance coverage.

"My husband's position has been eliminated after working for his company [sic] 12-1/2 years; he carried our insurance. As a weekend package/PRN home hospice RN, I am not eligible for insurance. I worry how this will affect us long term. I have been able to pick up hours, but that won't make up for losing our insurance effective June 1."

The threat posed by the loss of health insurance was often compounded by a fear of being unable to access necessary medical care due to the closure of non-COVID related medical offices. Some participants worried about how their persisting pre-existing health conditions and illnesses would remain neglected.

"I was furloughed for a month and am now in a panic over my bills. I am not sure I can make my car payment or other household bills. I was exposed by a careless coworker, and we had to close because of it. We are back to work, but not at full capacity. I am worried about my job and my future. On top of everything, I have tried to exercise, but was in a car accident, in December and have to have my spine fused, but cannot, because of the pandemic and closed elective surgeries."

"Since this started I was told I had an lesion that is likely skin cancer. I need to see a specialist to have it removed and their office is closed. Not being able to schedule a removal of the lesion has led to increased stress and could have a very negative impact on my health if it is cancer and it spreads before it can be removed. And, I no longer have job security. And I worry about losing my health insurance if a job loss occurs."

However, some participants who were either furloughed for an indeterminate period of time or had their workloads decreased to the point that it affected their livelihood indicated that termination might have been preferable because they could have been eligible for unemployment benefits.

"The ambulatory surgery center I work at offered us furlough when things became apparent that elective surgeries numbers would drop off significantly. I applied for unemployment as soon as possible. I have not received any money in the past five weeks. The financial strain has been an unwelcome daily stress as so many have received payment and there is no documentable/traceable reason I have not been paid. The mental strain of being a personal telenurse to so many friends and family is also a heavy burden."

"I work two, part time jobs; one as a hospice nurse, the other as a clinical instructor for a local nursing college. The college term has now ended and 1/3 of my salary is gone. The hospice nursing job has steadily decreased in hours as nursing homes and assisted living facilities (our primary source of clients) have severely reduced visitors, including hospice. I have asked my employer to furlough or terminate me, but they refuse. I am facing a severe financial hardship and no one is currently hiring and since my hospice employer will not furlough or terminate me, I have no way of applying for unemployment benefits."

3.1.3. Frustrations with work reassignment and changing work policies

A third and related stressor included haphazard and unanticipated work reassignments. Numerous frontline HCP reported that work assignments were arbitrarily and abruptly changed in the early stages of the pandemic, a direct consequence of service reorganization and the mass

furloughing of health workers. Participants described being erratically 'floated' to varying hospital floors and wards due to revenue loss, budget deficits, and short-staffed hospitals. For many of these HCP, it was their first time working on the assigned floor, requiring them to adapt to new clinical responsibilities in minimal time.

> "My nursing job changed since I was placed in a labor pool at the hospital I work at. I don't know anyone I work with. It's on an inpatient unit …. I haven't done inpatient nursing for 16 yrs so I'm working as a tech. My body is not used to working 12 hr shifts, especially my feet (I've had 4 previous foot surgeries) I don't have a locker to put my things. I feel very isolated. I'm grateful that, unlike my coworker friends, I don't have to work with positive Covid pts. But there is still the stress of undiagnosed pts on my floor that we've been taking care of, unknowingly. It is difficult to talk to anyone outside of healthcare/nursing about what is on my mind, what I am dealing with, physically, emotionally, mentally."

Furthermore, some HCP noted working twelve to fourteen hour shifts in complete isolation, resulting in burnout and other adverse mental health conditions. Another novel challenge presented by the pandemic involved the abrupt transition to tele-medicine and remote provision of healthcare. Many HCP cited challenges specific to shifting from in-person work to tele-health, including patient resistance and technological barriers to access.

> "I have an interesting position as a super stressed out / burned out oncology nurse that's not on the 'front line'. Patients are anxious, routines have changed, patients are still dying from advanced cancer. My institution is gearing up, my cancer center leadership is not knowledgeable and bends the institution policies to make it easier or is just plain non-compliant. I'm in information overload with daily multiple institutional emails, news and media, public addresses, social media, conflicting reports and ignorant public fighting for their "freedoms" without much regard for their fellow community. I work many unpaid hours weekly just to manage my caseload and would like a covid day off too. It's a weird feeling to be blessed that I have work and not being able to cope with my work load …. COVID is definitely adding stress as leadership is fighting the staff to make more "zoom" visits with patients because they reimburse higher than a televisit even though majority of cancer patients are elderly or have difficulty with technology or language. I still have to see many patients a day because they are on active chemotherapy. My provider and I both feel it's important to physically assess patients prior to treatment. Just a weird time."

As reflected in the aforementioned quotes, work reassignment policies were a source of immense stress that resulted in a loss of autonomy. In spite of this, the two HCWs described feeling 'grateful' and 'blessed,' counting their fortunes almost immediately disclosing their negative experiences. This common juxtaposition revealed the internal strife and conflict plaguing HCP amidst the coronavirus pandemic, who were at once made to feel fortunate for a higher call to help others and for job security, while also suffering silently from chaotic work environments, anxiety, and burnout. One HCP illuminates the perniciousness of 'hero' discourse and the ways in which it renders invisible the actual plight and lived experiences of health workers.

> "The most challenging part of this pandemic is being on edge every day of not knowing when I could get redeployed to work on the floor. I wish I didn't see all of the art/signs saying thank you to heroes, as I don't feel like a hero at all. I don't want to get redeployed but I would have to or else I would get punished."

3.1.4. Skepticism of PPE donning, doffing, and decontamination protocols

In addition to challenges posed by work reassignment, frontline HCP also reported frustration with the rapidly changing PPE donning, doffing,

and decontamination protocols. As a result of the depletion of the global supply of PPE in the early stages of the pandemic, HCP were ill-equipped in the midst of the coronavirus crisis to protect themselves and others from transmission. HCP disclosed that evolving national guidelines surrounding PPE policies sowed confusion.

> "We were not allowed to wear masks until April at work. Available but discouraged. Our institution went from not supporting to permissive to mandatory."

> "Transparency in the face of crisis can effectively reduce stress, anxiety and fear. Organizations and government agencies are failing to be transparent which leads to toxic workplace environments. If employees understood how much PPE was available on a Federal, state, county and organizational level, they would work to ensure supplies were used efficiently and effectively. Instead employees feel left in the dark and can't rationalize the ever changing policies surrounding PPE and their perception that they are not being kept safe."

A few HCP divulged that their respective hospital and workplace circumnavigated national policies and enforced their own arbitrary guidelines for PPE protocols, including the extended use of PPE traditionally disposed after one use; UV-light decontamination; abandonment of N-95 'fit-testing'; and storage of all PPE in brown paper bags.

> "[Redacted], my employer, doesn't value or adhere the standards set forth by the cdc [sic] and creates their own guidelines for employees to follow. We reuse the same surgical masks for over a month without replacement."

In addition to HCP's distrust in the effectiveness of PPE reuse to sterilization policies, several participants described the negative consequences of administration's failure to provide sufficient PPE. One HCP described voluntary working fewer hours as their employer denied regular access to PPE.

> "Employed as paramedic in prehospital setting. Primarily employed by a Municipal service that provides sufficient ppe [sic] with a number of size options. Also employed at private service, significantly less ppe [sic] and restricted access to it to "prevent theft." Provided limited quantity of gowns/isolation suits and difficult to obtain more during shift causing unnecessary exposure. Have largely stopped working there for duration of pandemic due to lack of supplies"

For some HCP, loss of work was involuntary. One HCP recounted a fellow colleague being fired for questioning the administrators' decisions pertaining to PPE usage. This example echoes sentiments of other HCP who described fearing their job security by verbalizing their discontent with PPE regulations or being less productive amidst work reassignments.

> "I was pregnant working in the ICU when we got our first COVID patients in our community. Our hospital administrators told us "per the CDC" we didn't need N95s unless doing an aerosolizing procedure. They didn't routinely provide them at first. 5 nurses got sick from this one patient. Our charge nurse was fired for speaking up about a PPE."

> "I'm a speech language pathologist and a part of the rehab department of my facility. We are required to acquire our n95s if we want them on our own. While nearly every other department has them delivered to their manager daily and distributed. Sometimes, the other units give them to us willingly. But more often than not, we get push back. We have brought this concern up multiple times and nothing changes. On top of the stressful and ever-changing work environment, it's truly disheartening to feel like our lives are less than other staff in the facility. We have also been working odd hours, odd jobs, and have been under constant pressure to meet pre-COVID

productivity standards with the not so subtle threat of losing our jobs if we cannot."

3.1.5. Unseen and unheard: A lack of acknowledgement

A fifth identified stressor was the sense of being unacknowledged and insufficiently supported by workplace administration and leadership. Numerous HCP noted feeling 'expendable' and 'dehumanized,' perceiving their workplace leadership to dismiss the concerns voiced by HCP. This perceived disposability was regularly discussed in stark contrast to 'hero' rhetoric, as discussed earlier.

"I feel my employer has done their staff a disservice and treated us like we were expendable and our lives didn't matter and let us be exposed repeatedly"

"Am growing more concerned about nursing burnout. The internal stress of being "a hero" while being mentally abused at work has created so much stress for all of us. And feeling demeaned by administration telling me "You signed up for this" when I bring up valid concerns regarding protection or policy."

Some participants reported losing faith in both their occupation and the health system, verbalizing their desire to retire early or leave the health profession entirely due to the mental anguish, disrespect, and poor treatment they withstood amidst the pandemic. A handful of HCP reported resigning from their position.

"I work at a Magnet credentialed hospital. I had planned to retire in 2+ years but think almost every day while working that I may not be able to cope for two more years. I feel I have so much to offer but am under appreciated. It is not a good place to be. I'm starting to really see that life is too short to stay in that place."

"This has been a challenging time that no one in nursing signed up for. I love being a nurse and doing what I do every day. I don't feel supported by our upper management. The protocol we have for caring for Covid patients in Maternity is unacceptable. They are now being more strict about finances and it is having an effect on patient safety (ie stricter staffing). It's a very tough and complicated situation."

3.1.6. Stigmatization

One psychological stressor unique to frontline workers amidst the early stages of the pandemic involves the stigmatization of their occupation. More specifically, active HCP revealed being overly ostracized as a result of public fear that they are both sources of infection and transmission. The following quotes from HCP starkly oppose earlier ones wherein participants were valorized for their labor and likened to 'soldiers' and 'heroes,' demonstrating how the words and actions used to portray the value of HCP were often mismatched.

"The stress, the gossip, the wait for a "surge" or our first positive COVID patient … The stress is hell. All of society is in waiting while we continue to work our butts off … Lots of social and psychological dissidence. Can't go to the grocery store it post office after work without getting the evil eye because I wear scrubs but I'm tired and don't want to go out again either …

"My son was attending a [redacted] preschool program, they decided to reopen last week, however, rejected his return because I'm the only parent that is in contact with covid patients, despite explaining the use of PPE and all precautions necessary to prevent infection. This has caused tremendous stress, feelings of discrimination, guilt, sadness, anger."

3.1.7. Frontline witnesses of suffering and dying

A sixth stressor stemmed from participants' amplified witnessing of suffering and death on the frontlines. Participants described the

discomfort and helplessness they endured while watching patients and coworkers test positive for the coronavirus, some of whom ended up losing their life to the virus, with no relatives or family allowed to be present with them in their final moments due to hospital visitation restrictions.

"I have had several coworkers who have tested positive for Covid-19 & a couple who have expired due to complications. That has been the hardest part of this whole thing … and being afraid to bring anything home from work."

"Our poor patients are suffering!! The dementia is worse than usual and we are giving it to them because they are so confused and have no family to help them get reoriented post-op. Right now, I don't like my job very much because the stress is crazy.

Participants also mentioned frustrations surrounding their inability to keep patients and their loved ones apprised of information regarding the virus (e.g. transmission, symptoms, short- and long-term impacts) as a result of the sparse scientific knowledge available.

"Caring for new mothers diagnosed with COVID who are choosing to separate from their infants and the stress they are feeling, and not knowing what to tell them about whether it is safe to hold their infants feels terrible and wrong."

"I work at an ob gyn clinic and was pregnant during the start of the coronavirus outbreak-it was hard to provide patients reassurance when I myself was learning more about coronavirus and unsure what answers to give them. this experience first hand [sic] has given me more empathy towards patients and they to me, as they saw i was in the same shoes as they were."

A few participants even likened their workplace to a 'battle' or 'war zone' due to the rampant number of causalities and devastation, describing their moral injuries from having to make ethically impossible life-and-death decisions due to inadequate respirators, beds, and resources.

"I am in the NY area (Long Island) the first 4 weeks of this pandemic was something that is so hard to explain, something I have never seen in 30+ years of nursing. It truly was like a war zone."

The following quote provides a comprehensive glimpse into the constellation of psychosocial stressors originating from the workplace that adversely impact one's physical, emotional, and psychological health. Most significantly, the following insights are from *one* individual, illuminating the extensive data mined across 1024 records within this sample.

"Unfortunately, the anxiety, frustration and moral injury practitioners have been feeling have mostly stemmed from administration … For the "surge" staffing, without warning and effectively immediately they switched our shifts to opposite work weeks as "we need you in the ICU at all times for procedures" … The irony is, our best defense against this disease beyond excellent hygiene is to eat healthy, exercise regularly and get a good nights sleep … all aspects our administration and boss who is ironically Chief Wellness Officer for the hospital system has invariably taken away from us … when at work [my husband] wore a mask and administration asked him not to as they felt it provoked fear and anxiety amongst staff … How stupid can you be???? … If our work environment continues to impact our personal lives so extensively and negatively, after more than seven years with the system, [my husband and I] plan on resigning. … [T] here are brutalities in other forms both personally and professionally. You don't forget the images of people dying with family members out the window saying their goodbyes."

3.2. Psychological impacts and somatic symptoms

The above workplace stressors prompted a myriad of psychological and physical health sequalae amongst HCP. Participants described a significant range of emotions in response to the workplace stressors, including the onset or exacerbation of depression and anxiety, guilt, anger, frustration, detachment, and hopelessness. In addition to exacting a toll on psychosocial health and wellbeing, workplace stressors frequently manifested in somatic and other bodily symptoms.

3.2.1. Exacerbation of pre-existing depression, anxiety, and post-traumatic stress disorder

The two most frequently reported psychological impacts on frontline HCP were the development and/or exacerbation of pre-existing depression and anxiety due to the increased workload, financial insecurity, and exposure to suffering and death. These were often exacerbated by containment and isolation measures.

"Lots of feeling of depression, I have reached out to a shrink. So much death and the public is so stupid. This is a scary disease. I take vitamin c, zinc, elderberry, viactic, MV, apple cider vinegar. I was working out but now I'm so physically and emotionally drained"

"I have covid right now. I've been isolated in a studio apartment alone in brooklyn [sic] for the last week and still have a week to go. I'm depressed, lonely, anxious, misunderstood. I miss nature. I've been thinking a lot about moving out of the city once my lease ends because I am miserable here. All the positives like community are gone and all the negatives have exploded."

3.2.2. Guilt

Another common psychological impact was feelings of guilt among HCP. One of the most common sources of guilt included HCP's perceptions that the work they were performing was insufficient and/or substandard. Numerous HCP referred to competing responsibilities – such as their professional work and domestic responsibilities – as a reason for working fewer hours or shifts, which became a primary source of guilt.

"Cover inpatient surgical division and to reduce exposure have gone to working every 3rd week since admissions down. Some guilt about being a healthcare worker but not really contributing. Have enjoyed the new experience of homeschooling my children and not having the sleep deprivation of night shift."

"I work in pediatrics, so I have had feelings of guilt for not being more helpful with my adult icu colleagues at times. I know I am contributing but it doesn't seem the same. I also feel guilty that I'm not home to help school our children and my husband has to take all of that responsibility. I changed my work hours so that I am at work 4 days instead of 5 to be home one day to teach the kids. Still with a 40-hour work week on top of that. Always exhausted."

A few HCP specifically noted grappling with survivor's guilt as they witnessed either their colleagues working longer hours or sacrificing their lives on the front-line.

"It is difficult to stay motivated and hopeful for the future. There is so much uncertainty. I am using most of the self-care modalities I know as a certified holistic nurse, but there are still days I have a tough time - and I am not working on the frontlines in a hard hit area. I also feel guilty for not stepping up and working the Covid-19 units across the country. I teach nursing am wrapping up my PhD, so I don't have the time; however, there are days where I feel like I am experiencing something similar to what I imagine survivor's guilt feels like - especially when I see my former students working on the front lines. It weighs heavy on my heart and brings me to tears."

3.2.3. Anger and frustration

Numerous health workers expressed feeling angered and frustrated by both the intrinsic challenges of being a frontline health worker during a pandemic and the broader societal negligence and apathy towards COVID-19. More specifically, HCP described the frustration with community members who did not adhere to public health guidelines. Some participants described being disheartened by the futility of their sacrifices since others, including patients, coworkers, relatives, and community members, failed to recognize the severity of the coronavirus pandemic and actively put themselves and others at increased risk of exposure due to their not abiding to health guidelines.

"I continue to feel like I don't know what to do and the reopening hasn't helped. I see risk all around and the lack of people following guidelines makes me nervous, angry and I lose hope."

"Watching my colleagues not follow good infection protection is very distressing."

3.2.4. Loss of motivation, focus, and a sense of purpose

Yet another psychological health impact reported among frontline HCP during the pandemic was a loss of motivation and sense of purpose in their professional and personal lives – which was explained as a consequence of both the emotional and physical burnout and exhaustion experienced by HCP. Most often, HCP reported feeling unmotivated to maintain their physical and psychosocial well-being.

"Working in a hospital has been incredibly stressful and the job I love now feels odious and the hospital no longer feels like a safe place. My work as a student has been severely curtailed and my volunteer work as a board director responsible for the employees at a nonprofit is highly stressful. Nothing feels good at home and finances are a huge stressor as well. There is so much work to do but it is SO HARD to stay focused."

"I have experienced a close friend pass away from COVID. I am working in a dedicated COVID hospital. Required to have same expectations as surrounding hospitals who are not caring for these patients. Feel depressed and unmotivated."

3.2.5. Somatic manifestations of stress

In addition to enduring oft-invisible psychological health impacts, participants also described experiencing somatic manifestations of stress, including weight fluctuations, skin irritation, insomnia or other difficulties in sleeping, fatigue, migraines, body aches, nausea, and heart palpitations.

"I am the only person assigned full-time as an infection preventionist at the largest skilled nursing facility in the country. This pandemic has significantly changed my line of work and has exacerbated existing work-related depression and anxiety (since January 2019) I have faced in this position to the point to where I am now experiencing new physical ailments (migraines, more severe ezcema exacerbations)."

"I've been anxious for the first time in my life. I'm not sleeping well."

"Chaos at home and chaos at work. Together it has been difficult to find a comfortable place. Insomnia and irritability have set in."

"having trouble falling and staying asleep. Profound sense of exhaustion (physical, mental, emotional) on days after working in a covid unit."

"I was at lunch during work and talking about covid. I must have been more anxious than I thought bc suddenly had a few palpitations and my heart rate skyrocketed to 140 and my head and arms went tingly. It would come and go over course of a few hours so went to ER. They

believe I went into SVT. I followed up with cardiology, had a normal echo and placed on a beta blocker twice a day. Probably stress and anxiety Induced."

3.3. Coping mechanisms

Frontline HCP employed several coping mechanisms to manage the psychological impacts of their workplace stressors. Among the multitude of strategies reported, the most common included: consumption of food, substance use, engaging in religious activities, mindfulness, self-care, exercise, and spending time with family, friends, and pets. A handful of HCP described how their routing coping mechanisms had to be adjusted as a result of the pandemic lockdown, leading them to innovate new strategies to manage stress. Participants often expressed their perception of these behaviors as being either beneficial or detrimental to their overall well-being, which is explored in the following sections.

3.3.1. Healthy coping mechanisms

Participants reported engaging in behaviors that would alleviate work-related stressors and improve their physical and psychosocial well-being. Such coping strategies include incorporating mindfulness practices into daily routine, exercising and healthy eating, spending time with pets and loved ones, engaging in religious activities, and reducing social media usage.

"Gardening is amazingly therapeutic. I'm working in the yard and garden whenever I can, listening to audio books or singing birds. Also we are fostering kittens and their play help us laugh. Petting them is very good therapy."

"My religious faith was a daily source of comfort before the pandemic, and has become even more of a daily comfort since the pandemic began. I've stopped my online use of news and social media because it was causing emotional upset. Without online and social media interaction, I am able to maintain emotional calmness, satisfaction in my daily goals, and decrease worrying."

Some HCP revealed an evolution of their coping mechanisms and described how limitations posed by the ongoing pandemic had engendered changes in previous coping strategies.

"Some things I'd normally do to cope–like see a show, or a movie, or a concert, or catch dinner with a friend—just aren't available to me right now. But I'm committed to focusing on what's going well. My kids and I went hiking with our dogs today in the Rockies. My coping strategies have had to evolve and I've had to work to keep my brain from being overly grouchy about not being able to access the other ones how I'd like to. Sometimes, just acknowledging that this is hard makes me feel better."

A few HCP reported seeking support from virtual therapists and psychiatrists. Furthermore, some HCP described their workplaces as being facilitators of self-care through self-care programmed events and supportive colleagues, for which they expressed feeling grateful.

"I was furloughed in Mid March 2020 because of COVID. Initially there was much more alcohol consumption, depression, and anxiety. As time went on, I had accepted what had happened and stopped drinking and felt better. Was exercising regularly and getting outside. Starting working again this week and feel good about the extra precautions being taken and mental health has increased."

"My work has a mindfulness session everyday at noon via Skype. It is fantastic."

3.3.2. Unhealthy coping mechanisms

HCP described utilizing coping strategies that they perceived to be detrimental to their health and well-being, including the consumption of unhealthy food and increased substance usage, such as alcohol and marijuana.

"I have been struggling to keep from gaining weight. I recently started smoking out of boredom and stress. I am very lonely."

"I have certainly noticed an increase in my alcohol consumption. A glass of wine after work is now a necessity versus once in a while after a tough day. Every day is now a tough day.

"When I was laid off in the beginning of the pandemic I was under tremendous stress. I was depressed. Drinking and using marijuana a lot more often. Felt very hopeless."

"As mentioned with food, my alcohol consumption has notably increased and almost becoming like a feeling of necessity. I have also needed to add a nightly dose of 3mg of Melatonin in order to sleep well. I've found my brain is not shutting down without the consumption of these things."

4. Discussion

This qualitative study mined the free-text responses of a large survey of American HCP early in the COVID-19 pandemic to provide insight into the lived experiences of frontline HCP. Specifically, this study explored work-related psychosocial stressors, the psychological and somatic manifestations of those stressors amongst active HCP, and the coping mechanisms employed by HCP in response to work-induced stressors.

We found that workplace stressors included expected concerns regarding viral exposure, inadequate PPE, and fears of bringing the virus home. Many nurses were surprised at being furloughed during a pandemic; the resulting uncertainties and loss of income and health insurance were stressful. Frustration with abrupt reassignment to unfamiliar work settings was common, along with dissatisfaction with PPE usage policies and decontamination measures in the initial months of the pandemic. Long hours and extensive workloads were often cited. Frontline HCP expressed discomfort with their labor being valorized while their safety and concerns went unaddressed. Language such as 'expendable,' 'abused,' 'threatened' and 'under-appreciated' was frequent. Quite a few HCP either left work or were considering doing so. Finally, the frustration of not being able to help patients and the pain of witnessing suffering and death were strong themes, even at this early point in the pandemic.

Our findings are corroborated by evidence from a growing body of literature on the psychological stressors afflicting HCP amidst global pandemics. A vast number of workplace stressors cited by HCP within our study, including disease uncertainty, isolation due to social distancing and quarantine, contagion anxiety, and stigmas associated with being a frontline HCP, reflect sentiments expressed by frontline HCP amidst past epidemics, including the SARS and Ebola outbreaks (Chong et al., 2004; Galbraith, Boyda, McFeeters, & Hassan, 2021; Goulia, Mantas, Dimitroula, Mantis, & Hyphantis, 2010; Raven, Wurie, & Witter, 2018; Shaukat, Ali, & Razzak, 2020). The distress caused by a systemic lack of acknowledgement and protection of HCP from our study reaffirmed psychosocial stress theories positing the association between low decision latitude and employee burnout (Karasek, 1979; Van der Doef & Maes, 1999). Certain stressors were unique to the COVID-19 health emergency, including the vast transition to tele-medicine. Nearly all of the aforementioned stressors were unique to health emergencies (Galea, Merchant, & Lurie, 2020; Mo et al., 2020; Raven et al., 2018).

However, a substantial number of workplace stressors cited by HCP echoed perceptions of burnout pre-pandemic. Overburdened health systems, mistrust in intentions and priorities of administration, poor work-life balance, loss of camaraderie amongst colleagues, helplessness, emotional exhaustion, and personal and reputational vulnerability have existed as workplace stressors for decades (Chopra, Sotile, & Sotile, 2004;

Kronenfeld & Penedo, 2021; Linzer et al., 2001; Patel, Bachu, Adikey, Malik, & Shah, 2018). And yet, burnout prior to the pandemic was habitually unreported due to existing evidence that HCP fear reputational retribution or job insecurity if they disclose mental health and/or substance use struggles to their employers (Dyrbye et al., 2017; Guille, Speller, Laff, Epperson, & Sen, 2010). Thus, HCP often suffered silently even in pre-pandemic times. The recent coronavirus pandemic has merely exacerbated an ongoing, 'twin' epidemic of healthcare worker burnout and moral injury, resulting in adverse chronic physiological conditions (e.g. cardiovascular disease), mental health outcomes (e.g. suicidal ideation, post-traumatic stress disorder). In a profession that requires immense emotional intelligence and empathy, moral injury and burnout can also adversely influence workplace outcomes (Maslach & Leiter, 2016; Tiwari & Bhagat, 2021). Perhaps the COVID-19 pandemic – and the associated high turnover of medical staff - will engender a global recognition of and reckoning with the widespread burnout among HCP, placing the onus of mental healthcare not on HCP themselves but the medical systems and administrations for which they work.

HCP in the current study, most of whom were seasoned nurses, expressed negative emotional and physical health sequelae of work stress. They described symptoms of depression, anxiety, and post-traumatic stress and noted the somatic manifestations, including disordered sleep, heart palpitations, panic attacks, migraines, and body aches, all of which reverberated with findings from existing studies (Spoorthy, Pratapa, & Mahant, 2020; Sritharan, Jegathesan, Vimaleswaran, & Sritharan, 2020; Vizheh et al., 2020). Exhaustion, anger and frustration were common. Less expected were feelings of guilt among HCP who did not consider themselves on the very front line of caring for patients with COVID-19. Even as some grew tired of being named 'heroes,' others were hurt by feeling stigmatized and avoided in public when they were identifiable as HCP. Those whose workplaces provided emotional support and resources were appreciative. These results indicate severe strain on frontline HCP and the dire need for workplace and community support. While evidence of psychological and emotional morbidities amongst HCP are well documented across the current COVID-19 pandemic and in past health emergencies, there is sparse literature on the coping strategies of HCP. As Gunnell et al. (2020) aptly noted, lessons from past outbreaks reveal that psychological morbidity "may peak later and endure for longer than the physical health consequences of the pandemic." The longevity of psychological health issues stemming from the coronavirus pandemic has already been confirmed, urging the yielding of insights into effective coping mechanisms to promote the prevention and tertiary interventions to mitigate burnout and improve the ongoing HCP mental health crisis (Abbott, 2021; Galea et al., 2020).

Multiple HCP astutely noted the direct and indirect influence of the COVID-19 pandemic on stressors. The pandemic and related lockdown measures simultaneously heightened workplace stressors while eliminating common coping strategies, such as going to the gym or dining with friends. Some HCP were forced to rapidly adjust their pre-pandemic coping strategies, turning to food, substances, exercise, and mindfulness activities instead. Some HCP sought medical treatment in the forms of prescription medication and therapy. Many understood that some of their coping mechanisms might impact their health negatively. Several HCP revealed the nuanced impact of the pandemic by describing their aggravated stress reactions while also mentioning their "gratitude" for the slow moments and silver linings. For example, furloughed HCP described the challenges of financial insecurity while also discussing their reinstatement of family dinners and rediscovery of recreational hobbies such as baking, gardening, and cooking heavier meals. The ability to describe silver linings was in part mediated by the flexibility afforded to certain HCP whose work transitioned from in-person to remote, or whose workload was lightened. While certain changes in work arrangements were viewed as "blessings," other HCP derived significant stress from said adjustments. Our findings revealed the plurality of stress reactions and coping mechanisms amongst participants, corroborating existing literature on how coping mechanisms are variable according to individuals' stress perception, lived experiences, and broader contexts (Lazarus and Folkman, 1984; Tiwari & Bhagat, 2021).

Limitations of this study should be noted. Despite the gender representation reflecting that of the nursing workforce, our sample, which was drawn from the nursing population over many decades, over-represented non-Hispanic White individuals compared to the racial/ethnic distribution of today's nursing workforce. Different stressors, stress reactions, and coping mechanisms might be reported by HCP drawn from more diverse populations. The current analysis is limited to workplace psychosocial stressors; however, for many health workers, the pandemic was not the sole crisis in their life (Xiong et al., 2020). Participants described broken engagements, miscarriages and infertility, postpartum depression, deaths of loved ones, natural disasters, and forced relocations, all of which compounded workplace psychosocial stressors. Future papers will examine the confluence of work and family stress. Furthermore, while this qualitative study examined solely psychosocial stressors emerging from the workplace, such stressors are compounded by containment and physical isolation, lack of physical support networks, persistent fear and anxiety, social media fearmongering, and civil unrest within a broader turbulent political climate.

While qualitative research typically relies on more in-depth structured interviews or focus groups that probe specific topics, our approach relied on a series of prompted and unprompted comment boxes. As a result, participants volunteered their 'top of mind' responses; deeper probing might have yielded different insights. Over half of the baseline and month 1 survey respondents provided comments; we received the most input from the final text box that prompted: 'We are interested in learning more about your experiences during this pandemic. Please add anything else you would like to tell us.' The qualitative analysis yielded data on topics we had not thought to query in the survey; many yielded insights that would never have been captured by standardized scales. Most importantly, the participants' own words give us specific, granular information about how they, and the systems in which they worked, either rose to or failed the challenge of the early pandemic. Their comments implicate the broader issues of systemic fractures in our healthcare system - the lack of pandemic preparedness and the breakdown of trust between HCP and health administration/management. The reactions of the HCP in our survey suggest that management would do well to improve supply, distribution, sterilization and reuse of PPE; provide cushioning regarding income and continuity in health insurance; improve communication with their HCP; providing confidential mental health consultations; and facilitate positivity/optimism within the workplace. From these HCP, we can learn ways to better prepare for future humanitarian and public health crises.

Funding

Declaration of conflicting interests

The authors declare that there are no conflicts of interest.

Acknowledgements

integral member of the initial coding and research team. Also, a most sincere note of gratitude to the healthcare providers that completed the surveys, without whom this study would not exist.

References

Abbott, A. (2021). COVID's mental-health toll: How scientists are tracking a surge in depression. *Nature, 590*(7845), 194–195. https://doi.org/10.1038/d41586-021-00175-z

Ali, S., Noreen, S., Farooq, I., Bugshan, A., & Vohra, F. (2020). Risk assessment of healthcare workers at the frontline against COVID-19. *Pakistan Journal of Medical Sciences, 36*(COVID19-S4), S99–S103. https://doi.org/10.12669/pjms.36.COVID19-S4.2790

Aly, H. M., Nemr, N. A., Kishk, R. M., Elsaid, N. M. A., & bakr. (2021). Stress, anxiety and depression among healthcare workers facing COVID-19 pandemic in Egypt: A cross-sectional online-based study. *BMJ Open, 11*(4). https://doi.org/10.1136/bmjopen-2020-04528

Arshad, M. S., Hussain, I., Nafees, M., Majeed, A., Imran, I., Saeed, H., et al. (2020). Assessing the impact of COVID-19 on the mental health of healthcare workers in three metropolitan cities of Pakistan. *Psychology Research and Behavior Management, 13*, 1047–1055. https://doi.org/10.2147/PRBM.S282069

Cabarkapa, S., Nadjidai, S. E., Murgier, J., & Ng, C. H. (2020). The psychological impact of COVID-19 and other viral epidemics on frontline healthcare workers and ways to address it: A rapid systematic review. *Brain, Behavior, & Immunity - Health, 8*, Article 100144. https://doi.org/10.1016/j.bbih.2020.100144

Cai, H., Tu, B., Ma, J., Chen, L., Fu, L., Jiang, Y., et al. (2020a). Psychological impact and coping strategies of frontline medical staff in Hunan between January and March 2020 during the outbreak of Coronavirus disease 2019 (COVID-19) in Hubei, China. *Medical Science Monitor : International Medical Journal of Experimental and Clinical Research, 26*. https://doi.org/10.12659/MSM.924171. e924171-1-e924171-16.

Cai, Q., Feng, H., Huang, J., Wang, M., Wang, Q., Lu, X., et al. (2020b). The mental health of frontline and non-frontline medical workers during the coronavirus disease 2019 (COVID-19) outbreak in China: A case-control study. *Journal of Affective Disorders, 275*, 210–215. https://doi.org/10.1016/j.jad.2020.06.031

Centers for Disease Control and Prevention. (2021). *Covid Data Tracker*. https://covid.cdc.gov/covid-data-tracker/#datatracker-home.

Chong, M.-Y., Wang, W.-C., Hsieh, W.-C., Lee, C.-Y., Chiu, N.-M., Yeh, W.-C., et al. (2004). Psychological impact of severe acute respiratory syndrome on health workers in a tertiary hospital. *The British Journal of Psychiatry: Journal of Mental Science, 185*, 127–133. https://doi.org/10.1192/bjp.185.2.127

Chopra, S. S., Sotile, W. M., & Sotile, M. O. (2004). Physician burnout. *JAMA, 291*(5). https://doi.org/10.1001/jama.291.5.633, 633–633.

Dong, Z.-Q., Ma, J., Hao, Y.-N., Shen, X.-L., Liu, F., Gao, Y., et al. (2020). The social psychological impact of the COVID-19 pandemic on medical staff in China: A cross-sectional study. *European Psychiatry, 63*(1). https://doi.org/10.1192/j.eurpsy.2020.59

Duarte, I., Teixeira, A., Castro, L., Marina, S., Ribeiro, C., Jácome, C., et al. (2020). Burnout among Portuguese healthcare workers during the COVID-19 pandemic. *BMC Public Health, 20*(1), 1–10. https://doi.org/10.1186/s12889-020-09980-z

Dubey, S., Biswas, P., Ghosh, R., Chatterjee, S., Dubey, M. J., Chatterjee, S., et al. (2020). Psychosocial impact of COVID-19. *Diabetes & Metabolic Syndrome: Clinical Research Reviews, 14*(5), 779–788. https://doi.org/10.1016/j.dsx.2020.05.035

Dyrbye, L. N., West, C. P., Sinsky, C. A., Goeders, L. E., Satele, D. V., & Shanafelt, T. D. (2017). Medical licensure questions and physician reluctance to seek care for mental health conditions. *Mayo Clinic Proceedings, 92*(10), 1486–1493. https://doi.org/10.1016/j.mayocp.2017.06.020

Elbay, R. Y., Kurtulmuş, A., Arpacıoğlu, S., & Karadere, E. (2020). Depression, anxiety, stress levels of physicians and associated factors in Covid-19 pandemics. *Psychiatry Research, 290*, Article 113130. https://doi.org/10.1016/j.psychres.2020.113130

Galbraith, N., Boyda, D., McFeeters, D., & Hassan, T. (2021). The mental health of doctors during the COVID-19 pandemic. *BJPsych Bulletin, 45*(2), 93–97. https://doi.org/10.1192/bjb.2020.44

Galea, S., Merchant, R. M., & Lurie, N. (2020). The Mental health consequences of COVID-19 and physical distancing: The need for prevention and early intervention. *JAMA Internal Medicine, 180*(6), 817. https://doi.org/10.1001/jamainternmed.2020.1562

Galehdar, N., Aziz, K., Toulabi, T., & Heydari, H. (2020). Exploring nurses' experiences of psychological distress during care of patients with COVID-19: A qualitative study. *BMC Psychiatry, 20*, 1–9. https://doi.org/10.1186/s12888-020-02898-1

Gavin, B., Lyne, J., & McNicholas, F. (2020). Mental health and the COVID-19 pandemic. *Irish Journal of Psychological Medicine, 37*(3), 156–158. https://doi.org/10.1017/ipm.2020.72

Goulia, P., Mantas, C., Dimitroula, D., Mantis, D., & Hyphantis, T. (2010). General hospital staff worries, perceived sufficiency of information and associated psychological distress during the A/H1N1 influenza pandemic. *BMC Infectious Diseases, 10*, 322. https://doi.org/10.1186/1471-2334-10-322

Guille, C., Speller, H., Laff, R., Epperson, C. N., & Sen, S. (2010). Utilization and barriers to mental health services among depressed medical interns: A prospective multisite study. *Journal of Graduate Medical Education, 2*(2), 210–214. https://doi.org/10.4300/JGME-D-09-00086.1

Gunnell, D., Appleby, L., Arensman, E., Hawton, K., John, A., Kapur, N., et al. (2020). Suicide risk and prevention during the COVID-19 pandemic. *The Lancet Psychiatry, 7*(6), 468–471. https://doi.org/10.1016/S2215-0366(20)30171-1

Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics, 42*(2), 377–381. https://doi.org/10.1016/j.jbi.2008.08.010

Karasek, R. A. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly, 24*(2), 285–308. https://doi.org/10.2307/2392498

Khalid, I., Khalid, T. J., Qabajah, M. R., Barnard, A. G., & Qushmaq, I. A. (2016). Healthcare workers emotions, perceived stressors and coping strategies during a MERS-CoV outbreak. *Clinical Medicine & Research, 14*(1), 7–14. https://doi.org/10.3121/cmr.2016.1303

Khasne, R. W., Dhakulkar, B. S., Mahajan, H. C., & Kulkarni, A. P. (2020). Burnout among healthcare workers during COVID-19 pandemic in India: Results of a Questionnaire-based Survey. *Indian Journal of Critical Care Medicine: Peer-Reviewed, Official Publication of Indian Society of Critical Care Medicine, 24*(8), 664–671. https://doi.org/10.5005/jp-journals-10071-23518

Kronenfeld, J. P., & Penedo, F. J. (2021). Novel Coronavirus (COVID-19): Telemedicine and remote care delivery in a time of medical crisis, implementation, and challenges. *Translational Behavioral Medicine, 11*(2), 659–663. https://doi.org/10.1093/tbm/ibaa105

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer Publishing Company.

Linzer, M., Visser, M. R. M., Oort, F. J., Smets, E. M. A., McMurray, J. E., & Haes, H. C. J. de (2001). Predicting and preventing physician burnout: Results from the United States and The Netherlands. *The American Journal of Medicine, 111*(2), 170–175. https://doi.org/10.1016/S0002-9343(01)00814-2

Maslach, C., & Leiter, M. P. (2016). Understanding the burnout experience: Recent research and its implications for psychiatry. *World Psychiatry, 15*(2), 103–111. https://doi.org/10.1002/wps.20311

Mo, Y., Deng, L., Zhang, L., Lang, Q., Liao, C., Wang, N., et al. (2020). Work stress among Chinese nurses to support Wuhan in fighting against COVID-19 epidemic. *Journal of Nursing Management, 28*(5), 1002–1009. https://doi.org/10.1111/jonm.13014

Nguyen, K. T. H. N., Stuart, J. J., Shah, A. H., Becene, I. A., Berrill, J. E. S., Gelaye, B., et al (in press). Novel methods for leveraging large cohort studies for qualitative and mixed methods research. American Journal of Epidemiology.

Norful, A. A., Rosenfeld, A., Schroeder, K., Travers, J. L., & Aliyu, S. (2021). Primary drivers and psychological manifestations of stress in frontline healthcare workforce during the initial COVID-19 outbreak in the United States. *General Hospital Psychiatry, 69*, 20–26. https://doi.org/10.1016/j.genhosppsych.2021.01.001

Pan, K.-Y., Kok, A. A. L., Eikelenboom, M., Horsfall, M., Jörg, F., Luteijn, R. A., et al. (2020). The mental health impact of the COVID-19 pandemic on people with and without depressive, anxiety, or obsessive-compulsive disorders: A longitudinal study of three Dutch case-control cohorts. *The Lancet Psychiatry*. https://doi.org/10.1016/S2215-0366(20)30491-0, 0(0).

Patel, R. S., Bachu, R., Adikey, A., Malik, M., & Shah, M. (2018). Factors related to physician burnout and its consequences: A review. *Behavioral Sciences, 8*(11), 98. https://doi.org/10.3390/bs8110098

Pope, C., Ziebland, S., & Mays, N. (2000). Analysing qualitative data. *BMJ British Medical Journal, 320*(7227), 114–116.

Raven, J., Wurie, H., & Witter, S. (2018). Health workers' experiences of coping with the Ebola epidemic in Sierra Leone's health system: A qualitative study. *BMC Health Services Research, 18*(1), 251. https://doi.org/10.1186/s12913-018-3072-3

Rich-Edwards, J. W., Ding, M., Rocheleau, C. M., Boiano, J. M., Kang, J. H., Becene, I., et al. (2021). American frontline healthcare personnel's access to and use of personal protective equipment early in the COVID-19 pandemic. *Journal of Occupational and Environmental Medicine*. https://doi.org/10.1097/JOM.0000000000002308. *Publish Ahead of Print*.

Ripp, J., Peccoralo, L., & Charney, D. (2020). *Attending to the emotional well-being of the health care workforce in a New York City health system during the COVID-19 pandemic*. Academic Medicine. https://doi.org/10.1097/ACM.0000000000003414

Ritchie, J., Lewis, J., Lewis, P., of, S. P. J., Nicholls, C. M., & Ormston, R. (2013). *Qualitative research practice: A guide for social science students and researchers*. SAGE.

Shaukat, N., Ali, D. M., & Razzak, J. (2020). Physical and mental health impacts of COVID-19 on healthcare workers: A scoping review. *International Journal of Emergency Medicine, 13*(1), 40. https://doi.org/10.1186/s12245-020-00299-5

Smiley, R. A., Lauer, P., Bienemy, C., Berg, J. G., Shireman, E., Reneau, K. A., et al. (2018). The 2017 national nursing workforce survey. *Journal of Nursing Regulation, 9*(3), S1–S88. https://doi.org/10.1016/S2155-8256(18)30131-5

Spiers, J., Buszewicz, M., Chew-Graham, C., Dunning, A., Taylor, A. K., Gopfert, A., et al. (2021). What challenges did junior doctors face while working during the COVID-19 pandemic? A qualitative study. *BMJ Open, 11*(12), Article e056122. https://doi.org/10.1136/bmjopen-2021-056122

Spoorthy, M. S., Pratapa, S. K., & Mahant, S. (2020). Mental health problems faced by healthcare workers due to the COVID-19 pandemic–A review. *Asian Journal of Psychiatry, 51*, Article 102119. https://doi.org/10.1016/j.ajp.2020.102119

Sritharan, J., Jegathesan, T., Vimaleswaran, D., & Sritharan, A. (2020). Mental health concerns of frontline workers during the COVID-19 pandemic: A scoping review. *Global Journal of Health Science, 12*(11), 89. https://doi.org/10.5539/gjhs.v12n11p89

Tiwari, S., & Bhagat, D. (2021). Moderating effect of emotional intelligence on occupational stress and burnout of health care professionals. *Prabandhan: Indian Journal of Management, 14*(4), 39–54. https://doi.org/10.17010/pijom/2021/v14i4/158724

Trumello, C., Bramanti, S. M., Ballarotto, G., Candelori, C., Cerniglia, L., Cimino, S., et al. (2020). Psychological adjustment of healthcare workers in Italy during the COVID-19 pandemic: Differences in stress, anxiety, depression, burnout, secondary trauma, and compassion satisfaction between frontline and non-frontline professionals.

International Journal of Environmental Research and Public Health, 17(22). https://doi.org/10.3390/ijerph17228358

Van der Doef, M., & Maes, S. (1999). The job demand-control (-Support) model and psychological well-being: A review of 20 years of empirical research. *Work & Stress, 13*(2), 87–114. https://doi.org/10.1080/026783799296084

Vizheh, M., Qorbani, M., Arzaghi, S. M., Muhidin, S., Javanmard, Z., & Esmaeili, M. (2020). The mental health of healthcare workers in the COVID-19 pandemic: A systematic review. *Journal of Diabetes and Metabolic Disorders*, 1–12. https://doi.org/10.1007/s40200-020-00643-9

Xiong, J., Lipsitz, O., Nasri, F., Lui, L. M. W., Gill, H., Phan, L., et al. (2020). Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *Journal of Affective Disorders, 277*, 55–64. https://doi.org/10.1016/j.jad.2020.08.001

Zaka, A., Shamloo, S. E., Fiorente, P., & Tafuri, A. (2020). COVID-19 pandemic as a watershed moment: A call for systematic psychological health care for frontline medical staff. *Journal of Health Psychology, 25*(7), 883–887. https://doi.org/10.1177/1359105320925148