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Primary drivers and psychological manifestations of stress in frontline healthcare workforce during the initial COVID-19 outbreak in the United States

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ABSTRACT

Objective: The purpose of this study was to understand the physical and psychological impact of high stress clinical environments and contributory factors of burnout in multidisciplinary healthcare workforce during the initial outbreak of COVID-19.
Method: In-person qualitative interviews informed by an adaptation of Karasek's Job Demand-control model were conducted with a convenience sample of healthcare workforce from March to April 2020.
Results: Themes emerging from interviews coalesced around three main areas: fear of uncertainty, physical and psychological manifestations of stress, and resilience building. Shifting information, a lack of PPE, and fear of infecting others prompted worry for those working with Covid-infected patients. Participants reported that stress manifested more psychologically than physically. Individualized stress mitigation efforts, social media and organizational transparency were reported by healthcare workers to be effective against rising stressors.
Conclusion: COVID-19 has presented healthcare workforce with unprecedented challenges in their work environment. With attention to understanding stressors and supporting clinicians during healthcare emergencies, more research is necessary in order to effectively promote healthcare workforce well-being.

1. Introduction

The initial outbreak of COVID-19 in the United States (US) posed significant challenges for healthcare workforce [1,2]. Rapid surges of patients with COVID-19 coupled with the uncertainty of viral transmission and treatment protocols yielded unprecedented stress and burnout in clinicians [3]. Drastic changes in work environments and stress are likely deleterious to clinicians' longitudinal health outcomes [4]. Investigators outside the US assert clinicians will experience both adverse physical and psychological effects from providing health care during this pandemic [5,6]. A better understanding of the causes and sequelae of stressful clinical work environments can inform efforts to support clinicians' physical and emotional health during times of crisis.

Prior to COVID-19, clinician burnout reached alarming rates with over 50% of clinicians experiencing some level of burnout [7]. Burnout is characterized as long-term exposure to stress and manifested by high emotional exhaustion, high depersonalization and a low sense of personal work accomplishment [8]. In 2019, the National Academy of Medicine created a taskforce targeting an evidence-based agenda to combat burnout with recommendations for stress mitigation initiatives [7]. Studies that examine the impact of the clinical environment on clinician stress levels during the COVID-19 pandemic are just emerging [9]. Negative implications of burnout prior to the current pandemic include increased risk of chronic physiological conditions (e.g., cardiovascular disease; obesity) [10–12], psychiatric conditions (e.g., depression, post-traumatic stress disorder [PTSD], and suicidal thoughts) [12–14], and adverse organizational outcomes (e.g., low workforce retention rates; poorer quality of care) [15,16]. Stress, a precursor to burnout, may be exacerbated by specific work environment factors, [17] home characteristics, [18,19] and pre-existing chronic health conditions

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[20]. including pain and mental health conditions [21] Researchers recently found that people with pre-existing anxiety and mood disorders were negatively affected by COVID-19 and require tailored interventions for coping and resilience [22]. Understanding effects of environmental factors and arming clinicians with effective stress mitigation interventions may optimize overall health, increase resilience and improve organizational outcomes [14].

The evidence about clinician stress during COVID-19 has predominantly focused on physicians, such as anesthesiologist, radiologists, and immunologists [2,23]. Evidence about frontline workforce, other than physicians, during the initial outbreak are lacking. Further, studies surrounding the experience of frontline health care workforce during the COVID-19 pandemic have been predominantly quantitative in nature [24]. A qualitative approach to capture the real-world experiences of frontline workforce is lacking. Therefore, using a qualitative design the purpose of this study was to understand the physical and psychological impact of high stress clinical environments and contributory factors of burnout in multidisciplinary healthcare workforce during the initial outbreak of COVID-19. Further, we aim to understand what aspects of the work environment contribute to increased job related stress and subsequently how frontline healthcare workforce are coping.

2. Methods

Approval from the hospital's institutional review board was received prior to the start of the study. We conducted in-person qualitative interviews with a convenience sample of healthcare workforce from March to April 2020. The first patient with COVID-19 admitted to the facility was on March 18, 2020 thus garnering real-time perspectives about the initial COVID-19 wave.

2.1. Theoretical model

This study was guided by an adaptation of Karasek's Job Demand-control model [25]. The initial model notes that high demand jobs, low decision-making, and low social support pose higher risk of adverse psychological and physiologic outcomes. 'Demand' is defined as the sheer quantity of the work and 'control' surrounds the discretion a person exercises over tasks [26]. The adapted version considers additional individual characteristics within the multifaceted nature of work environments such as coping, resources and self-efficacy [27–30]. This model was purposively selected to allow for the inductive exploration of all emergent themes surrounding the COVID-19 work environment as opposed to a specific burnout model that may have inhibited the identification of other psychological and physical sequalae experienced by workforce.

2.2. Recruitment & data collection

A convenience sample of participants were recruited in-person at an urban academic medical center in Washington, DC [31]. The on-site investigator rounded on clinical units and verbally introduced the purpose of the study, its voluntary nature, and explanation of study participation to staff and leadership. Interested participants scheduled an interview at a time that was convenient to them. Next a snowball technique, where active participants identified other potential workforce that may be interested in conducting an interview, was used to concurrently identify additional participants [32]. Interviews were then scheduled either in-person or via email. The study sample was open to all healthcare workforce hospital-wide with no limitations on the size of the sample or clinical discipline.

An open- ended interview guide [33], based on the dimensions of the adapted Karasek theoretical model, was used. The interview guide started with broad questions such as "Tell me how you initially realized that you needed to care for COVID-19 patients," and moved toward targeted questions that focused on resources, psychological health, and psychosocial support. Prompts such as, "How were you feeling?" and "How did this impact you?" were used. The interview guide was discussed by three members of the research team (PhD-prepared clinicians with qualitative research expertise) to determine face validity prior to the start of the interview process.

Informed written consent was obtained prior to the start of the interviews. The interviews were held in a private location at the hospital with only the interviewer and interviewee present to avoid disruption and enable privacy for sensitive interview responses. Qualitative interviews allow researchers to obtain potentially personal and emotional responses to the questions asked Physicians, registered nurses (RN), respiratory therapists, patient care technicians (PCT), pharmacists and hospital leadership were eligible for inclusion. One researcher, a PhD-prepared nurse, conducted all interviews. The interviews were audio recorded and sent for professional transcription.

2.3. Data analysis

Transcripts were imported in NVIVOv23 [34] for data analysis and checked against the audio files for accuracy. Two researchers inductively and deductively coded the first 10% ($n = 5$) of transcripts independently to gain a sense of content and emerging codes [35]. Next, the researchers met to reach consensus about a finalized codebook, shared definitions, and emergent categories and themes. The remaining transcripts were then coded independently by two researchers (PhD prepared nurses) with expertise in qualitative design, workforce, and clinician burnout. The research team met weekly to discuss codes, group codes into categories and determine emergent themes. A third researcher (the on-site interviewer) was consulted for consensus surrounding emergent themes.The interviews and data analysis were conducted concurrently to allow the research team to further explore emergent themes in subsequent interviews. Interviews continued until data saturation was achieved [36]. Data rich quotes were extracted to exemplify each of the emergent themes and respective subthemes.

3. Results

The final sample included 55 healthcare workers, including RNs ($n =$ 21), PCTs (n−13), physicians ($n = 12$), respiratory therapists ($n = 5$), and pharmacists ($n = 4$). Interviews lasted approximately 20 min. The sample was predominantly female (75%) and African American (49%). More than half of participants were younger than 40 years old and worked in the emergency department or intensive care unit. Three themes emerged: 1) The Fear of Uncertainty; 2) Exhibited Physical and Psychological Manifestations of Stress; and 3) Building Resilience. (Table 1).

3.1. The fear of uncertainty

The little information initially known about COVID-19 treatment and patient care presented unique challenges for healthcare workers during the initial surge. Participants reported that their organizations struggled with creating uniform COVID-19 policies. One PCT described:

> "We had no training, no preparation. Every day the procedures change. One day they'll say, 'you don't have to wear a mask' and then, 'no, you have to wear a mask as soon as you walk in'… To this day, I don't really know my role as a tech when it comes to COVID patients … Some doctors will say, 'Okay, if we have the COVID patients, one nurse, one tech.' Some other physicians don't say anything. We don't have huddles. So, we're unaware."

When describing challenges to rapidly changing protocols, one physician remarked: "So, we are following the guidelines, but unfortunately, since it's all new, the guidelines are changing every hour. There's so much unknown out there. No one knows what we are dealing with.

Table 1
Emergent Themes about stress in healthcare workforce during the initial COVID-19 outbreak in the US.

Theme	Sub-Theme	Example
Fear of Uncertainty	*Navigating the flow of information*	"I'm here to care for patients, but it would've been nice to have a little prep. I would've brought extra clothes for work to change into. I would've had time to mentally prepare for this, but instead, I walked in and just looked around and noticed everybody's suited up but me, and it just took me a while to get it through my head what was going on." NURSE 2003
	Pace of Change	"We do have access to protocols, but then the thing is that the protocols itself is not standardized. I know different hospitals are following different things, and even in our hospital, the protocol and the guidelines, we're getting emails, yes, but it's changing every day. So, yesterday, whatever they were asking to do is not the same anymore. So, now I'm like, okay, but then we already did not do the things that you wanted us to do today, so we're already exposed. So, it's that kind of thing that it's all changing." MD 3002
	PPE Stressor	"They're asking us to go see patients without giving us enough supply and PPE, so I feel like no one actually cares about our lives or my family's life for that matter, right" MD 3002
	Risk of Infecting Others	"I was kind of nervous because I'm like I don't wanna bring something home. I didn't know what to expect because some people get it, they're asymptomatic and they're fine. Other people, they change real fast." Nurse 2002
Physical and Psychological Manifestations of Stress	*Physical and Psychological Stress*	"When I'm on call for the COVID pager, I sleep less well. And, occasionally, it's because of pages that come through once an hour overnight, and then I'm thinking about COVID and can't fall asleep. "MD 3004
	Anxiety	"Again, the first like – probably like the first week in, just like my anxiety level was much higher. Normally, I'm working four to five shifts a week, or I'm trying to, but when this started coming to the hospital, I signed up. I was doing like every other day." NURSE 2009
	Burnout	"One of my coworkers – she works night shift – and I worked with her the other night and we were just talking and she started crying and I'm just like, "What's wrong?" And she's just like, "It's a lot. It's a lot to handle" and she lost a few people and you know she feels like if she called out, she might get ridiculed or they might write her up, but she's like, "I'm emotionally drained." PCT 4008 I am tired because I have been working five shifts a week, for weeks now. Our department is short and our workload have drastically increased." RESP 6003
Building Resilience	*Organizational Efforts*	"Support so far, communication is great with administration. Telling us the resources we have in the basement pharmacy. And that it's not to be for an expendable use, meaning that for other people to use outside of the facility. So, they're keeping us up to date with what we have inside, making sure that if we run anything, to let the administration know. And then, it's roles, because there's daily updates as well from our core director or pharmacy administration. So, that shows us that they're also in the loop of what's going on." Pharmacist 5003
	Stress Mitigation	"Yesterday, a senior leader mentioned that the head of the nursing division that purchased snacks for the staff, and we go and get whatever we wanted. "NURSE 2009
	Solidarity	"I don't know is going to happen, but I feel like we all just know that there is a level of stress and anxiety that comes along with it and we're all just there for each other a little bit more." PCT 4010
	Social Support	"I'm constantly getting texts and phone calls. There was one day where I was very exhausted. I knew my brother was pretty worried about me. He texted me and was like stay positive. That was helpful. "MD 3005
	Increased Resilience	"I would say I'm actually probably the most calm I've been in a long time. I think a part of that is right now I have to be. RESP 6005 I think at the initial stage I was anxious, but now I've gotten over my fears. Because, it's here to stay for a while. So, I have to get over my fear to be able to sleep." PCT4011

There are no concrete protocols to follow, and that definitely adds to anxiety and stress that we are following." The concerns expressed reflected a problematic balance between attempting to relay the most up-to-date information while avoiding information overload.

As more COVID-19 information became available, the pace of change presented another cause of worry. A respiratory therapist described the strain in keeping up with the flow of information: "I think it was just so much information being thrown at the staff at one time. I think a lot of us were overwhelmed and just didn't understand what was the right thing for us to do." Though healthcare workers are trained to handle a wide variety of potential challenges, there was a lack of specific COVID-19 guidance. One nurse mentioned "I don't feel like I have enough training. In nursing school, we are trained to care for patients on all types of precautions…droplet, contact and different isolations. However, caring for a COVID patient, it's everything. It's all of them at once. Although, yes, we are trained to care for these patients in isolation, none of them are everything at one time." The uncertainty was noted as particularly difficult, with one physician calling COVID-19, "uncharted

territory…. a lack of standardized care or lack of enough information, and not knowing what to expect, is definitely challenging."

Personal protective equipment (PPE) became a controversial stressor over time. A respiratory therapist stated early on: "As far as our gown, gloves, N95 masks, I think we've been doing good. We've had enough supplies. There was probably a little confusion already. People were just scared because initially they thought everybody was gonna run out. I think the hospital just started hoarding stuff and they put stuff away, but I think we're doing better now." Over time however, PPE supply was reported as inadequate. One physician said, "I feel like we were not prepared at all to face this. We really do not have enough PPEs in the hospital. We are asked to use just a regular mask. They are not even giving us N-95s. When I asked for a regular mask yesterday in the ED to see a patient who is not confirmed with COVID yet but I don't know what I'm getting into, I was told 'Why do you need a regular mask?'" To some, this lack of PPE indicated a lack of organizational support. A physician described the challenge of not receiving requested PPE as, "… an example of feeling not supported was that I tried getting [hospital scrubs] to wear while I'm at work and was denied. I was told that they were only for people in procedural areas. Whereas two weeks ago I was able to get them without any trouble. So, while I don't necessarily have to see these patients, I am in [infectious disease] and I do have the chance of needing them. So, I would love to have access to hospital scrubs that I can put on when I get here and take off before I leave and minimize my chances of bringing anything home, but I was squarely told 'no' yesterday."

The risk of infecting others outside the hospital was also a major concern. Many worried about infecting vulnerable family members, as one physician shared, "If you get infected, chances are that a reasonable percentage are gonna get critically ill and we know you're gonna spread it to your family members. I'm particularly worried about my father who's sick at home. If I get sick what should I do to prevent it from spreading to him, basically there's not much that you can do. The second issue is that if you get seriously sick, then who's gonna take care of him?" A nurse echoed this concern: "I'm unable to go see a lot of my family members…I have elderly grandparents we are not able to see until the passing of this pandemic because, it will be too high of a risk to go see them and possibly pass the disease onto them." This initial worry often led to participants distancing themselves from family, which added a layer of psychological strain. One PCT described this struggle: "I was anxious. I decided that my son was gonna go live with my mom. She has lung disease and she's one of his primary caregivers. I was very distraught. It was very heartbreaking to me that my son wasn't gonna be living with me."

3.2. Exhibited physical and psychological manifestations of stress

Participants reported that stress manifested more psychologically than physically. A few participants reported physical implications ranging from skin breakdown from long-term mask use to physical exhaustion. For example, the constant vigilance was described as draining. A respiratory therapist shared: "You could just tell that everybody's starting to get exhausted, just the changing of the gowns so many times is exhausting. Breathing through this mask. By the time you get home, you're still breathing and rebreathing some of the CO2 throughout the day. You can tell people are just getting exhausted." Stress was increased not by patient volume but rather by patient complexity, as one physician pointed out: "Right now, among 16 patients, I would say 10 would be suspected or confirmed COVID for us. This feeds the emotional burnout that we are experiencing right now, not the actual load of patients." A nurse also shared, "after my shift, I felt so burnt out because you are constantly donning, taking off your stuff, and you're sweating. I had marks on my face from wearing the mask for so long. I felt like I got run over by a truck when I got home." Physically, there were no reports of worsening chronic conditions, but participants reported that physical activity and sleep were hindered. Several participants reported trouble falling asleep and attributed this to lack of time to decompress mentally despite their physical exhaustion.

Most participants did not reports symptoms of depression but anxiety was the most frequently reported manifestation of stress psychologically, regardless of a personal history. A nurse explained what drove her anxious feelings: "I keep questioning myself, "Did I wash my hands long enough? Did I take my mask off the right way without contaminating myself? You don't feel clean. I feel like I'm not doing it right. I feel like I'm exposing my family. I'm definitely anxious about that. I feel like if they did get sick, it's gonna be because of me, especially having four kids." Another nurse shared, "I didn't have mental health issues prior. Now it's anxiety. Information overload. Every night I'm looking at the news. I'm checking every source to see what's new with COVID in the world. I think that sometimes you have to check out. I hear about it at work." A PCT shared her own personal struggles and said, "since COVID-19, I feel stressed. I've actually had a few anxiety attacks when coming to work. When I got to work this morning, I was having bad anxiety. It's been a very stressful situation."

Some participants felt that the effects of burnout and anticipated symptoms were yet to emerge. A physician described the potential of COVID-19 to increase the baseline level of burnout many healthcare workers experience: "Well, certainly it will affect us. A typical healthcare worker is already burned out quite a bit even before this happened. So, this will have its effect too and it's not gonna help, it's gonna make it worse…the longer it stays, the harder it gets."

3.3. Building resilience

Though participants pointed to multiple stressors, there were common perspectives about building and maintaining resilience to high stress environments both within and outside the immediate work environment. First, leadership communication was reported as favorable to reducing stress. One pharmacist explained a recent communication: "We received an email from the [hospital] president yesterday, which I thought was very thoughtful. We're receiving emails from [administration] on a daily basis, I think they're very hands on, trying to stay ahead of this thing and just keeping everyone informed." Daily emails that promoted transparency of the hospital's responses and available resources also eased the stress of participants. One pharmacist described that, "so far, communication is great with administration keeping us up to date with what we have, making sure that if we run into anything, to let the administration know. There are daily updates as well from our core director or pharmacy administration. That shows us that they're also in the loop of what's going on."

Hospital-led programs set up to combat stress in clinicians were available, but most participants declined these services. A physician said, "I think there's a program set up for physicians and members of staff that are having psychological problems but I don't see know any special one that has been set up for COVID." A nurse expressed that the timing of the stress mitigation initiatives was not conducive to the needs of healthcare workforce. She explained that most efforts should be, "either after your shift ends, you could come for a talk session but not during our shifts. It's too hectic." On the contrary, stress mitigation efforts created by the workforce themselves, both within and outside the hospital, were viewed as more effective. Innovative ways to decompress were set up by groups of clinicians based on preference and availability. A nurse shared, "we've been trying to do things that lighten the atmosphere. Some of the nurses went and did yoga together [on-site] and somebody brought ice cream. I think in general we understand it's a stressful time and everyone is trying to create avenues for people to de-stress." Prayer and spirituality were also a common theme among several participants. A PCT described her unit's method of incorporating spirituality to reduce stress. "We created a prayer team. My boss implemented it. We pray before we start our shift. I also have a good support system at home. If I'm [working] and I get overwhelmed, I'll pick up the phone and call and pray over the phone. It's a strong support

to keep me positive through a difficult time."

Solidarity among healthcare workers yielded a greater sense of teamwork. There were reports of a compression of the traditional workforce hierarchy and an "all hand on deck approach." A PCT said that "I feel good when we work as a team. It makes it easier and you're not tired as much as when you're working alone. We can help each other better." Participants noted that increased tension due to COVID-19 prompted staff to assist each other more often. A nurse explained: "There is a willingness to help that I'm seeing more, so if you go into a patient's room, and you've gowned-up, and you need something in the room, they would probably try to see how they could assist, maybe probably bring it and leave it by the door. So, I'm seeing people are more willing to comply." Another nurse said, "the fact that you see more leadership at night shift – 'What do you need? How can we support you?' Just them being here, present, is definitely enough to make me feel supported." The presence of leaders working alongside staff was also noted by a PCT: "We have an awesome leader; she's very good, she's understanding. She works with us as far as making sure we have supplies; she goes beyond and above the call of duty. And she's there, and she's hands on." Another PCT shared a similar response about her unit nurse manager, "I feel like if I ever needed something specifically I would feel comfortable going to him to say hey look, we need a little bit more education or we need this, or how can we do this?"

Many participants discussed the support received outside of the work environment at home and via social media. A physician described, "my family does not live in our state. I'm actually able to talk to them more. Checking in with my parents more often than before. I've had friends that I hadn't heard from in a while actually send me text messages or Facebook messages. Little brief things like, 'I'm thinking of you. I hope you're doing well, safe.' People checking in, and that makes a big difference in this stressful time. So, personally, I have felt really supported." A PCT also said, "Social media is an abundant amount of [support] and encouragement. Pretty much praise for me doing the work that I do." Several physicians and nurses reported that they turned to social media for acquiring information rapidly compared to the traditional evidence search. A comradery of information exchanged via social media was reported to help stay current with emerging knowledge given the rapid changes in evidence and lack of published practice guidelines. A nurse explained that is was crucial to obtain, "details about what's going on. A lot of time, our colleagues who are in the hot areas, New York, they send out some of their experiences, how they are managing it, on *Facebook* or *WhatsApp*. So, we are just reading to see if we can incorporate their experience and then go from there." A general sense of support from the greater community was noted as helpful for stress mitigation as one nurse shared, "Social media is constantly thanking us for what we do. It's nice to know that the community knows what we're doing."

By the conclusion of the interviews a general sense of increased resilience was expressed by several participants. One physician indicated prior preparation as beneficial, saying that "…we've been prepared for a much longer time so there wasn't any shock and we know what our role is in this hospital and pretty much everything come down onto us. Most of the time, we feel on our own even before COVID. So, we've been prepared pretty good mentally. That's what we have to do, and we know the way that things work in this hospital." Another physician indicated that challenges brought on by COVID-19 were part of the expectations of medical training: "It's stressful but it's not something unexpected. As an infectious disease attending, this is what we've signed up to do in life – in our careers. It is just expected that we would be involved in caring for patients during a pandemic."

4. Discussion

The purpose of this study was to capture real-world perspectives about stress in frontline healthcare workers during the initial COVID-19 outbreak. Overall, we found that the uncertainty of COVID-19 practice guidelines, lack of resources including PPEs, and risk of transmission to loved ones at home were the primary drivers behind stress. Further, anxiety, physical exhaustion, and sleep disturbances were the predominant manifestations of stress experienced by participants. Over time, our participants reported innovative measures, such as on-site exercise and prayer, that were implemented to mitigate stress and build resilience in their high stress COVID-19 environments. Our findings also highlight that stress impacts clinicians differently and that stress mitigation initiatives are more likely to be used when individualized based on preference. There were significant efforts to provide psychological support system to clinicians yet without clinician input they may be less likely to be used.

Our findings also illuminate the importance of psychosocial support, not only by a clinician's immediate family and co-workers, but through social media. Given the rapid emergence of COVID-19, the healthcare workforce was not equipped with the knowledge needed to approach care, reduce risk for transmission, and reduce stress. Social media appears to have played a large role in stress reduction and providing a sense of solidarity between healthcare workforce over large geographic areas. This finding is novel given that social media is not evidence-based as traditional practice guidelines are. Yet, the benefits of psychosocial support were deemed effective from the perspectives of healthcare workforce in this study. More research is needed to understand the content of information shared and innovative ways to monitor the reliability and validity of such shared content.

Increased teamwork across disciplines also emerged as a significant mitigator of stress, yielding less perceived burnout and improved clinician wellbeing. This finding further highlights the need for attention to clinical team compositions and team member relations within the work environment. Previous studies have noted that when two disciplines effectively co-manage the same patient, there are improved clinician outcomes [37,38]. In our study, the blurred tiers of a traditional workforce hierarchy during COVID-19 were viewed as an optimal approach to patient care as well as clinician wellbeing. Further, transparency of hospital preparedness and ongoing communication between administration and staff decreased stress. Researchers have found in previous studies that clinician-administration relations have significant impacts on the role of clinicians within interdisciplinary teams and perceived teamwork [39]. During COVID-19, our findings highlight the essential role of transparency and organizational support to promote an effective team response and promote clinician wellbeing.

The uniqueness of this study timeline during the early weeks of the initial COVID-19 outbreak contributed to our findings that resilience was being built over time. This may be attributed to the evolution of information that became available about viral transmission, treatment and plan of care. While resilience appeared to increase over time in our study sample, it remains unclear if the coping mechanisms and sense of strength and flexibility to overcome stress during the initial outbreak will be withheld in subsequent waves. More research, including longitudinal studies that follow participants over longer periods and additional COVID-19 surges, is needed to understand the stability of the resiliency experienced.

The application of the Karasek model in this study allowed us to closely examine the work demands and sense of control by frontline clinical workforce during the initial COVID-19 surge. Based on our findings, it appears that as an overall group, our participants shifted within the model from an initial "high demand/low control" dimension to the "active job" dimension where workforce were motivated to learn and develop new behavioral patterns. The study was limited however to one interview per participant and therefore it remains unclear if all participants made this shift. Previous evidence has suggested that tailored interventions at the individual level are needed to help overcome stress [40]. This is consistent with our findings that participants integrated stress mitigation activities based on personal preference, team resources, and time availability. The role of social support noted in the adapted version of the Karasek model was illuminated by our

participant sample in the form of social media support. More research is needed to understand the rationale behind individual decisions to pursue various stress inoculation therapies as opposed to others. This may include a more detailed investigation of decision-making factors, such as work environment characteristics, culture, religion, and gender, that prompt participation in specific stress reducing interventions.

Our study was limited to a single medical center in a northeastern state in the US, which may limit generalizability and transferability. Other hospitals and outpatient settings with various workforce supply size and composition may have different perspectives. However, strengths of this current study include a large and multidisciplinary sample providing insight into early stages of the COVID-19 response that may inform other clinical organizations.

Alarmingly, we are still unaware of the long-term repercussions of stress that frontline workforce have experienced during the initial COVID-19 outbreak. As noted by some of our participants, the psychological and physical ramifications of stress in COVID-19 work environments may not have emerged yet. It is well documented that exposure to a traumatic event or prolonged periods of stress can result in post-traumatic stress disorder and increased cardiovascular risk [41]. Surveillance of frontline COVID-19 workforce is needed to mitigate long term adverse effects of the stress experienced during the pandemic. Further, the struggle with work-life balance during the pandemic emerged as a subtheme in our findings but more research is needed to investigate home stressors in depth. Such evidence may provide organizations with a guide to developing supportive measures that improve quality of life in healthcare workforce both in work and home environments.

5. Conclusion

COVID-19 has presented healthcare workforce with unprecedented changes in the work environment and increased stress. Our findings highlight key causes and sequelae of stress, as well as potential avenues for mitigation. Social media, individualized stress mitigation efforts, and compression of the traditional hierarchical roles appears to increase resilience in health care workers.

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Data statement

Due to the sensitive nature of the questions asked in this study and to ensure organizational privacy, survey respondents and the study site were assured raw data would remain confidential and would not be shared.

Declaration of Competing Interest

None to report

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