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Investigating burn-out contributors and mitigators among intensive care unit nurses during COVID-19: a focus group interview study

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ABSTRACT

Objective Past literature establishes high prevalence of burn-out among intensive care unit (ICU) nurses, and the influence of the COVID-19 pandemic in intensifying burn-out. However, the specific pandemic-related contributors and practical approaches to address burn-out have not been thoroughly explored. To address this gap, this work focuses on investigating the effect of the COVID-19 pandemic on the burn-out experiences of ICU nurses and identifying practical approaches for burn-out mitigation.

Design Semistructured focus group interviews were conducted via convenience sampling and qualitatively analysed to identify burn-out contributors and mitigators. Maslach Burnout Inventory for Medical Personnel (MBI-MP) and Post-traumatic Stress Disorder Checklist (PCL-5) were employed to quantify the prevalence of burn-out of the participants at the time of study.

Setting Two ICUs designated as COVID-19 ICUs in a large metropolitan tertiary care hospital in the Greater Houston area (Texas, USA).

Participants Twenty registered ICU nurses (10 from each unit).

Results Participants experienced high emotional exhaustion (MBI-MP mean score 32.35, SD 10.66), moderate depersonalisation (M 9.75, SD 7.10) and moderate personal achievement (M 32.05, SD 7.59) during the pandemic. Ten out of the 20 participants exhibited post-traumatic stress disorder symptoms (PCL-5 score >33). Regarding contributors to burn-out in nurses during the pandemic, five thematic levels emerged—personal, patient related, coworker related, organisational and societal—with each factor comprising several subthemes (eg, emotional detachment from patients, constant need to justify motives to patients' family, lack of staffing and resources, and politicisation of COVID-19 and vaccination). Participants revealed several practical interventions to help overcome burn-out, ranging from mental health coverage to educating public on the severity of the pandemic and importance of vaccination.

Conclusions By identifying the contributors to burn-out in ICU nurses at a systems level, the study findings inform the design and implementation of effective interventions to prevent or mitigate pandemic-related burn-out among nurses.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The participatory approach involving COVID-19 intensive care unit (ICU) nurses helped identify various contributors to burn-out and several practical strategies to mitigate it.

⇒ Qualitative data were complemented and contextualised by validated survey instruments, which measured the prevalence of burn-out and post-traumatic stress disorder among the nurse participants at the time of study.

⇒ While qualitative findings were assessed for and achieved saturation, the sample comprised nurses from two COVID-19 ICUs in a large, well-equipped metropolitan hospital and therefore may not represent perspectives from substantially different types of units, health systems or locations.

⇒ Due to the small sample size, the quantitative findings from the validated questionnaires are limited to the burn-out and post-traumatic stress disorder experienced by the participants and may not be generalisable.

INTRODUCTION

Burn-out syndrome, defined as "emotional exhaustion and cynicism that occurs frequently among individuals who do 'people-work…,'"[1] is a widespread, long-standing and critical issue among healthcare professionals.[2] Burn-out among these professionals is detrimental to physical and mental health and may adversely affect the quality of patient care.[3] Prior literature identified inadequate staffing,[4] lack of resources[5] and the necessity to make critical decisions[6] as contributors to burn-out among nurses. However, the unprecedented conditions surrounding the COVID-19 pandemic deeply impacted the healthcare community, nurses in particular, and further exacerbated burn-out symptoms.[7]

Several studies have documented burn-out among nurses during the pandemic.[7–11] For

example, a recent study[8] investigating nurses' stress, depression and burn-out levels using several validated questionnaires revealed that the nurses had high stress and burn-out levels and moderate depression; specifically younger, inexperienced nurses suffered higher levels of stress and burn-out. Similarly, Chen *et al*[9] investigated trauma, burn-out and post-traumatic stress disorder (PTSD) among nurses during the pandemic. Their study indicated that female nurses working at COVID-19 designated hospitals experienced higher post-traumatic growth scores. A systematic review and meta-analysis on nurses' burn-out and related risk factors during the pandemic revealed a high level of burn-out among nurses and added that several sociodemographic (eg, age and experience), social (eg, decreased social support) and occupational factors (eg, colleagues' ability to cope with the pandemic) may influence burn-out.[7]

While these studies show a consistent trend in increased burn-out among nurses, the focus has been limited to documenting prevalence with less emphasis on systemic contributors and practical mitigation methods. In addition, only a few studies during the pandemic have focused on intensive care unit (ICU) nurses, who are disproportionally affected by burn-out compared with other nurses.[10 11] Finally, most published work in this area use surveys or questionnaires, which may not provide an opportunity to elicit in-depth and scaffolding feedback from nurses.[12] Studies have not employed participatory, focus group or group interview sessions with nurses to facilitate in-depth discussions and exchange of opinions about COVID-19-related burn-out, its major contributors and practical mitigation strategies.

To address this gap, we conducted focus group interviews with nurses from two large ICUs designated as 'COVID-19 ICUs' in a large health system. The objective of this study was to investigate the impact of the COVID-19 pandemic on ICU nursing work, identify major contributors to such burn-out and suggest practical approaches for burn-out mitigation. The findings of this research may inform the design and implementation of effective interventions to prevent or mitigate pandemic-related burn-out among nurses. This study also complements earlier reflections and recommendations on provider burn-out reported from the same hospital system.[13]

METHODS
Settings and participants
Participants were registered nurses (see table 1 for demographic information) working a combination of 12-hour day and night shifts at a medical ICU (n=10) and cardiac ICU (n=10) at a large metropolitan tertiary care hospital in the Greater Houston area with each unit comprising 40 beds. Both ICUs were designated as COVID-19 ICUs. A recruitment email was sent to all nurses at both ICUs. On the day of the study, the first 10 participants who showed interest in participation were recruited. Focus groups' saturation was determined based on Guest *et al*.[14]

Table 1 Participant demographics

	Medical ICU	Cardiac ICU
Total participants (n)	10	10
Male/female	1/9	1/9
Years of experience as a registered nurse (mean (SD))	7.47 (7.9)	9.74 (11.7)
Years of experience working at their current unit	6.30 (7.9)	6.35 (8.3)

ICU, intensive care unit.

Data collection
Semistructured focus group interviews were conducted at each ICU in December 2021 when the Delta variant of COVID-19 was ongoing. The interviews lasted for 70 min at the medical ICU and 60 min at the cardiac ICU. Participants were given participant numbers to maintain confidentiality and were asked to complete the Maslach Burnout Inventory for Medical Personnel (MBI-MP),[1 15] and Post-traumatic Stress Disorder Checklist (PCL-5).[16] These questionnaires were employed to understand the prevalence of burn-out at the time of data collection among our participants to better contextualise the qualitative findings.

Interviews focused on understanding the shared experiences of nurses in three main areas: (1) challenges they faced during the pandemic and its effect on their mental health; (2) major contributors to their burn-out, both pandemic related and not pandemic related; and (3) strategies or practical interventions to overcome burn-out (see online supplemental appendix 1 for the list of questions). Interviews were audiorecorded, and files were transcribed by a professional third-party service and checked by PS to ensure accuracy.

Data analysis
Maslach Burnout Inventory for Medical Personnel
Several studies have used MBI-MP to quantify burn-out of healthcare providers, specifically during the COVID-19 pandemic.[17–19] The items in the MBI-MP are divided into three subscales: emotional exhaustion (nine items), depersonalisation (five items) and personal achievement (eight items); each item represents how often the participants experience burn-out-related feelings. The participants rated each of the items on a scale of 0 (never) to 6 (everyday) and the sum of their ratings for each of the subscales was calculated and categorised as high, moderate or low.[20]

Post-traumatic Stress Disorder Checklist

PCL-5 is a 20-item self-reported questionnaire to detect the presence and severity of PTSD symptoms in healthcare providers.[21 22] Each item is rated on a scale of 0 (not at all) to 4 (extremely), and the sum of the ratings is calculated for each participant. The sum corresponds to the severity of PTSD symptoms, to a maximum value of 80, with a score over 33 considered as probable presence of PTSD.[22]

Table 2 Maslach Burnout Inventory for Medical Personnel mean subscale scores for the 20 participants

Subscales and categories	n	%
Emotional exhaustion		
High (>27)	15	75
Moderate (17–26)	2	10
Low (0–16)	3	15
Depersonalisation		
High (>13)	6	30
Moderate (7–12)	6	30
Low (0–6)	8	40
Personal achievement		
High (>39)	5	25
Moderate (32–38)	6	30
Low (0–31)	9	45

Focus group interviews

Two of the authors (PS, a postdoctoral fellow with a background in biomedical engineering and human factors, and FS, a faculty in human factors engineering at a large research-intensive institution), both experienced in qualitative coding, coded the transcribed data for both focus groups. Coders developed a codebook using open and axial coding. An inductive thematic analysis was used, whereby data are coded as emergent without a priori categories.[23] Disagreements during the coding process were resolved by collective discussion of the two authors until full consensus was achieved. This manuscript adheres to the Standards for Reporting Qualitative Research (SRQR) guidelines.[24]

Patient and public involvement

None.

RESULTS

MBI-MP and PCL-5

Results from the MBI-MP showed that on average participants experienced high emotional exhaustion (M 32.35, SD 10.66), moderate depersonalisation (M 9.75, SD 7.10) and moderate personal achievement (M 32.05, SD 7.59) at the time of the study. Of the 20 participants, 75% exhibited high emotional exhaustion, 60% reported moderate to high depersonalisation and only 25% reported high personal achievement at work (see table 2). Findings from the PCL-5 revealed an average PTSD score of 36.3 (SD 14.31) with half of the participants (n=10) showing symptoms associated with PTSD (score over 33). Additionally, when given the definition of burn-out, 18 of the 20 participants self-reported that they are experiencing burn-out.

Focus groups

Five themes emerged from the transcribed data—personal, patient related, coworker related, organisational and societal—with each theme comprising several subthemes (table 3). The emergent themes revealed that the pandemic-related causes of burn-out for ICU nurses were multifaceted in nature, ranging from microlevel (personal) to macrolevel (societal) influences.

Personal factors

Several participants felt emotionally detached from their patients for a variety of reasons including high mortality rate among COVID-19 patients under their care; the need to overcome the guilt of not being present at the time of their patient's demise as they had to care for other patients; and the need to rapidly reassign bed space after a mortality with a new COVID-19 patient.

It was painful to see I couldn't even be in the room when somebody had to be totally excavated, or they couldn't talk to their families. I could give no support and that made me a little detached from [the patient]-… So, I had to emotionally detach myself and that changed how I'm a nurse. (Participant C6)

Participants were also concerned about acquiring COVID-19 themselves or feared that they may transmit the virus to their family.

I have seen myself my anxiety level go up, at the start of the pandemic. I was just anxious about my family and their health and them getting sick, because seeing how sick these patients can get, it was like my biggest fear. (Participant M5)

Some participants who self-identified as immunocompromised stated that during the initial phases of the pandemic they had to leave their current unit and work at another 'non-COVID' unit with different coworkers because vaccines were unavailable.

I have been working on this unit for over 20-years and loving the patient population. But when the pandemic hit, I am immunocompromised, so I had to leave my unit and my comfort level and go to another unit which was very stressful for me, but I just went on for nine months. (Participant C7)

Participants also cited that they personally felt biased in triaging patients, specifically when they had to care for two COVID-19 patients, forcing themselves to prioritise the patient with higher survival chances.

But when it comes to having two (patients), and when I say two like super sick COVID patients and they're both intubated, on multiple medications, it does feel like you're playing God and you're having to pick the favorite one because they're so sick. And it feels like that does mentally take a toll on you because you can choose one: [one] can end up dying, [whereas] the other one [may] live. (Participant C10)

Patient-related factors

A major contributor to patient-related burn-out was a perceived lack of balance between the amount of effort in saving a patient and the actual outcome. Participants

Table 3 Summary of identified themes, rationale and subthemes

Theme	Description	Subthemes
Personal	Issues related to the personal feelings of nurses during their shift	Emotional detachment from patients
		Fear of being infected and/or being a carrier
		Working out of comfort zone
		Feeling biased in saving patients
Patient-related	Issues related to patient-related activities (efforts toward saving a patient) and patient outcomes.	Lack of balance in effort and patient outcome
		Increased workload
		Clinical complications due to longer stay
		Constant need to justify motives to patient's family
		Reduced quality of care for non-COVID-19 patients and possibility of transmission
Coworker related	Issues associated with the nurses' feelings/concerns about their coworkers	Watching coworkers being burnt out
		Fear of coworkers getting infected
		Calibration in perception of workload
Organisational	Issues related to the organisation where the nurses worked at the time of study	Uncertainty of treatment plan
		Donning and doffing of protective wear
		Lack of staffing and resources
		Lack of workflow due to emerging conditions
		Visibility of leadership support
		Team cohesion and trust
Societal	Issues related to the societal, political or the environment surrounding the workplace	Uncertainty about the pandemic situation
		Unavailability of vaccines
		Politicisation of COVID-19 and vaccine
		Insensitivity to existing risks

reported that, irrespective of their hard work and effort towards saving a patient, COVID-19-related complications determined the outcome.

I think the biggest thing for me that was really draining mentally was that we were working so hard for these patients. They were so, so, so sick. And it was no matter what you did, they still died; like most of them; or ended up going to an LTAC [long-term acute care facility] and staying there. (Participant C5)

Participants also cited being overwhelmed with the number of patients admitted. This increase in workload caused both physical and mental burn-out, as reported by the participants.

So, we're slammed with admissions like one patient dies and then we get an admission right away, [for a] very sick [patient]. We get to prone these patients with little help or sometimes it's just us four people proning 300-pounds, so it's physically and mentally draining. (Participant C4)

Other clinical complications due to longer hospital stay, such as pressure ulcers, further exacerbated nurses' workload and was reported as a contributor to burn-out.

[If] patient is on the ventilator for longer, most likely they're going to need central line for longer, most likely, they're going to need a Foley for longer, they're on the bed for so long. So, most of these patients get pressure ulcers, and then it just adds more work to you as a nurse, because if respiratory is in

there need help, we need to be in there, if wound care needs help, we have to be in there, like we're expected to do like a million things extra for patients whose progress is so slow. (Participant M6)

Multiple participants reported the constant inflow of inquiries from patients' families. Though the participants understood the intention of the families, the increase in workload combined with pressure to justify their motives and treatment mode to families was associated with burn-out.

When you're taking care of some of these patients, it's not just the patients that wear you down, it's also the families when they can't come in, and they're calling constantly or they're not calling at all. And they're questioning your motives… And it really starts to affect your mentality of, am I really doing my best? (Participant M10)

Finally, since the two ICUs studied in this research cared for both COVID-19 and non-COVID-19 patients, as the proportion of COVID-19-patients increased, nurses had to care for both types of patients. Therefore, some participants felt concerned about the safety of non-COVID-19 patients due to the possibility of virus transmission or exposure, especially for non-COVID-19 transplant patients:

I feel like some [COVID] patients were endangering patients that were non-COVID patients by setting up with a COVID

patient and a non-COVID patient population, possibly being a transplant patient. (Participant C10)

Coworker-related factors

Participants perceived burn-out as being prevalent among most of the staff working in the ICU. Participants mentioned that observing coworkers showing fatigue or stress contributed to their own burn-out.

I feel once other people, once the other nurses around me start burning out or start showing fatigue or frustration, I start showing fatigue and frustration. So, it's not just me that's getting a little bit worried about the burnout from the COVID-19 pandemic but certainly all around just the toil of everybody. (Participant C9)

Participants were also concerned about their colleagues acquiring COVID-19 from patients.

I felt that they (unvaccinated patients) were maybe increasing the risk of all us co-workers or my colleagues of getting it and it was frustrating. And so, I felt helpless. (Participant C7)

Finally, participants cited that they had to constantly defend their work after each shift to the next shift nurse taking over for them.

You have to defend yourself and what you did, and it's kind of a horrible. I don't even have that self-respect that I feel like, no, I did do something … I need to tell them exactly everything that I did, because if not, they're going to look at the room and wonder, did you even do anything at all. (Participant M6)

Organisational factors

A few participants associated burn-out with the uncertainty of the treatment plan for COVID-19 during the early stages of the pandemic.

We're defining treatment as we go, also dealing with possible things at home related to the pandemic, things on the news related to pandemic, things in our family related to pandemic. (Participant C2)

Several participants reported the need to don and doff protective wear several times during a shift as a contributor to burn-out.

I think one of the things that also adds on to the length of everything that we're doing is all the gowning up and gowning down. So, every single time we go into a room, you have to put on a gown, a shield, gloves, you go, and you do one task, you forget one little thing, you have to go outside of the room, redo all that over and over. (Participant M1)

Almost all participants connected limited staffing and shortages in qualified ICU nurses to burn-out. Nurses especially felt that the common 2:1 patient-to-nurse ratio resulted in disproportionate care given to less critical patients which resulted in a feeling of guilt for not providing proper care for both patients.

Because it is COVID, there was a bunch of staffing issues, so you wouldn't have the appropriate resources you need. And so you're having to work—you're having to stretch yourself super thin between two patients, and I did have situations where I was in one room for so long that when I came out my other patient wasn't doing good because I didn't even know and with the lack of staffing, at the end of the day, you feel like what did I actually accomplish, what did I actually do for my patient today, you leave work feeling like I'd worked so hard and I didn't actually get anything done for my patient. (Participant M5)

Participants also stated that they lacked team cohesion during the pandemic resulting in loss of trust among their coworkers; the hiring of new nurses, specifically new graduates, in need of training was cited as a major contributor to this issue.

But this unit was a place that people came and stayed. The whole dynamic of the unit has changed because of the influx of people. I'm going to tell you more than half of these people or third of these people, I don't know their names. (Participant C2)

When asked about new pandemic-specific workflows, all twenty participants agreed that no such workflows were defined at the time of pandemic, with some referring to changed workflows being 'chaotic'.

Usually when you get your patients, you can prioritize your day and think, "Okay, this is what I'm going to do for this patient," and make a list. [During pandemic] there was always five-hundred other things that came up. There was no going with the flow or the workflow. (Participant C5)

Societal factors

Most participants claimed that the uncertainty of the pandemic situation, such as governmental regulations and surging influx of COVID-19 cases, played a major role in feelings of burn-out.

You're in a situation where the global sense of what we knew was constantly changing, not only here at the hospital but here at home and the world. Our nurses were put out there to do things we had never done before to deal with something we had never done before that nobody knew how to deal with. We were on the edge of the cusp of not only trying to save our lives but save other people's lives. (Participant C2)

Similarly, participants cited unavailability of vaccines at the early phase of the pandemic and some patients' vaccine hesitancy after vaccine availability as major sources of stress.

Some of the patients were not getting the vaccine, and I felt that they were maybe increasing the risk of all us co-workers or my colleagues of getting it and it was frustrating. (Participant C7)
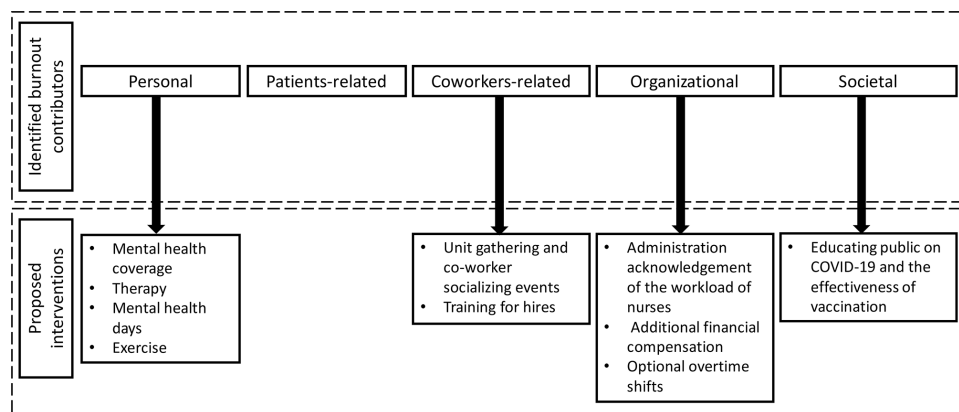
Figure 1 Identified burn-out contributors and proposed interventions that emerged from focus group interviews.

Most participants referred to the 'politicisation of the COVID-19 pandemic and the vaccine' as a contributor to burn-out. Participants reported that some of their patients and their families did not believe the ongoing situation, which nurses found to be emotionally draining.

Unfortunately, it become very politicized. I've had experiences where I've had patients or patients have (family) members call the COVID-19 pandemic a scam or a 'scam-demic' or fake or what have you and it just becomes entirely frustrating especially when their loved ones or them a couple of rooms over across the unit, one floor down, across the hospital, there's someone saying goodbye to their loved one for the last time because of COVID-19. (Participant C9)

Finally, participants described an overall 'insensitivity to risks' among public who did not appreciate the severity of the pandemic situation.

I feel like now that the pandemic has gone to the point where it is now it feels like a lot of people are just more not in the mind to really care too much about their patient population. And they're willing to make some match at this point just to bend and not have to take as many precautions as we did earlier on. (Participant C10)

Strategies to overcome burn-out

Participants proposed several ways to address or mitigate pandemic-related burn-out. To overcome personal contributors to burn-out, participants proposed mental health coverage, therapy, mental health days and exercise. Similarly, unit gathering and coworker socialising events and training for hires were proposed as potential interventions to address coworker-related burn-out. For organisational contributors to burn-out, participants recommended administrative acknowledgement of their workload, additional financial compensation and optional overtime shifts. Finally, educating the public on COVID-19 and the effectiveness of vaccination was identified as a potential approach to help nurses overcome societal issues contributing to high burn-out.

DISCUSSION

This study assessed the severity of burn-out symptoms in a sample of ICU nurses caring for COVID-19 patients in a large health system and identified major contributors and recommendations to address pandemic-induced burn-out. Findings from the MBI-MP questionnaire and focus groups suggest that the participants experienced burn-out symptoms. Nurses were emotionally drained and frustrated with their work. High emotional exhaustion is also associated with low job satisfaction,[25] work attitudes,[26] cognitive withdrawal from their job and organisation,[27] and reduced quality of life of the personnel.[28] Similar to a previous study that used MBI-MP during first wave of COVID-19 pandemic,[29] the nurses in our study also showcased a moderate level of personal achievement and depersonalisation, indicating that the negative impacts of the pandemic may have obscured their perception of personal achievements and feelings of indifference towards work.

Studies prior to the pandemic considered a high score of emotional exhaustion and depersonalisation as indicators for burn-out in nurses.[30 31] Though our study also reported a high emotional exhaustion score, our findings contrast with studies that associated burn-out with high depersonalisation score. The nurses in our study were more concerned about the well-being of their patients and coworkers and cared for how they were perceived by others as reflected in several qualitative subthemes such as 'lack of balance in effort and patient outcome,' 'fear of coworkers getting infected,' and 'calibration in the perception of workload.' This phenomenon may be explained by the documented boost in team unity in healthcare environments during the pandemic,[32] which may have influenced our depersonalisation score to be at the moderate level. Results from the PCL-5 questionnaire revealed that half of the participants experienced some level of PTSD symptoms. This corroborates findings of increased PTSD symptoms in healthcare providers during the pandemic.[21 22] Past studies support the association of negative sentiments with high level of PTSD and burn-out.[33 34] Similarly, in our study, participants used sentiments such as 'isolated', 'frustrated', 'helpless',

'angry', 'less tolerance', 'exhausted', 'unaccomplished', 'sleeplessness', 'failed', 'anxious', 'stressed' and 'judged' repeatedly to describe their feelings at work during the pandemic.

Qualitative findings from the focus groups showed that factors ranging from personal to societal have contributed to burn-out in nurses. Several factors have been previously documented as contributors to burn-out prior to the pandemic. For instance, lack of staffing and resources,[5] increased workload[35] and unsatisfactory work conditions (problems with coworkers)[36] were well known for inducing burn-out. Other pandemic-specific factors have also been reported elsewhere. For example, 'reduced quality of care for non-COVID-19 patients and possibility of transmission' during the pandemic has been mentioned in several other studies that refer to non-COVID-19 patients as 'collateral damage'.[37 38] However, our study identified several other factors specific to the COVID-19 pandemic such as uncertainty of treatment plan, donning and doffing of protective wear, fear of being infected and the societal subthemes.

Complementing research that identified burn-out interventions from literature or organisational leaders,[39 40] this study recognised possible solutions by directly communicating with nurses. The strategies proposed by the nurses focused on personal, coworkers related, organisational and societal factors that contributed to burn-out, but not on patient-specific factors. The suggested solutions directly correspond to each of the identified themes for major contributors, as shown in figure 1. A few participants acknowledged that they have been addressing the personal contributors of their burn-out by visiting therapists, taking days off and working out. This suggests that having access to mental health resources and guided yoga therapy, and exercise facilities within the organisation can help nurses overcome personal burn-out contributors. For instance, a recent study showed that mindfulness-based interventions, such as mindfulness lectures, practising meditation and yoga, reduced emotional exhaustion in ICU nurses and personal contributors of burn-out.[41] No intervention was proposed for patient-related contributors as most of its subthemes involved patient outcomes rather than easily modifiable patient behaviours. Research corroborates that individual stress mitigation efforts, healthy use of social media and transparency within the organisation are effective measures to overcome stress and burn-out during the pandemic.[42]

This study has several limitations that may affect the generalisability of the results. First, though the goal of MBI-MP and PCL-5 questionnaires were to investigate the prevalence of burn-out within our participants, the findings cannot be generalised to the entire unit due to the small sample size. Second and most importantly, the sample was limited to nurses from two COVID-19 ICUs in one large, well-equipped metropolitan hospital. While we reached saturation in our qualitative findings, larger and stratified samples across different units, health systems and locations may be needed to verify and expand the findings presented here. In particular, studies have found that nurses working in hospitals with larger numbers of patients are more prone to stress than smaller hospitals.[42] Therefore, the burn-out contributors may not be generalisable for smaller hospitals. Work is needed to investigate the contributors to burn-out in ICU nurses at hospitals in urban/well-served and rural/underserved settings as well as healthcare systems with different numbers of COVID-19 patients to gain insights on the different contexts of burn-out.

Given the possibility of similar or more severe pandemics in the future and the perennial issues of healthcare worker burn-out exacerbated by pandemics, mitigation of burn-out among front-line healthcare providers, specifically nurses, requires a proactive and systematic approach. To that end, by identifying the contributors to burn-out in ICU nurses and practical mitigation methods using a participatory approach, this study may inform the design and implementation of effective interventions to prevent or mitigate pandemic-related burn-out among ICU nurses.

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REFERENCES

1 Maslach C, Jackson SE. The measurement of experienced burnout. *J Organ Behav* 1981;2:99–113.
2 Bridgeman PJ, Bridgeman MB, Barone J. Burnout syndrome among healthcare professionals. *Am J Health Syst Pharm* 2018;75:147–52.
3 Peterson U, Demerouti E, Bergström G, *et al*. Burnout and physical and mental health among Swedish healthcare workers. *J Adv Nurs* 2008;62:84–95.
4 Garrett C. The effect of nurse staffing patterns on medical errors and nurse burnout. *Aorn J* 2008;87:1191–204.
5 Chen SM, McMurray A. "Burnout" in intensive care nurses. *J Nurs Res* 2001;9:152–64.
6 Masiero M, Cutica I, Russo S, *et al*. Psycho-Cognitive predictors of burnout in healthcare professionals working in emergency departments. *J Clin Nurs* 2018;27:2691–8.
7 Galanis P, Vraka I, Fragkou D, *et al*. Nurses' burnout and associated risk factors during the COVID-19 pandemic: a systematic review and meta-analysis. *J Adv Nurs* 2021;77:3286–302.
8 Murat M, Köse S, Savaşer S. Determination of stress, depression and burnout levels of front-line nurses during the COVID-19 pandemic. *Int J Ment Health Nurs* 2021;30:533–43.
9 Chen R, Sun C, Chen J-J, *et al*. A large-scale survey on trauma, burnout, and posttraumatic growth among nurses during the COVID-19 pandemic. *Int J Ment Health Nurs* 2021;30:102–16.
10 Gray K, Dorney P, Hoffman L, *et al*. Nurses' pandemic lives: a mixed-methods study of experiences during COVID-19. *Appl Nurs Res* 2021;60:151437.
11 Moll V, Meissen H, Pappas S, *et al*. The coronavirus disease 2019 pandemic impacts burnout syndrome differently among Multiprofessional critical care Clinicians-A longitudinal survey study. *Crit Care Med* 2022;50:440–8.
12 Althubaiti A. Information bias in health research: definition, pitfalls, and adjustment methods. *J Multidiscip Healthc* 2016;9:211–7.
13 Sasangohar F, Jones SL, Masud FN, *et al*. Provider burnout and fatigue during the COVID-19 pandemic: lessons learned from a high-volume intensive care unit. *Anesth Analg* 2020;131:106–11.
14 Guest G, Namey E, McKenna K. How many focus groups are enough? building an evidence base for Nonprobability sample sizes. *Field methods* 2017;29:3–22.
15 Schaufeli WB, Bakker AB, Hoogduin K, *et al*. On the clinical validity of the maslach burnout inventory and the burnout measure. *Psychol Health* 2001;16:565–82.
16 Blevins CA, Weathers FW, Davis MT, *et al*. The Posttraumatic Stress Disorder Checklist for *DSM-5* (PCL-5): Development and Initial Psychometric Evaluation. *J Trauma Stress* 2015;28:489–98.
17 Butera S, Brasseur N, Filion N, *et al*. Prevalence and associated factors of burnout risk among intensive care and emergency nurses before and during the coronavirus disease 2019 pandemic: a cross-sectional study in Belgium. *J Emerg Nurs* 2021;47:879–91.
18 Jalili M, Niroomand M, Hadavand F, *et al*. Burnout among healthcare professionals during COVID-19 pandemic: a cross-sectional study. *Int Arch Occup Environ Health* 2021;94:1345–52.
19 Kakemam E, Chegini Z, Rouhi A, *et al*. Burnout and its relationship to self-reported quality of patient care and adverse events during COVID-19: a cross-sectional online survey among nurses. *J Nurs Manag* 2021;29:1974–82.
20 Maslach C, Jackson SE, Leiter MP. *Evaluating stress: A book of resources*. In: *Maslach burnout inventory*. Third edition. US: Scarecrow Education: Lanham, MD, 1997: 191–218.
21 Geng S, Zhou Y, Zhang W, *et al*. The influence of risk perception for COVID-19 pandemic on posttraumatic stress disorder in healthcare workers: a survey from four designated hospitals. *Clin Psychol Psychother* 2021;28:1146–59.
22 Wild J, McKinnon A, Wilkins A, *et al*. Post-Traumatic stress disorder and major depression among frontline healthcare staff working during the COVID-19 pandemic. *Br J Clin Psychol* 2022;61:859–66.
23 Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol* 2006;3:77–101.
24 O'Brien BC, Harris IB, Beckman TJ, *et al*. Standards for reporting qualitative research: a synthesis of recommendations. *Acad Med* 2014;89:1245–51.
25 Kalliath T, Morris R. Job satisfaction among nurses: a predictor of burnout levels. *J Nurs Adm* 2002;32:648–54.
26 MÁ L-C, López-Carballeira A, Ferro-Soto C. Is public healthcare healthy? the role of emotional exhaustion. *Balt J Manag* 2021;16:386–406. doi:10.1108/BJM-04-2020-0136
27 Bolton LR, Harvey RD, Grawitch MJ, *et al*. Counterproductive work behaviours in response to emotional exhaustion: a moderated mediational approach. *Stress Health* 2012;28:222–33.
28 López-Cabarcos M Ángeles, López-Carballeira A, Ferro-Soto C. The role of emotional exhaustion among public healthcare professionals. *J Health Organ Manag* 2019;33:649–55.
29 Bellanti F, Lo Buglio A, Capuano E, *et al*. Factors related to nurses' burnout during the first wave of coronavirus Disease-19 in a university hospital in Italy. *Int J Environ Res Public Health* 2021;18:5051.
30 Snibbe JR, Radcliffe T, Weisberger C, *et al*. Burnout among primary care physicians and mental health professionals in a managed health care setting. *Psychol Rep* 1989;65:775–80.
31 West CP, Dyrbye LN, Sloan JA, *et al*. Single item measures of emotional exhaustion and depersonalization are useful for assessing burnout in medical professionals. *J Gen Intern Med* 2009;24:1318–21.
32 Aughterson H, McKinlay AR, Fancourt D, *et al*. Psychosocial impact on frontline health and social care professionals in the UK during the COVID-19 pandemic: a qualitative interview study. *BMJ Open* 2021;11:e047353.
33 Doran JM, O'Shea M, Harpaz-Rotem I. In their own words: veteran experiences with evidence-based treatments for PTSD in the Veterans health administration. *Psychiatr Q* 2021;92:961–80.
34 Restauri N, Sheridan AD. Burnout and posttraumatic stress disorder in the coronavirus disease 2019 (COVID-19) pandemic: intersection, impact, and interventions. *J Am Coll Radiol* 2020;17:921–6.
35 Greenglass ER, Burke RJ, Fiksenbaum L. Workload and burnout in nurses. *J Community Appl Soc Psychol* 2001;11:211–5.
36 Demir A, Ulusoy M, Ulusoy MF. Investigation of factors influencing burnout levels in the professional and private lives of nurses. *Int J Nurs Stud* 2003;40:807–27.
37 Hübner M, Zingg T, Martin D, *et al*. Surgery for non-Covid-19 patients during the pandemic. *PLoS One* 2020;15:e0241331.
38 Masroor S. Collateral damage of COVID-19 pandemic: delayed medical care. *J Card Surg* 2020;35:1345–7.
39 Nowrouzi B, Lightfoot N, Larivière M, *et al*. Occupational stress management and burnout interventions in nursing and their implications for healthy work environments: a literature review. *Workplace Health Saf* 2015;63:308–15.
40 Howell BAM. Battling burnout at the Frontlines of health care amid COVID-19. *AACN Adv Crit Care* 2021;32:195–203.
41 Xie C, Zeng Y, Lv Y, *et al*. Educational intervention versus mindfulness-based intervention for ICU nurses with occupational burnout: a parallel, controlled trial. *Complement Ther Med* 2020;52:102485.
42 Norful AA, Rosenfeld A, Schroeder K, *et al*. Primary drivers and psychological manifestations of stress in frontline healthcare workforce during the initial COVID-19 outbreak in the United States. *Gen Hosp Psychiatry* 2021;69:20–6.