



Maternal and neonatal health care worker well-being and patient safety climate amid the COVID-19 pandemic

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Abstract

Objective To assess maternal and neonatal healthcare workers (HCWs) perspectives on well-being and patient safety amid the COVID-19 pandemic.

Study design Anonymous survey of HCW well-being, burnout, and patient safety over the prior conducted in June 2020. Results were analyzed by job position and burnout status.

Result We analyzed 288 fully completed surveys. In total, 66% of respondents reported symptoms of burnout and 73% felt burnout among their co-workers had significantly increased. Workplace strategies to address HCW well-being were judged by 34% as sufficient. HCWs who were “burned out” reported significantly worse well-being and patient safety attributes. Compared to physicians, nurses reported higher rates of unprofessional behavior (37% vs. 14%, $p = 0.027$) and difficulty focusing on work (59% vs. 36%, $p = 0.013$).

Conclusion Three months into the COVID-19 pandemic, HCW well-being was substantially compromised, with negative ramifications for patient safety.

Introduction

Maternity providers attend approximately 3.8 million births annually, with over 10% of newborns requiring care in a neonatal intensive care unit (NICU) [1–3]. Care for birthing persons and their sick infants is highly rewarding but also physically and emotionally taxing, with a quarter to half of health care workers (HCWs) reporting severe burnout, poor

work-life integration, depression, or other manifestations of impaired well-being [4, 5]. Human factors in healthcare, such as HCW burnout, safety culture, and teamwork have been shown to associate strongly with quality of care delivery [6, 7]. External influences, such as the current COVID-19 pandemic, may influence care context with potentially negative consequences for provider well-being, safety and quality of care, and outcomes of birthing persons and critically ill infants.

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HCW burnout is a work-related, reversible syndrome primarily consisting of emotional exhaustion, decreased personal accomplishment, and/or depersonalization [8], inversely related to well-being and a culture of patient safety [5, 9]. Burnout has been linked to detrimental effects on HCWs, organizations, and patients. For example, burned out HCWs experience higher rates of depression, alcoholism, and suicidal ideation, as well as poorer relationships with family, co-workers and patients [10–14]. Organizations suffer from increased staff turnover, decreased productivity, increased lawsuits, and worse safety culture ratings [5, 9, 15, 16]. In turn, these factors associate with lower patient satisfaction, increased medical errors, and poor patient outcomes such as increased health-care associated infection rates and mortality [4, 6, 17–19]. Obstetrics and Neonatology are care settings that are particularly vulnerable to burnout [5, 20], in part due to the high-stakes, technical environment, and need to continuously deliver empathic care in a time-sensitive high-pressure environment [4, 21].

The COVID-19 pandemic may further exacerbate HCW burnout and impair well-being [22], given the threat of the pandemic to human life, including concern for infections in patients, loved ones, or oneself [23]; rapidly changing information requiring frequent adjustments to care delivery systems; lack of adequate care resources including personal protective equipment and limited testing capabilities; and changes to home life responsibilities such as child care, distance learning, and restricted social interactions. However, whether the pandemic affects HCW well-being, and in which direction, has been controversial. In a perspective, Hartzband and Groopman suggested that emotional exhaustion (the most salient component of burnout for HCW) may actually decrease during the pandemic due to increased autonomy and professional recognition, and thus, perhaps HCWs would find renewed meaning in their profession [24]. Other studies however, have found increased distress due to COVID, raising concern regarding increasing burnout [22, 23, 25–28]. Acquisition of empirical data on maternal and neonatal HCW perceptions of emotional exhaustion and patient safety culture is critical, because adverse findings would be concerning for HCW, as well as for patients. This would be significant because it would reveal an actionable pathway to reduce collateral damage from COVID-19. The objective of this study was to assess these domains during a relatively early stage of the pandemic.

Methods

Design and participants

Cross-sectional survey study of obstetric and neonatal HCWs. We invited a convenience sample of HCWs who

had registered for the California Maternal/Perinatal Quality Care Collaborative (CM/PQCC) “Mental Health Considerations during the COVID-19 Pandemic” webinar to complete an anonymous electronic survey via Stanford’s QualtricsSM platform. The webinar was one of a series on COVID-19 held 4/29/2020. There were 1725 registrants and 673 attended. Participation was targeted to California HCWs, but was also open to out-of-state participants. The 3–5 min HCW survey was administered between 5/26/20 and 6/8/20 to webinar registrants after receipt of IRB approval. Potential respondents received two reminder emails during that period. Participation and completion of individual items was voluntary, and responses were anonymous. At the time of the survey, California experienced a steady, moderate number of cases (~2500/day) and deaths (~60/day), predominantly in the southern regions of the state. Maternity units were more directly affected than NICUs, with higher case loads in hospitals serving vulnerable populations.

Measures

The survey consisted of 13 well-being and patient safety items, along with demographic information. All items asked participants to relate questions to their experience over the preceding month, and used a 5-point Likert scale ranging from disagree strongly to agree strongly. Eight items were novel and based on literature review of the suggested effect of COVID-19 on mental health and patient safety culture. These items were developed by JP, revised among the authors, pilot tested among five colleagues, which included content and methods experts in relevant clinical and wellness areas, and further revised for content and clarity as needed. They covered domains of patient safety, teamwork, work-life integration, and well-being in the context of COVID-19. Respondents were asked to consider the following items during the month prior to the survey: “It has been difficult to fulfill home and work responsibilities”; “Unprofessional behavior in my work setting has affected my well-being”; “Support from colleagues has lifted me up”; “I have been hopeful about the future”; “Existing strategies to improve staff well-being in my work setting were sufficient”; “Burnout among my co-workers has significantly increased”; “My co-workers have had difficulty focusing on their work”; and “Medical errors have increased in my work setting”. Items include a mix of assessments of respondents and their colleagues to reduce participant’s social desirability bias in questions about patient safety.

We evaluated burnout with a widely used [9, 19, 29–32] 5-item emotional exhaustion scale shown to have excellent psychometric properties [19, 29, 32–34], external validity [9, 31, 33], and responsiveness to interventions [19, 32, 34]. To limit response burden, particularly during the pandemic,

we elected to forgo assessment, of depersonalization and personal accomplishment to reduce survey burden. According to a psychometric meta-analysis, of the three sub-scales of burnout (emotional exhaustion, depersonalization, and personal accomplishment), emotional exhaustion consistently produces the largest and most consistent coefficient alpha estimates [35]. Self-reported demographics included respondent role, years in current position, job area, ACOG [36] and AAP level of care [37], location (state/country), and sex. For job position analyses, we pooled respondents into “physician” (physician, NP/PA), “nurse” (nurse, CNS/educator, CNM, nurse manager), and “other” (hospital manager/administrator, social worker, behavioral health, academia, quality staff/provider, and other) groups due to the small number of respondents from some of the categories [5, 38].

Analysis

Respondents from outside the United States were excluded from analyses. Frequencies and proportions were used to describe survey responses and respondent demographics. For ease of interpretability, we defined a “percent concerning” measure to indicate the proportion of respondents reporting undesirable results. Questions are transformed from the 5-point Likert scale to a 100-point scale. We used the established threshold of 50 or higher, averaged across scale items [9, 19, 29, 33, 39], to reflect “not disagreeing,” with emotional exhaustion items. For each of the novel items we calculated percent agreement by combining agree slightly with agree strongly as a fraction of all respondents. We stratified analyses by maternal vs. neonatal HCWs, as well as by neonatal or maternal level of care. We used chi square tests and ANOVA to evaluate response differences across subgroups. All statistical analyses were performed using SAS version 9.4. For perspective, we compared emotional exhaustion in this neonatal and maternal HCW sample with prior samples of 2073 HCWs in 44 California NICUs in 2011 [5] and 10,627 HCWs from 829 work settings in 31 hospitals in Michigan in 2016 [33]. This study was approved by the Stanford University Institutional Review Board (#56642).

Results

After excluding non-United States HCWs, our sample included 1725 eligible HCWs who registered for the webinar, of which 673 participated in the webinar. Of these, 288 fully completed the survey sent to them 1 month after the webinar (reflecting up to 17% of registrants or 43% of webinar attendees). A majority of the respondents were nurses and female, with nearly half reporting more than 5 years of work

experience in their current position. Maternity care respondents mostly worked in ACOG level II and III (highest level of care) facilities whereas most neonatal respondents worked in AAP level III, with about 1/8 distributed to each of the other levels of care. About one third of respondents were from California (Table 1).

Figure 1 shows item level responses. Dichotomized responses (agree slightly and agree strongly) reveal that 12% reported increased medical errors, 33% reported more unprofessional behavior, 58% reported co-workers having difficulty focusing on work, and 59% reported difficulty meeting home and work responsibilities. Only 34% of respondent reported sufficient institutional strategies to meet these well-being challenges. Notably, 70% of respondents were hopeful about the future and 83% felt lifted up by their colleagues, and simultaneously 73% perceived an increase in burnout among their co-workers. In total, 66% of respondents reported symptoms consistent with emotional exhaustion.

Compared to physicians, nurses reported higher percentages concerning for unprofessional behavior (37% vs. 15%, $p = 0.036$) and difficulty focusing on work (60% vs. 38%, $p = 0.024$). A perceived increase in medical errors was reported by 14% of nurses, compared to 6% of physicians ($p = 0.337$). Figure 2 shows consistently worse ratings across all items among respondents with burnout (emotional exhaustion) compared to those without burnout. Responses were similar across specialties and levels of care, the only significant difference being less sufficient available institutional resources for well-being among higher ACOG defined levels of maternity care (L I 51%, L II 38%, L III 30%, $p = 0.039$).

Figure 3 shows the current survey results in context to prior assessments of burnout among 2073 HCWs from California in 2011 and 10,627 HCWs from Michigan in 2016. The current observed prevalence of burnout of 66% is consistent with work settings in the highest quintile from prior assessments.

Discussion

This survey provides a summary of HCW well-being and care culture among a sample of neonatal and maternity care providers during the COVID-19 pandemic. In our sample, 73% of respondents reported increased coworker burnout and 66% reported personal symptoms of emotional exhaustion in the month prior to the survey, which correlated with the early phase of the COVID-19 pandemic response in the United States. Most respondents also expressed difficulty balancing home and work responsibilities, and nearly half felt that existing institutional strategies were unable to cushion these effects. As a group,

Table 1 Demographics characteristics of the study population.

	N	%
Total	288	100.0
<i>Gender</i>		
Male	10	3.5
Female	277	96.2
Prefer not to answer	1	0.3
<i>Role of work^a</i>		
MD	34	11.8
RN	169	58.7
Other	85	29.5
<i>Years working in the current position</i>		
Less than 1 year	32	11.1
1–5 years	112	38.9
6–10 years	36	12.5
Greater than 10 years	106	36.8
<i>Specialty (select all apply)^b</i>		
OB	209	72.6
Neo	134	46.5
Other	93	32.3
<i>ACOG level of maternal care^c</i>		
Level I	35	12.2
Level II	105	36.5
Level III	91	31.6
N/A	45	15.6
Do not know	9	3.1
<i>AAP level of neonatal care^d</i>		
Level I	41	14.2
Level II	46	16.0
Level III	103	35.8
Level IV	41	14.2
N/A	51	17.7
Do not know	4	1.4
<i>Current residential state</i>		
California	104	36.1
Non-California ^e	184	63.9

^aMD includes: physician, NP/PA; RN includes: nurse, CNS/Educator, CNM, nurse manager; Other includes: Hospital manager/Administrator, social worker, behavioral health, Academia, Quality staff/Provider, and other.

^bOB includes: labor and delivery, antepartum, postpartum; Neo includes: newborn nurse, NICU; other includes Emergency Department, Medical/Surgical, operating room, ambulatory care, Patient/Family support services, and other.

^cLevel I: basic care of low-risk to moderate-risk pregnancies; Level II: specialty care of low-risk, moderate-risk, and high-risk pregnancies; Level III: subspecialty care for more complex conditions and complications.

^dLevel I: Well newborn nursery; Level II: special care nursery; Level III: neonatal intensive-care unit (NICU); Level IV: regional neonatal intensive-care unit (regional NICU).

^eNon-California includes Washington, DC and 40 states in the United States. States without respondents included are Alaska, Delaware, Hawaii, Maine, North Dakota, South Carolina, South Dakota, Vermont, and Wyoming.

Data may not add to 100% due to low percentage of missing across response categories (all <1.1%).

respondents that experienced burnout rated all other well-being and safety items significantly worse.

For purposes of context and anchoring, we relayed current results within prior samples of neonatal and other hospital-level health care workers. Although these comparisons should be treated with caution, given the different populations and sampling methods, it is notable that burnout prevalence was higher than in any of 44 NICUs surveyed in 2011, and in the highest quintile for 829 work settings in 31 Michigan hospitals in 2016 [33]. The timing of this survey during the third month of the US response to the COVID-19 pandemic suggests that pandemic-related disruptions to work life and personal life were likely key contributors to the increased burnout prevalence. However, it may still be too early to fully understand the effect of COVID-19 on burnout, because we saw higher depression rates at 1-year follow-up of HCWs with high-risk exposure during the SARS outbreak [40].

Several mechanisms may explain an increase in burnout described in our study, viewed in light of the job demands-resources model of burnout [41, 42]. Although maternity and neonatal providers are less likely to directly care for COVID-19 patients relative to other specialties, job demands may nevertheless be increased. Demands may be increased due to frequently changing infection control processes, social distancing protocols at work, and additional testing and isolation of providers and patients [43]. Job resources may also be reduced, with support personnel delegated to additional roles or moved remotely, and staffing shortages secondary to infection exposures or budget shortfalls. Maternity care providers have been more exposed to SARS-CoV-2 positive patients (~10% of pregnant women), as positivity has been rare in newborns [44]. Yet, direct exposure to a contagious patient is relatively uncommon compared to emergency room or adult intensive care units. Nevertheless, we find high levels of disruption to HCW well-being. Direct exposure risk may thus not correlate well with HCW well-being. It is possible that stressors other than direct exposures can exert a similar emotional toll. For example, maternal and neonatal HCWs may experience substantial distress when separating mothers and families from their newborn [45]. Such distress is warranted. Fears of separation from the newborn and support persons during the pandemic appears to be fueling a rise in home and birth center births [46].

At the personal level, self-isolation, disrupted societal resources, limited childcare, and family concerns may all contribute to depleted physical and emotional resources, resulting in emotional exhaustion. Although an initial outpouring of support for HCWs during the acute phase of the pandemic response may have counteracted many of these

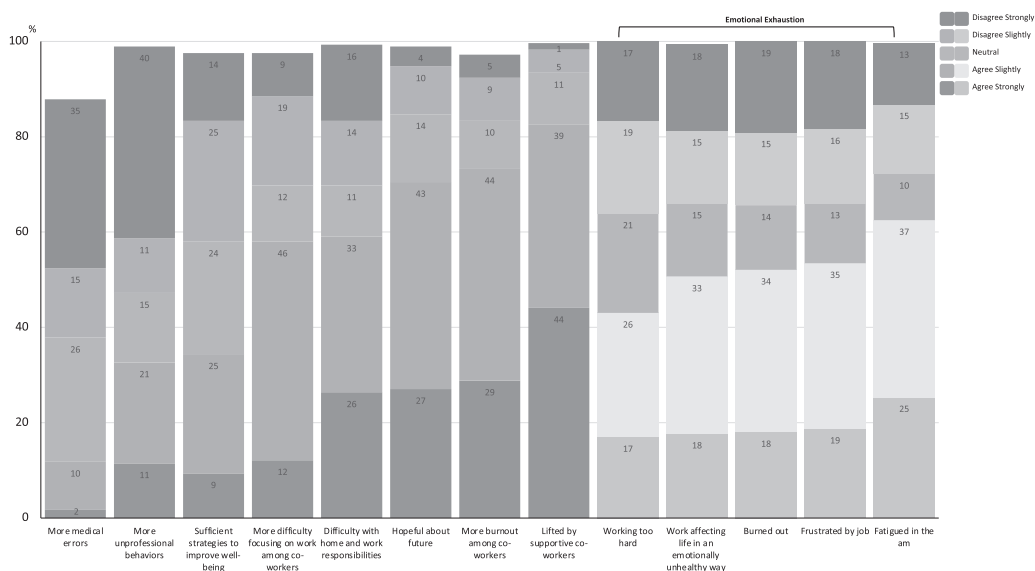


Fig. 1 Item level and scale level survey responses. Eight novel items to the left, five emotional exhaustion scale items to the right. Data were sorted by increasing % agreement (including Agree Strongly and Agree Slightly).

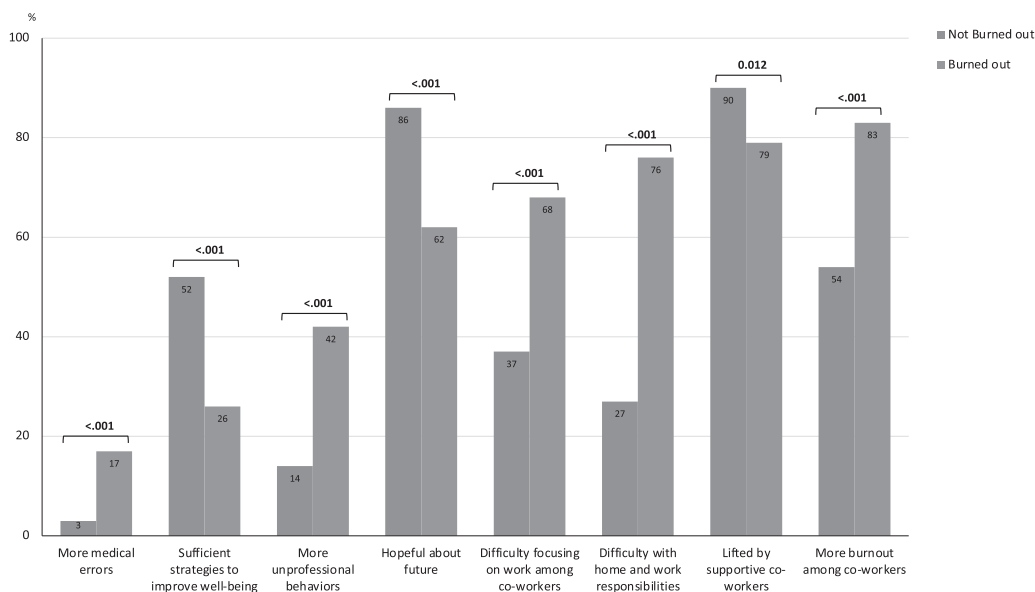


Fig. 2 Survey results stratified by respondent burnout status. Data were sorted by increasing % agreement among respondents with burnout (including Agree Strongly, Agree Slightly).

challenges, and even contributed to improved professional satisfaction and meaning in work [24], our findings suggest that any such effects may have been transient.

Relative to other published studies, the 66% reporting emotional exhaustion here is quite high. Prior research has shown that care quality and quality improvement efforts suffer as emotional exhaustion rates start to exceed 40% [5, 34]. Our results suggest that the emotional upheaval of the global health crisis may have impacted healthcare worker well-being sufficiently to impact patient safety. The precise impact of the pandemic on these relations is not

known, and to date, no studies of healthcare workers have addressed this question directly. Nevertheless, unpacking the impact of COVID-19 on HCW well-being, care quality, and quality improvement efforts will take several years and extensive efforts to address.

Only a third of respondents felt that existing strategies to improve staff well-being in the workplace were sufficient, indicating a dire need for effective strategies to address burnout during such times of upheaval. Yet, promoting HCW well-being should be of utmost priority to institutions as burnout is directly correlated with malpractice lawsuits,

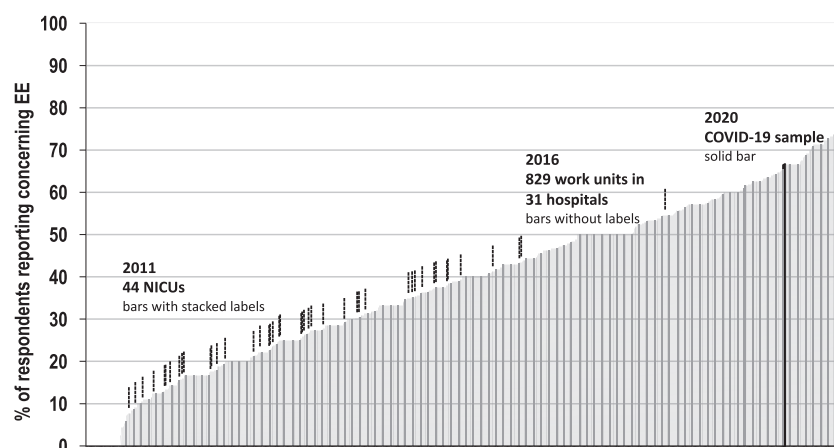


Fig. 3 Comparison of burnout (emotional exhaustion) in current sample with prior NICU and adult samples. Each bar shows % respondents reporting moderate to severe burnout in either the current sample, a NICU, or a hospital work setting. COVID-19 June, 2020 sample (solid bar; mean % reporting emotional exhaustion was 66%). Sample from 44 California NICUs in 2011 (stacked bar labeled;

mean % reporting emotional exhaustion was 26%) used a 4-item scale to which we subsequently added an additional item for improved construct validity. Unit level correlation between scales exceeds 0.98. Sample from 829 work settings in 31 hospitals in Michigan in 2016 (no label; mean % reporting emotional exhaustion was 40%) responded to the 5-item scale.

costly staff turnover, productivity, relationships among staff, patients safety, clinical outcomes, and patient satisfaction [5, 19, 28, 47–52]. Among our sample, maternity providers in centers with higher ACOG levels of maternity care felt that strategies to combat burnout were less sufficient. This suggests that institutions with higher levels of care may require relatively more aggressive strategies to support HCW well-being [22]. Indeed, over the past years, academic healthcare organizations have led the industry and established wellness offices tasked with identifying and employing effective strategies to combat burnout and improve HCW well-being [53]. However, our survey suggests that these efforts still have challenges in meeting frontline provider need. Current offerings may either fail to reach frontline providers or have not yet penetrated work culture in a way sufficient to alleviate chronic stress and suffering. Approaches to promote HCW well-being and address burnout are still evolving. Both structural and individual-focused interventions have been effective in combating burnout among HCWs [54]. Structural interventions in theory may carry benefits of better penetrance to the HCWs within a system and of longer-lasting effects. Conversely, individual-focused interventions may carry the benefits of rapid deployment and adoption with minimal resource expenditure, and many are conducive to remote engagement using smartphones or other technology—features that may be particularly beneficial during the highly dynamic and taxing environment of a pandemic response. We have found that simple, bite-sized strategies are favorably received by HCWs, and have developed a family of these interventions for healthcare workers (www.hsqu.dukehealth.org/tools) [32].

While many respondents noted a sense of support from their colleagues and expressed hope about the future, we found concerning negative consequences for patient safety culture, with respondents reporting difficulty focusing on work, unprofessional behavior, and a small (12%) perceived rise in medical errors. Obstetric and NICU care requires great attention to detail. Nurses execute more than 100 discrete work processes per shift and inattention can lead to imperfections with potentially severe adverse consequences [55]. Increases in shift length during the pandemic may further exacerbate errors [56]. Furthermore, a rise in errors (real or perceived) could be associated with the increase in burnout due to added stress from COVID-19, as higher burnout rates are well known to be correlated with an increase in medical errors [5, 18, 47, 57]. However, this is speculative and beyond the direct findings of this survey. In addition, the directionality of the relationship between burnout and errors in this survey is unknown, although there is good reason to expect bidirectionality [58, 59].

Of note, nurses were more likely than physicians to agree that their well-being was impacted by unprofessional behavior in the work setting, and that co-workers had difficulty focusing on their work. This is consistent with previous literature about differing perceptions of teamwork, in which nurses reported more impact and concern with unprofessional behavior than their physician counterparts [60]. Nearly 60% of respondents reported difficulty fulfilling both home and work responsibilities. Although one might expect this to be higher given the concurrent closure of schools/daycares, demographic data did not include information on spouses/partners or dependents at home.

This study should be interpreted in light of its design. Our analyses describe associations, not causal relationships and should be interpreted accordingly. We didn't correct for multiple testing. Thus, results should be viewed as hypothesis generating, subject to Type 1 error. Survey respondents consisted of a self-selected sample of HCWs available to complete a survey a month following a webinar they may or may not have attended. It is also possible that HCWs directly experiencing an increase in high acuity COVID-19 patients, or other extreme time demands were not included. We would expect such an omission to bias results toward the null, meaning the prevalence of HCW burnout observed in our study may be an underestimate. Conversely, it is possible that non-respondents don't perceive the current pandemic to influence either HCW well-being or patient safety, biasing our results toward a more extreme finding. While the direction of non-response bias is unknown, our study's response rate compares favorably with other published literature [61]. For confidentiality and brevity, respondents were not asked to identify their specific healthcare organizations or describe their personal resources and needs, preventing comparisons among healthcare settings and family situations. For parsimony, we used emotional exhaustion as a surrogate for burnout, but we may have not fully captured other manifestations of burnout such as depersonalization or reduced personal accomplishment. The novel items by definition have no baseline comparisons. Although we asked respondents to assess these in comparison to the prior month, attribution of changes to the pandemic requires caution. We also lacked information on regional differences or whether respondents were working in their usual work settings. Finally, although this study represents a snapshot of well-being and patient safety perceptions of maternal and neonatal HCWs, generalizability is strengthened by the variety of care settings and respondents from 40 states and the District of Columbia, which together account for more than 96% of the population.

In conclusion, HCW well being appears to have deteriorated during the pandemic with 73% of respondents endorsed an increase in co-worker burnout and 66% personal emotional exhaustion. Moreover, only a third reported sufficient institutional strategies to meet these well-being challenges. Those who reported symptoms of burnout were particularly likely to also endorse negative work setting impact. With the COVID-19 pandemic ongoing, burnout and its ramifications for clinical care will likely increase unless addressed. Interestingly, despite the high burnout rates, the majority of respondents were hopeful (70%). This could be due to the fact that COVID-19 may bring meaning to the work, and thus it may play a role in decreasing emotional exhaustion in the short term [22, 24], but longer term effects are still unknown. Thus, action should be taken

now as burnout and its downstream effects are likely to continue to increase if not addressed.

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Author contributions Dr. Profit conceptualized the study and reviewed and revised the initial manuscript; Dr. Haidari drafted the initial manuscript; Dr. Cui conducted data analysis; and all authors provided interpretation of data, reviewed and revised the manuscript critically for important intellectual content, and approved the final manuscript as submitted.

Compliance with ethical standards

Conflict of interest The authors declare no competing interests.

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