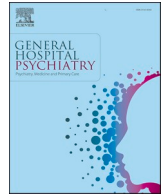




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Editorial

A research blueprint for keeping our healthcare workers healthy in the age of pandemics and the crises to come



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1. Introduction

The scale of the COVID-19 crisis has shaken the most battle-hardened of frontline providers. Providers have encountered alarming increases in patient volume and acuity, while experiencing unprecedented physical and psychological hardship, in addition to ongoing fears of exposure and threats to personal safety [1]. Healthcare workers (HCWs) in prehospital and emergency department (ED) settings across the globe, have been particularly vulnerable to the harmful mental health impacts of COVID-19, with PTSD, anxiety, and depression symptoms already widely reported among these frontline HCWs [2,3].

Research on the psychological and physiological toll of clinical work in routine conditions has accumulated over the past decade. The empirical evidence represents a warning: the state of clinician well-being was tenuous long before clinicians were asked to risk their lives holding society together as a global pandemic threatened to rip it asunder. Clinician burnout was already endemic, with nearly half of the approximately 900,000 practicing physicians in the US reporting symptoms of burnout, and some specialties (e.g. Emergency Medicine) reporting rates of burnout above 65% [4]. These existing mental health challenges among HCWs have only been amplified during this pandemic. Understanding and crafting a program of research around the study of occupational stressors in the healthcare environment is vital, as it would not only optimize the long-term well-being and functioning of providers, but also impact patient care. Previous work has found an association with clinician burnout and poorer medical care [5], including treatment errors and reduced patient satisfaction [6].

While a large body of work exists around clinician psychological well-being and occupational stressors, past efforts have yet to integrate the heterogeneous body of work and provide a broad model integrating the disparate evidence, especially as it pertains to the links between psychological and physical health. We propose a novel framework to guide current and future research around the topic of HCW well-being based on addressing individual provider risk, in addition to system level and cumulative occupational stressors, and finally to explore how

psychological distress in HCWs can contribute to cardiovascular disease (CVD) risk.

2. Healthcare may be hazardous to your health

A substantial literature in occupational health sciences has described the association between workplace environmental stressors commonly experienced by clinicians, such as shiftwork and sleep dysregulation, and the development of long-term metabolic and cardiovascular disease [7]. Many hospital services are staffed by shift workers—rotating between day, evening, and overnight shifts. Disturbances to sleep and circadian rhythms may contribute to shift workers' increased rates of adverse physical and mental health consequences compared to non-shift workers, including CVD, metabolic dysfunction, obesity, and mood disorders [8].

In addition to these occupational risk factors, exposure to the acute care environment itself may portend significant psychological and physical risk. Recent research suggests that acute care environmental factors influence patients' secondary psychological and CVD risk. For example, ED patients evaluated for life-threatening illnesses such as acute coronary syndrome (ACS) or stroke are often exposed to crowded and, at times, chaotic EDs for prolonged periods of time. Nearly 1 in 8 of ED patients surviving ACS events go on to develop PTSD symptoms, and ED overcrowding during patient evaluation is linearly associated with subsequent PTSD risk [9]. Disturbingly, clinicians are exposed to the same acute care stressors that increase psychological and CVD risk in patients, except providers experience the hospital environment for prolonged periods, working on rotating clinical shifts with irregular sleep schedules—often for decades. While patient distress is likely compounded by the acute life threatening cardiac event for which they are being treated, the alarming data on elevated infection risk by frontline providers during COVID-19 [10] has reminded us that HCWs also face health risk in the hospital environment. These hospital work exposures may result in sustained psychological stress and concomitant physiological strain, leading to a toxic cocktail for clinician career

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longevity, well-being, and perhaps chronic disease.

3. Setting a research agenda toward supporting healthcare workers

In the aftermath of the worldwide COVID-19 pandemic, how can we increase our understanding and study of emergency response systems to both support the health and wellness of frontline HCWs and optimize their ability to respond effectively to future crises? Investigations should be tailored to the individual provider, while also recognizing the broader environmental and system level factors potentially impacting provider health. For example, at the most basic level, HCWs are individuals consumed by concerns for the safety and physical well-being of themselves, their families, and patients, as they struggle with potential lack of personal protective equipment and gaps in scientific knowledge about virus transmission and treatments during the COVID-19 pandemic [3]. Investigations into associations between provider anxiety and the clinical environment spans factors at the individual level (e.g. potential differences in personality/pre-existing mental health) to environmental level variables (e.g. ED crowding, patient load, and personal protective equipment availability). Understanding the complex relationships between these individual and environmental/system level factors would help investigators gain unique insight into the differential contribution of these variables to clinical health and the development of targeted interventions.

Policy and work environment factors (e.g., HCW-centric staffing, social and emotional supports, reduced ED overcrowding) should also be prioritized. Clinician stress levels are associated with suboptimal organizational outcomes, e.g., poor quality of care, patient safety, and decreased patient satisfaction [11]. Research identifying the most important stressors for HCWs would benefit from qualitative methods, discussing with providers themselves, their subjective experiences and vulnerabilities. Complementing this research, assessments of psychophysiological stress measures in HCWs alongside standard psychosocial questionnaire research could identify high value intervention targets. Further, conducting comparative effectiveness research can provide an evidence base to inform improvements to policy organizational infrastructure (e.g., staffing ratios, team compositions, and workflow).

Understanding and addressing the long-term psychosocial and physical health implications of HCWs stress will be a longer-term priority. Current evidence about the physical implications of stress, including CVD risk, due to work environment factors remains scarce. In building on the science of HCW well-being, it will be vital to gain insight into the potential associations between occupational stressors and their impact on the physiological and psychological health of providers. Work should focus on elucidating these relationships on short-term provider health outcomes, in addition to observing any possible cumulative load effects of sustained exposure to these occupational stressors. For example, our group recently launched an NIH-funded longitudinal cohort study (R01HL146911) in ED nurses and physicians. In the Identification of Modifiable PROgnosticators for Burnout and Cardiovascular risk in Emergency Medicine (IMPROVE) Study, we are prospectively following frontline clinicians for 3 years, to test the influence of ED factors (clinician shift schedule/cycle, department overcrowding, surge periods, patient acuity) and sleep/circadian disturbance on the development of burnout and cardiovascular functioning (e.g. resting and ambulatory blood pressure). This work will be among the first to evaluate the relationship between ED stressors, disturbed sleep, and long-term clinician CVD and psychological risk. We hope others will prioritize, field-based studies using objective monitoring techniques, conducted with the aim of quantifying the progression of cardiovascular and mental health risk and identifying potential targets for randomized trials to reduce risk for burnout, direct or vicarious traumatization, and the myriad behavioral and physiological consequences that attend them.

4. Going forward: Informing the science of healthcare worker well-being in the wake of COVID-19

The ongoing COVID-19 pandemic has presented new challenges that are unprecedented in modern medicine, magnifying risk among not only acute care providers but for clinicians across every specialty. The lessons we have learned about how psycho-physiologic and environmental stressors can impact mental and physical health in acute care providers are now directly relevant to nearly all clinicians. As we emerge from this pandemic, it will be imperative for investigators to continue working to enhance our understanding of the occupational risk factors that undermine HCW worker well-being, and developing an empirically grounded support structure to buttress a stable and secure healthcare workforce. By doing so, we will lay the foundation for a robust emergency response and ensure the safety and health of HCWs for this and future crises on the horizon.

Presentations

None.

Conflicts of interest

None of the authors (BC, DE, AS) have any conflicts of interests related to this GHP submission.

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Data availability

No data was used for the research described in the article.

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