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Provider Burnout and Fatigue During the COVID-19 Pandemic: Lessons Learned From a High-Volume Intensive Care Unit

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GLOSSARY

CDC = Centers for Disease Control and Prevention; **COVID-19** = Coronavirus Disease 2019; **ECMO** = extracorporeal membrane oxygenation; **FAST** = Functional Analysis Systems Technique; **FEMA** = Federal Emergency Management Agency; **H1N1** = novel influenza A (H1N1pdm09) virus 2009; **HMH** = Houston Methodist Hospital; **HR** = human resources; **ICU** = intensive care unit; **IRB** = institutional review board; **MERS** = Middle East Respiratory Syndrome; **mHealth** = mobile health; **PPE** = personal protective equipment; **SARS** = severe acute respiratory syndrome; **SARS-CoV-2** = severe acute respiratory syndrome coronavirus 2; **SNS** = Strategic National Stockpile

The novel Coronavirus Disease 2019 (COVID-19) pandemic has resulted in an overall surge in new cases of depression and anxiety and an exacerbation of existing mental health issues, with a particular emotional and physical toll on health care workers.¹ Limited resources, longer shifts, disruptions to sleep and to work-life balance, and occupational hazards associated with exposure to COVID-19 have contributed to physical and mental fatigue, stress and anxiety, and burnout.² Similar to most hospitals in the COVID-19-affected areas, the Houston Methodist Hospital (HMH) system has experienced an overwhelming impact of this pandemic on personnel. For example, we have observed an unprecedented number of staff requesting Americans with Disabilities Act exemptions. Physicians and nurses are worried about their families, and some hesitate to go home in fear of exposing family members to infection. It is common to see emotional exhaustion in the intensive care unit

(ICU). We have observed front-line health care providers emotionally breaking down, mainly due to the added pressure to choose between family responsibilities and their inner sense of duty toward patients. At the same time, we have seen an overwhelming influx of support from medical leadership, public and private acknowledgments, community support (eg, food sent to care units), as well as additional services offered to staff, such as music therapy, counseling services, chaplain services, and accommodations in work schedules. Other organizational adaptations include allocation of more resources (eg, float nurses, physicians, patient care assistants, and new equipment). Moving forward, our institution has plans for marshaling resources from surgeons, anesthesiologists, other medical specialists across all disciplines, and, in extreme circumstances, anyone with medical training and background.

In this article, we share the lessons learned collectively by an interdisciplinary team of ICU leadership and collaborating scientists at the Center for Outcomes Research at HMH about the experience of occupational fatigue and burnout of intensive care personnel as a result of responding to the COVID-19 pandemic. We propose specific policy recommendations and guidelines for organizational readiness, resilience, and disaster mitigation.

BACKGROUND

Houston Methodist Hospital

HMH is the flagship hospital of an 8-hospital non-profit health care system spanning the Greater Houston metropolitan area, including a wide range

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of urban, suburban, and rural settings. For more than 100 years, HMH has served the Houston and global community with the highest quality patient care in a spiritual environment—indeed ironically, beginning its existence amidst the 1918 influenza pandemic.

HMH has 952 operating beds (2393 systemwide) and 8294 employees (25,543 systemwide). Each year, it has 45,511 emergency room visits, 381,585 outpatient visits, and 41,976 admissions (more than 1.3 million outpatient visits and more than 126,000 admissions systemwide).³ *US News & World Report* has named HMH the no. 1 hospital in Texas for 8 consecutive years, with placement among its top 20 “Best Hospitals Honor Roll” 3 times. In addition, HMH is nationally ranked in 9 specialties,⁴ and has been named the no. 1 employer in Texas by *Forbes*.⁵ Of particular note regarding its critical care capacities during this pandemic, HMH has 5 ICU units (cardiovascular, medical, coronary, surgical, and neonatal—with a total of 130 ICU beds), with 311 ICU beds systemwide across the community hospitals. At the time of this writing, HMH is caring for about 120 patients who have tested positive for COVID-19.

COVID-19 Pandemic

The novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is in the same family as the causative agent for previous Middle East Respiratory Syndrome (MERS) and severe acute respiratory syndrome (SARS) outbreaks. COVID-19 arose most likely from animal-to-human transfer in Wuhan, China. Unlike previous coronavirus outbreaks, the current COVID-19 emergence was marked by high rates of person-to-person transmission, including from asymptomatic carriers, combined with high severity of illness in vulnerable populations, including those with very common preexisting chronic conditions like diabetes, heart disease, and lung disease.⁶

The dilemma posed to health care workers is 2-fold: first, the anticipated, and now experienced, overload on the health care system capacity to respond to this pandemic with a suitable flow of equipment; and second, the high risk posed to health care workers on the front lines and their family members as a result of constant exposure. The public has been repeatedly called on to “flatten the curve,” in reference to the social and behavioral changes that we as a society can undertake to slow the spread of disease. This strategy has been prominent in US Centers for Disease Control and Prevention (CDC) reports since 2007, with maintenance of the guidelines as recent as 2017.^{7,8} This strategy was even deftly memed by medical experts on social media.⁹ However, across several states, implementation of these preventive measures has fallen short of desired goals.^{1,2,10–14}

LESSONS LEARNED

Several factors may have exacerbated occupational fatigue and burnout in ICUs. Given our overarching roles across various facets of the health care system and our first-hand experiences with the response, the “lessons learned” documented here provide a holistic overview of major system-level problems exposed by the pandemic. In what follows, 4 major contributors to COVID-19–related occupational fatigue and burnout are discussed: (1) occupational hazards; (2) national versus locally scaled response; (3) process inefficiencies; and (4) financial instability.

Occupational Hazards

Given the highly contagious nature of SARS-CoV-2, the US CDC has published strict infection control and prevention guidelines for front-line health care workers, including limited administrative access, strict workplace hygiene requirements, and usage of personal protective equipment (PPE).¹⁵ The rapid spread of the COVID-19 pandemic revealed an overall lack of preparedness and insufficient training as well as limited supplies of PPE for ICU staff, including anesthesiologists, intensivists, pulmonologists, nurses, respiratory therapists, and other front-line providers in most affected areas.

From the onset of the COVID-19 outbreak, it was apparent that testing for the virus, detecting its distribution through widespread surveillance, and subsequent contact tracing were major public health gaps. Most hospitals, including HMH, lacked the capacity to test significant portions of our patient population for novel infectious threats. This removed a highly effective infection control tool from our arsenal. Unfortunately, such unpreparedness, potentially resulting in poor patient outcomes, had a significant psychological burden on personnel.

National Versus Locally Scaled Response

The COVID-19 outbreak also exposed the inadequacy of the US Strategic National Stockpile (SNS) of PPE and ventilators during a pandemic affecting many states. In fact, to our knowledge, only 10%–25% of states’ requested PPE is being delivered, about 1 month into the pandemic. In addition, there are many uncertainties about when and how more PPE—and most important, ventilators—will become available.

The process to access the US SNS should be as lean as possible, but it has proven slow and logistically cumbersome. While federal authorities are assembling practical guidelines to extend the life and use of PPE, such plans may void the warranty on PPE.¹⁶ Critical care personnel are well aware that the effectiveness of PPE deteriorates outside of recommended usage, and such awareness only worsens the psychological pressure on these personnel.

Process Inefficiencies

The COVID-19 pandemic has revealed several issues related to current processes and established practices. Most importantly, the lack of established policies for pandemic triage, equipment ordering, and emergency management has led to systemwide inefficiencies and has increased the burden on health care workers.

While new protocols were put in place in response to the pandemic, these protocols were perceived as complex and, in some cases, premature. For example, anecdotal evidence suggests that most health care workers' vulnerabilities and contamination were related to improper PPE doffing. While training videos on donning and doffing were shared with staff, such videos were not updated to reflect specific PPE used in our system, and instructions were not intuitive for less experienced personnel.

Another important issue was related to policy overload coupled with mismatching policy from different levels or sources. For example, each subspecialty (eg, anesthesiology, critical care medicine, respiratory therapy, nursing, and others) follow guidelines provided by their respective professional societies for various procedures, in addition to new policies developed by the hospital. However, holistic efforts to align such guidelines were largely absent at the system level, resulting in teamwork issues, confusion, and frustration. At HMH, our physician executive and chief medical officer have addressed this issue via regular and timely update communications.

Financial Instability

At the time of this writing, COVID-19 has pushed the global economy to the brink of or already into a major recession. Modifications of population dispersion (social distancing) and quarantine protocols, and a complete halt to large portions of the US economy, have resulted in unprecedented overall societal stress and anxiety. Unfortunately, a disproportionate share of the sacrifice is borne by the portions of our population who are at greatest socioeconomic risk.

While business is booming in health care, all indicators point to a likely sustained overall economic downturn. This undoubtedly contributes to health care workers' stress and anxiety. In addition, anecdotal and news report evidence suggests that some private anesthesia groups in the country have experienced financial distress, resulting in furloughs and layoffs because they depend heavily on providing services for routine, elective surgeries, which have been canceled or delayed in a number of states.¹⁷ It is well documented that such uncertainty about future occupational stability (job security) is associated with a deterioration in mental well-being.¹⁸

ORGANIZATIONAL ADAPTATION AND OPPORTUNITIES

Several traits of resilient performance and improvisation have been observed at HMH. The incident command team was rapidly assembled; leadership-employee communication was constant and responsive; and human resources (HR) adapted policies to employee needs. To long-standing employees, these adaptations were not surprising, because our leadership and teams have literally weathered storms before, including in recent history, Hurricane Ike and Hurricane Harvey. Hurricanes are not pandemics, but their local effects are similar in terms of financial and emotional strains on employees, as well as sudden geographical isolation of both employees and patients.

In particular, the seamless way in which HMH executive leadership and HR adapted policies—including alternate paid time off options, advanced check dispersal with waived fees, telecommute policies, and waived copays for mental health services—was consistent with how the health system has previously assessed emerging disaster situations and responded with astute budget analyses to bolster employee bank accounts without breaking the hospital budget. Likewise, procedures for maintaining sensitive research areas such as our animal laboratories, clinical trials, and expedited institutional review board (IRB) approval mechanisms for disaster-critical research, much of which is now being implemented nationwide, are reminiscent of ride-out and recovery procedures already commonplace in a Texas Gulf Coast medical center. These proactive, positive responses corroborate that the best way to weather a storm is to look where storms have repeatedly been weathered. In a more direct way, we have seen this for the COVID pandemic in portions of Asia like Singapore and Hong Kong, which were previously affected most by SARS and novel influenza A (H1N1pdm09) virus of 2009 (H1N1) avian influenza and have likewise adapted comparatively faster to COVID-19.¹⁹

Digital communication tools have also shown promise in enabling remote work as well as intrainstitutional collaborative efforts. COVID-19 has brought health care professionals together across cities, states, and countries. For example, in the Greater Houston area alone, there have been more than 200 intensivists, extracorporeal membrane oxygenation (ECMO) specialists, and other specialized providers communicating through popular social media platforms (eg, WhatsApp) and learning from one another. In addition, this pandemic has opened the opportunity for innovations and adoption of alternative care delivery methods like telemedicine and virtual ICUs. HMH has been able to utilize these technologies for ECMO-treated COVID-19 patients and thus decreased traffic

in and out of our ICU patient rooms. Resilience was also evident in the formation of interdisciplinary teams to design novel devices to help protect anesthesiologists in intubating COVID-19–positive patients or persons under investigation.

DISCUSSION

The COVID-19 pandemic exposed several gaps in our health care system, including the need for proactive investment to increase large-scale epidemic and pandemic preparedness. The following recommendations are made to prevent burnout and mitigate occupational stress, especially among intensive care providers during a pandemic.

RECOMMENDATIONS AND POLICY IMPLICATIONS

- The national and regional disaster mitigation plans for future epidemics have to incorporate mechanisms to allow rapid and agile transformation of relevant industry to support massively increased demand for disinfectants, cleaning supplies, PPE, and other medical equipment for health care and community use. Although certain industries and corporations have exhibited a heightened sense of responsibility during the current COVID-19 pandemic, such efforts need to be preemptively planned, and specific industries should be earmarked, trained, and equipped for a rapid transformation. Industries willing to step up in times of crises and invest in disaster readiness may be incentivized by tax breaks or other mechanisms.
- Access to updated information about the availability of COVID-19 testing kits and PPE for health care workers may reduce the anxiety associated with uncertainty and reduce unproductive information seeking²⁰ and emotional distress.²¹ Daily rounds and huddles, along with communication technologies, such as huddle boards, can be used to serve as reliable information sources.
- Structured training on large-scale disaster management and response must be provided. The Society of Critical Care Management offers a Fundamentals of Disaster Management course, which can build crucial mental models and support development of organization-specific structures for response management.²² In addition, the Federal Emergency Management Agency (FEMA) offers a variety of free courses and resources.
- Disasters necessitate innovation. With the rise of COVID-19, several innovative designs were proposed to protect the health care workers on the front lines from the rapidly and widely spreading virus.²³ However, there is a dearth of manufacturing capacity and materials to produce many of these solutions. Systems of innovation that were developed and honed during other national emergencies when most resources were constrained (eg, the Functional Analysis Systems Technique [FAST] developed during the Manhattan Project)²⁴ are being revisited to tackle the problem nationally and globally. We need these solutions to buy time for effective antiviral medications and a vaccine for COVID-19. Meanwhile, there is a need to provide technical oversight to ensure that new designs meet minimum safety requirements. For example, during this pandemic, an abundance of homemade masks and gowns were designed and adopted without proper attention to fit and leak protection, potentially leading to a false perception of protection among health care workers.
- The United States has a well-trained yet largely untapped resource of medical professionals in the form of internationally trained physicians, nurses, medical technicians, and other health care providers. Due to strict state licensing regulations, such individuals are barred from routine direct patient care. Though we do not propose a blanket relaxation in medical licensure requirements, we feel it is imperative that willing and able individuals be periodically trained to maintain a medical reserve corps at the regional, state, and national level. We opine that the notion of wartime-like preparedness has to be a serious and deliberate consideration, and maintaining a readily deployable human capital reserve is part and parcel of such preparedness.
- While studies emerged to investigate pandemic-related mental health issues,¹ there is a need for feasible and practical methods to assess health care workers' fatigue and burnout.^{25,26} Wearable sensors have shown promise²⁷ by providing an opportunity to monitor fatigue, stress, and sleep biomarkers noninvasively and then communicating this information to clinical unit managers for timely intervention. In addition, mobile health (mHealth) tools have shown promise to facilitate mental health self-management. Simple methods such as breathing exercises, biofeedback, and mindfulness can be utilized to mitigate acute episodes of stress and anxiety, while telehealth services can be used to enable peer-support and occupational counseling. However, the integration of new technologies with current workflows may present additional burden and needs to be further examined.

The lessons learned and documented here demonstrate that when confronted with seemingly inadequate

federal-level logistics and response, it is perhaps time to recall the social virtues of local-level resilience and self-reliance. It is beyond the logistical capabilities of any government to provide what is needed to every citizen when the scope and magnitude of the disaster are beyond a localized event (eg, hurricanes, large-scale wildfires, and earthquakes). Such disasters strain national capacity for response. It was local authorities, in many cases aided by private citizens, that kept us all together, as one (eg, the Cajun Navy's role during Katrina²⁸ and Houstonians' response during Harvey²⁹). We can harness the government, industry, and individual efforts and resources to effectively mitigate such disasters and challenges. These efforts start with education and leadership that instill a sense of community and duty to the community, into the fabric of our society.

Pandemics of this scale occur roughly every 100 years, with more localized or less severe cases in the interim.^{30,31} We have learned from each of them, but we have still failed to devote enough of our public resources into providing adequate supplies and proactively planning to address these events. This is going to happen again, and it is our choice to act. ■

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DISCLOSURES

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