Mental Health and Social Support for Healthcare and Hospital Workers During the COVID-19 Pandemic

September 2021

JOHNS HOPKINS BLOOMBERG SCHOOL of PUBLIC HEALTH | Center for Health Security

Authors

Tener Goodwin Veenema, RN, PhD, MS, MPH, FAAN
Contributing Scholar, Johns Hopkins Center for Health Security
Professor, Johns Hopkins School of Nursing
Senior Associate, Department of International Health, Johns Hopkins Bloomberg School of Public Health

Svea Closser, PhD
Associate Professor, Department of International Health, Johns Hopkins Bloomberg School of Public Health

Johannes Thrul, PhD
Assistant Professor, Department of Mental Health, Johns Hopkins Bloomberg School of Public Health

Luther G. Kalb, PhD, MHS
Director of Informatics, Center for Autism and Related Disorders and Department of Neuropsychology, Kennedy Krieger Institute
Assistant Professor, Department of Mental Health, Johns Hopkins Bloomberg School of Public Health

Kathryn M. McDonald, PhD, MM
Bloomberg Distinguished Professor, Johns Hopkins University School of Nursing, School of Medicine (General Internal Medicine), Carey School of Business and Bloomberg School of Public Health (Health Policy and Management)

Cheryl Dennison Himmelfarb, PhD, RN
Vice Dean for Research and Deputy Director, Institute for Clinical Translational Research, Johns Hopkins School of Nursing
Joint Appointments in the Johns Hopkins University School of Medicine and the Johns Hopkins Bloomberg School of Public Health

Erin E. Cooney, MSPH, CPH
PhD Candidate, Department of International Health, Johns Hopkins Bloomberg School of Public Health

Kaitlyn Atkins, MPH
PhD Candidate, Department of International Health, Johns Hopkins Bloomberg School of Public Health

Soim Park, KMD, PhD, MA
Research Associate, Department of International Health, Johns Hopkins Bloomberg School of Public Health

Sarah Schneider-Firestone, MSW
Research Associate, Johns Hopkins School of Nursing and Johns Hopkins Bloomberg School of Public Health

Hannah Marker, MPH
Research Associate, Department of International Health, Johns Hopkins Bloomberg School of Public Health

Edbert Hsu, MD, MPH
Associate Professor, Department of Emergency Medicine, Johns Hopkins Medicine
Associate Director, Office of Critical Event Preparedness and Response, Johns Hopkins University

Roma Vasa, MD
Associate Professor, Psychiatry and Behavioral Sciences, Kennedy Krieger Institute, Johns Hopkins University School of Medicine

Steven A. Harvey, PhD
Associate Professor, Department of International Health, Johns Hopkins Bloomberg School of Public Health

Pamela Surkan, ScD
Professor, Department of International Health, Johns Hopkins Bloomberg School of Public Health

Diane Meyer, RN, MPH
Managing Senior Analyst, Johns Hopkins Center for Health Security
Research Associate, Department of Environmental Health and Engineering, Johns Hopkins Bloomberg School of Public Health

Elena Martin, MPH
Analyst, Johns Hopkins Center for Health Security
Research Associate, Department of Environmental Health and Engineering, Johns Hopkins Bloomberg School of Public Health

Wink MacKay, RN, MSN, CCRN
Critical Care Educator, Suburban Hospital, Johns Hopkins Medicine

Mary Jo Lombardo, DNP, RN, CEN
Clinical Education Program Manager, Howard County General Hospital, Johns Hopkins Medicine

Suzanne Dutton, DNP, GNP-BC, RN
Geriatric Advanced Practice Nurse, Sibley Memorial Hospital, Johns Hopkins Medicine

Acknowledgments

The authors wish to gratefully acknowledge the institutional support they have received from Johns Hopkins University for this COVID-19 project and specifically the Vice Deans for Research for their input and ongoing support of this study. In doing so, the University has taken a national leadership role in demonstrating their commitment to employee mental health.

The authors would also like to thank Julia Cizek, Kathleen Fox, Margaret Miller, and Prarthana Vasudevan for editing, design, and publication support.

Suggested citation: Veenema TG, Closser S, Thrul J, et al. *Mental Health and Social Support for Healthcare and Hospital Workers During the COVID-19 Pandemic.* Baltimore, MD: Johns Hopkins Center for Health Security; 2021.

© 2021 The Johns Hopkins University. All rights reserved.

Contents

Executive Summary iv
Background 1
Methods 3
  Survey 3
  Interviews 5
Findings 6
  Survey 6
  Interviews 18
Discussion 32
  Limitations 34
Conclusion 35
References 36

Executive Summary

Healthcare and hospital workers providing care and support to infected patients during a pandemic are at increased risk for mental distress. Factors impacting their mental health include high risk of exposure and infection, financial insecurity due to furloughs, separation from and worries about loved ones, a stressful work environment due to surge conditions with scarce supplies, traumatic experiences due to witnessing the deaths of patients and colleagues, and other acute stressors. Finding ways for institutions to support the mental wellbeing of healthcare and hospital workers in an acute pandemic-related crisis situation is of critical importance. The factors affecting mental health are deeply connected to work-related motivation and attendance. Willingness to come to work is multifactorial and is dependent upon an individual's self-perception of risk, as well as having the skills and resources necessary to perform work tasks given the nature of the public health emergency. Social and material support for healthcare workers in a variety of high-stress and high-risk settings is important for supporting workers' mental health and in maintaining their commitment in challenging conditions.

The impact of the COVID-19 pandemic on healthcare workers has been profound, characterized by death, disability, and an untenable burden on mental health and wellbeing. *Lost on the Frontline*, a report published by *The Guardian* and Kaiser Health Network in April 2021, revealed that more than 3,600 healthcare workers in the United States had died of COVID-19. While the median age of death due to COVID-19 was 78 years, in healthcare workers, it was 59. Two-thirds of deceased healthcare workers were people of color, revealing the deep inequities tied to race, ethnicity, and economic status in America's healthcare workforce. Lower-paid workers who handled everyday patient care, including nurses, support staff, and nursing home employees, were far more likely to die in the pandemic than physicians. Only 30% of the deaths were among hospital workers, with few employed by well-funded academic medical centers. Healthcare workers were 3 times more likely to contract COVID-19 than the general public. Detrimental effects also experienced by healthcare and hospital workers included financial hardship, stress related to known and unknown information, and fear of the uncertainty regarding continued progression of the pandemic. As of August 2021, the COVID-19 pandemic is far from over and its full impact upon hospital and healthcare workers remains unknown.

The Johns Hopkins Health System (JHHS) operates in 2 states and the District of Columbia. Johns Hopkins Medicine (JHM) is the robust partnership between JHHS and the Johns Hopkins University School of Medicine, with a workforce of approximately 53,000 employees and a very limited number of contract workers. JHHS and JHM have played a leadership role during the COVID-19 response both nationally, by producing

and sharing data to inform decisionmaking and evidence-based guidelines for response, and regionally, in accepting large numbers of patients during the surge. Prior to the onset of the pandemic, JHHS and JHM leadership had established a commitment to employee mental health and wellbeing through substantial investments and the implementation of numerous programs to support employees. However, even with the presence of these dedicated resources, clinical and nonclinical staff have reported high levels of stress, anxiety, and burnout.

To identify the issues most critical to healthcare workers' mental health, wellbeing, and motivation during the COVID-19 pandemic, we conducted a cross-sectional survey (1,189 responses) and 73 semistructured interviews with individuals currently employed at JHHS and JHM hospitals located in Maryland and the District of Columbia. Our study population included healthcare providers and direct support services staff, including workers in frontline environmental services, food services, and security.

The responses from our survey and interviews revealed that the trauma of witnessing COVID-19 death was exacerbated by the general stress of working during the pandemic and that the significant mental health burden created by the pandemic/infectious disease environment itself was characterized by the ongoing uncertainty and ambiguity about the scientific understanding of the virus. Additionally, stressors negatively impacting employee mental health stemmed from the workplace, resulting in reduced trust of and increased perceptions of betrayal in the institution.

Although our findings are specific to one academic health system, they may be relevant to other hospitals and health systems. Studies such as this offer an important window into learning more about employee health from the unique stress and trauma of the COVID-19 pandemic and can facilitate progress toward a health system that communicates value and prioritizes safety for all staff.

Background

The impact of the COVID-19 pandemic on healthcare workers has been profound, characterized by death, disability, and an untenable burden on mental health and wellbeing. *Lost on the Frontline*,[1] a report published by *The Guardian* and Kaiser Health Network in April 2021, revealed that more than 3,600 healthcare workers in the United States had died of COVID-19. While the median age of death due to COVID-19 was 78 years, in healthcare workers, it was 59. Two-thirds of deceased healthcare workers were people of color, revealing the deep inequities tied to race, ethnicity, and economic status in America's healthcare workforce. Lower-paid workers who handled everyday patient care, including nurses, support staff, and nursing home employees, were far more likely to die in the pandemic than physicians. Only 30% of the deaths were among hospital workers, with few employed by well-funded academic medical centers. Healthcare workers were 3 times more likely to contract COVID-19 than the general public. Healthcare and hospital workers, employed in an environment where COVID-19 patients are receiving care, are at increased risk for mental distress.[2-5]

Existing research shows that frontline health and hospital workers have faced high burdens of anxiety, depression, and posttraumatic stress disorder in the wake of COVID-19.[6-8] While these burdens are well documented among clinical staff caring for COVID-19 patients, the literature suggests that other hospital staff, including nonclinical staff or clinicians not involved in COVID-19 patient care, face similar distress.[9,10] This distress is driven by concerns about contracting or transmitting the virus, financial insecurity due to furloughs, separation from and worries about loved ones, a stressful work environment due to surge conditions with scarce supplies, traumatic experiences due to witnessing death of patients and colleagues, and other acute stressors. The factors affecting mental health are deeply connected to work-related motivation and attendance. Willingness to come to work is multifactorial and is dependent upon an individual's self-perception of risk, as well as having the skills and resources necessary to perform work tasks given the nature of the public health emergency.[11,12] Social and material support for healthcare workers in a variety of high-stress and high-risk settings is important for supporting workers' mental health and in maintaining their commitment in challenging conditions.[13,14]

At present, little is known about the mental health and social support needs of healthcare and hospital workers during the COVID-19 pandemic. We sought to understand the impact upon Johns Hopkins Health System (JHHS) employees and to extrapolate relevant lessons that could inform our understanding of the pandemic's impact and enhance support services. The particular needs of hospital service workers, who are more likely to be people of color, face wage inequality, and lack paid sick leave or insurance,[15-17] are not well understood. At JHHS, these workers commonly reside in underresourced neighborhoods surrounding the hospital, which have faced more severe pandemic impacts. At the same time, while the pandemic's impacts on clinical staff are more established in the literature,[2-5] understanding the needs of JHHS clinicians is equally important to determining appropriate, context-specific solutions. Finding ways

for institutions to support the mental and social wellbeing of healthcare and hospital workers in an acute pandemic-related crisis situation is of critical importance.

In April 2020, the Johns Hopkins University Office of Research commissioned an interdisciplinary team of researchers from across the university to conduct an analysis of healthcare and hospital workers employed in JHHS settings in order to characterize the mental health impact of working on the frontlines during the COVID-19 pandemic. The goal of this study was to understand the current mental health and social support needs of healthcare clinicians and hospital support workers within JHHS in order to carefully discern lessons learned and consider future strategies that could mitigate mental health impacts during public health emergencies.

The objectives of the study were to:

1. Identify the issues most critical to JHHS healthcare and hospital workers' mental health, wellbeing, and motivation during the COVID-19 pandemic
2. Explore and disseminate strategies for supporting mental and behavioral health and wellbeing in healthcare workers impacted by COVID-19

Methods

The study was conducted in 2 stages. First, an online cross-sectional survey was disseminated via email to employees working at the 5 JHHS hospitals in Maryland and the District of Columbia and 1 JHHS affiliate healthcare facility, made up of clinical, research, and educational centers (hereafter referred to as JHHS or JHHS sites). Survey respondents who expressed interest in participating in a follow-up interview were invited to a semistructured interview. Survey respondents received a $10 gift card for their participation. Interview participants each received a $50 gift cards for their participation. This study was approved by the Johns Hopkins University School of Medicine Institutional Review Board (IRB00248088).

Survey

The invitation to participate in the survey included a link to access a secure, cloud-based, multi-item survey hosted in the Qualtrics Research Suite Software (Qualtrics, Provo, UT). The online survey comprised 64 close- and open-ended questions (46 and 18, respectively) that covered key measures of mental health and social support and took about 5 to 10 minutes to complete. The survey was available in both English and Spanish and was accessible for a 6-month period from July 2020 to January 2021.

Respondents were allowed a single survey response per individual, restricted by IP address. Recruitment consisted of direct emails to employees at JHHS sites. Employees could also access the survey via a central Johns Hopkins University website containing information about available research opportunities for JHHS employees. Participation was voluntary and consent was provided at the beginning of the online survey, all survey responses were anonymous and confidential, and all data were secured.

The final study group of 1,189 respondents included direct patient care providers, such as physicians, nurses, respiratory therapists, and patient care technicians working in an inpatient or outpatient setting or emergency department, as well as direct support services staff and administration, such as frontline workers in environmental services, facilities and engineering, nutrition services, security, interpreter services, clinical laboratories, clergy/chaplain services, clinical mid-level management, and hospital leadership.

The survey collected 9 major categories of information from respondents:

Sociodemographics and household characteristics. Respondents were asked about their age, gender, race/ethnicity, education, household finances, household characteristics (eg, relationship status, children, living with someone at higher risk of severe illness from COVID-19, and work status.

Work characteristics and experience. Respondents were asked about their occupational role, years working in that profession, and tenure at the current workplace.

Prior specialized work experience. Respondents were asked about their experience working in infectious disease outbreak situations and disaster relief and humanitarian crisis settings prior to COVID-19.

Experiences with COVID-19. Respondents were asked if they had had test-confirmed or suspected COVID-19 infection and results of SARS-CoV-2 antibody tests and if they were aware of COVID-19 infections among coworkers and household members.

COVID-19 patient care and infection concerns. Respondents were asked if they had cared for patients with COVID-19 and about their level of concern about getting infected themselves and infecting someone in their household.

Mental health diagnoses and current mental distress. Respondents were asked about preexisting and current mental health conditions and were asked to report if they had any changes to prescription medication for a mental health condition since the beginning of the COVID-19 pandemic. Current mental distress was assessed using the 4-item Patient Health Questionnaire (PHQ-4), which has adequate construct validity and is reliable in the general population.[18] Respondents were asked for the frequency over the past 2 weeks with which they had been bothered by 2 symptoms of anxiety (items drawn from the 7-item Generalized Anxiety Disorder scale) and 2 symptoms of depression (items drawn from the PHQ-9). Scores were obtained by summing the 4 items (range 0 to 12), which were classified into categories indicating distress severity based on validated points (normal [0 to 2], mild [3 to 5], moderate [6 to 8], or severe [9 to 12]).[18] A total score of ≥3 for the 2 anxiety questions suggests having anxiety symptoms and for the 2 depression questions suggests having depressive symptoms.

Stress and burnout. Respondents were asked to answer questions related to personal experiences of work and family stress related to the COVID-19 pandemic, which were assessed with 2 items taken from the Coronavirus Impact Scale.[19] Experiences of burnout were assessed with a single item that was previously validated for use with primary care staff.[20] A single question assessed how experiences during the COVID-19 pandemic impacted how respondents felt about their decision to work in healthcare.

Reactions to stress. Respondents were asked if their drinking behavior had changed since the beginning of the COVID-19 pandemic. Current alcohol use (quantity and frequency) and frequency of heavy episodic drinking (binge drinking) in the past 30 days was assessed using items from the National Survey on Drug Use and Health. Experiences of posttraumatic stress as a consequence of the COVID-19 pandemic were assessed by 3 items adapted from the Impact of Event Scale – Revised.[21] These selected and modified items assessed experiences of hyperarousal, intrusive thoughts, and avoidance behavior related to experiences during the COVID-19 pandemic.

Perceived betrayal. Respondents were asked about experiences of institutional betrayal, which were assessed with 5 items adapted from the Moral Injury Events Scale.[22] These items assessed perceived betrayal by fellow healthcare workers, institutional leaders,

and others outside of the healthcare profession. In addition, these items assessed perceptions that the physical and mental health of the respondent was compromised without consent or care for their wellbeing.

Interviews

At the end of the survey, respondents were asked whether they were interested in engaging in a semistructured interview. A total of 280 survey respondents indicated they were interested in being interviewed. We stratified respondents into employment categories and then contacted a random sample of people within each employment category, interviewing a total of 68 JHHS employees. Additionally, the research team recruited and interviewed 3 family members of healthcare providers and 2 health system leaders identified as providing exceptional support by JHHS staff interviewees.

A team of 6 interviewers conducted 73 interviews. At first, interviews were conducted in pairs, and then they shifted to individual interviews once confidence was achieved that the interviews would be consistent in approach and scope. Due to public health measures in place for the COVID-19 pandemic, all interviews were conducted remotely using Zoom. The interviews lasted between 20 and 90 minutes, with most interviews lasting about 1 hour. Interviews were conducted from late September to early December 2020. Participants provided oral consent prior to beginning the interview. With permission, the team audio recorded all but 2 interviews and subsequently transcribed them. Two interviews failed to record due to technical difficulties, resulting in a final total of 71 interviews for analysis.

The research team used a detailed interview guide that allowed interviewee responses to drive subsequent questions. Interviews explored social context, stressors, and supports in respondents' work and home environments, including availability of protective equipment, existence of and responses to stigma, motivation to work, current state of wellbeing, and access of support that could help them stay resilient. Interviews with family members and health system leaders included questions tailored to their roles.

Between January and March 2021, the research team followed an inductive coding process. A group of 6 team members split up and read the interview transcripts, generating a preliminary list of codes and themes. The transcripts—each labeled with a unique coded identifier to connect the demographic data for each interviewee to the transcript content—and the codebook were then uploaded to NVivo version 12 (QSR International, Melbourne, Australia). The team selected 6 test transcripts to code; each of 5 team members coded 3 test transcripts to check for intercoder reliability and to finalize the codebook. The final codebook of 37 codes was established and then used to code the remaining 65 transcripts.

This report explores 6 overarching themes that emerged as particularly important in the analysis: (1) mental health, (2) betrayal, (3) hierarchy, (4) communication, (5) personal protective equipment (PPE), and (6) camaraderie.

Findings

Survey

Sociodemographic and Household Characteristics

Table 1 presents demographic information about the survey respondents.

Age, Gender, Race, and Ethnicity Characteristics

Respondents ranged in age from 18 to 77 years, with a mean age of 39 years. Most (85%) of the respondents identified as women, while the rest identified as men (14%) or as transgender or nonbinary (1%). The majority (61%) of respondents identified as non-Hispanic White, while 22% identified as non-Hispanic Black, 7% as non-Hispanic Asian, 6% as Hispanic/Latinx, and 4% as multiracial.

Education and Socioeconomic Concerns

Almost one-quarter (24%) of respondents had earned an associate's degree or less while one-third (34%) had received a bachelor's degree and the remaining 42% had earned a graduate degree. About 20% of respondents reported being very or extremely concerned about their household's financial situation. Almost one-fifth (18%) of respondents from one of the hospitals reported having been furloughed previously during the pandemic.

Household Characteristics

About half (49%) of our respondents reported being married and about one-third (34%) reported being single. An additional 8% reported living with a partner, while the remaining 9% were divorced, separated, or widowed. Almost 40% reported having children aged 17 years or younger living with them, and 14% reported living with someone at higher risk of severe illness from COVID-19.

Table 1. Participant Demographic Characteristics (N = 1,189)

Characteristic	*n (%)*
What is your current age? mean (SD)	38.86 (11.84)
What is your gender identity?	
Male	161 (13.6)
Female	1,011 (85.2)
Transgender male	1 (0.1)
Transgender female	1 (0.1)
Nonbinary	7 (0.5)
Prefer not to answer	5 (0.3)
Missing	3 (0.2)
Race	
Non-Hispanic White	729 (61.7)
Non-Hispanic Black	259 (21.9)
Non-Hispanic Asian	83 (7.0)
Non-Hispanic Multiracial	42 (3.6)
Hispanic/Latinx	69 (5.8)

Marital status	
Married	582 (49.1)
Single	407 (34.3)
Separated	21 (1.8)
Divorced	70 (5.9)
Living with partner	95 (8.0)
Widow/widower	10 (0.8)
Children aged 0 to 17 years living at home	468 (39.9)
Elderly or immunocompromised individual at home	163 (13.9)
Education level	
Less than high school	4 (0.3)
High school graduate/GED	87 (7.5)
Some college	110 (9.4)
2-year degree	75 (6.4)
4-year degree	395 (33.9)
Graduate degree	494 (42.4)
Concerned about household financial status	
Not at all concerned	339 (29.9)
Slightly concerned	342 (30.2)
Moderately concerned	231 (20.4)
Very concerned	123 (10.8)
Extremely concerned	99 (8.7)
Have you been furloughed?	97 (17.8)

Work Characteristics and Experience

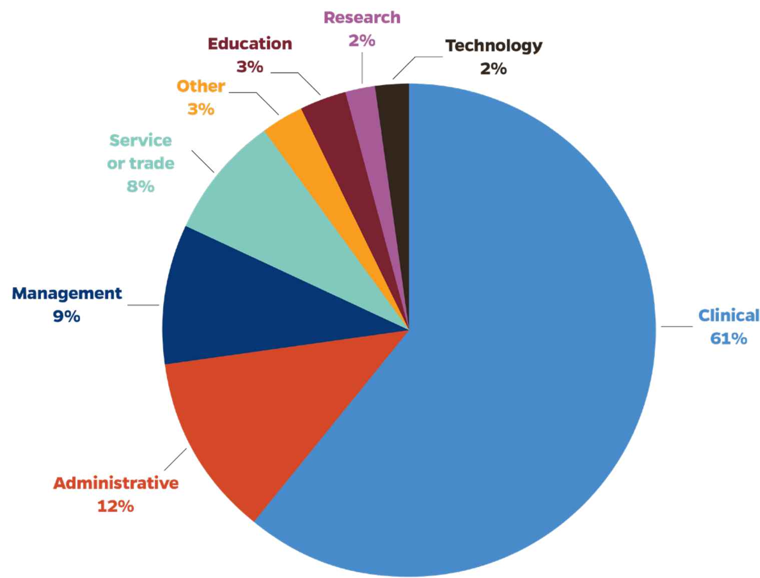
Role in Healthcare

About 61% of respondents worked in a clinical role, followed by 12% in administrative roles, 9% in management, 8% in service or trade, 3% each in education and other roles, and 2% each in technology and research (Figure 1). Clinical, education, and administrative staff were more likely to be women, whereas service staff, management, and technology staff were more likely to be men.

About 35% of non-Hispanic Black staff served in a clinical role, compared to 64% to 68% of staff in other racial/ethnic groups and over 80% among non-Hispanic Asian staff. In contrast, service staff were more likely to identify as non-Hispanic Black than any other racial/ethnic group.

Staff reported having worked in their current roles for an average of 8 to 11 years. This was similar across gender and education groups but was about half as long among Hispanic/Latinx staff compared to other racial/ethnic groups. Management typically had twice the experience in their current roles compared to other staff.

Figure 1. Survey Respondents' Roles in Healthcare



Prior Experience

Tenure at JHHS was generally found to be longer the higher the current job role was in the institutional hierarchy. On average, clinical, administrative, education, research, and other staff had 7 to 8 years of experience working at JHHS, whereas management had 15 years, and service staff reported only 5 years of experience (Table 2). This was consistently lower among Hispanic/Latinx staff, who reported working at JHHS for one-third to half as long as other racial/ethnic groups (Table 3).

Only 10% of staff reported prior experiences working in outbreaks and 4% had ever worked in disaster/humanitarian relief. Men (11%) were more likely to have disaster/humanitarian relief experience than women (3%) (Table 4). Management and clinical staff were more likely than other groups to have experience in other outbreaks (Table 2).

Table 2. Prior Experience, by Job Category (N = 1,189)

Factor	*Total*	*Clinical (n = 709)*	*Administrative (n = 140)*	*Technology (n = 20)*	*Service or Trade (n = 88)*	*Management (n = 103)*	*Other (n = 39)*	*Education (n = 36)*	*Research (n = 22)*	*P Value*
Years in this type of work or profession, mean (SD)	11.3 (10.4)	10.3 (9.8)	11.9 (10.5)	13.7 (9.5)	9.1 (9.7)	18.2 (12.2)	13.0 (11.9)	10.7 (9.9)	9.5 (8.9)	<0.001
Years employed by JHHS, mean (SD)	8.2 (8.0)	7.4 (7.3)	8.7 (7.9)	12.5 (8.6)	5.5 (6.9)	15.2 (10.5)	8.9 (6.9)	7.2 (7.4)	6.6 (6.7)	<0.001
Ever worked in prior outbreaks, n (%)	115 (10.1)	70 (10.0)	8 (5.8)	1 (5.0)	9 (10.3)	20 (20.0)	5 (12.8)	1 (2.8)	1 (4.5)	0.015
Ever worked in disaster/ humanitarian relief, n (%)	49 (4.3)	32 (4.6)	2 (1.5)	2 (10.0)	4 (4.6)	7 (6.9)	1 (2.6)	1 (2.8)	0 (0.0)	0.37

Abbreviations: JHHS, Johns Hopkins Health System; SD, standard deviation.

Table 3. Prior Experience, by Race/Ethnicity (N = 1,189)

Factor	*Total*	*Non-Hispanic White (n = 729)*	*Non-Hispanic Black (n = 259)*	*Non-Hispanic Asian (n = 83)*	*Non-Hispanic multiracial (n = 42)*	*Hispanic/ Latinx (n = 69)*	*P Value*
Years in this type of work or profession, mean (SD)	11.25 (10.40)	12.32 (11.16)	10.39 (9.19)	10.32 (9.20)	8.88 (8.17)	5.30 (5.10)	<0.001
Years employed by JHHS, mean (SD)	8.22 (8.04)	9.12 (8.63)	7.55 (7.45)	6.60 (5.92)	7.02 (6.57)	3.8 (3.10)	<0.001
Ever worked in prior outbreaks, n (%)	115 (10.1%)	72 (10.2%)	32 (13.2%)	3 (3.7%)	1 (2.4%)	6 (9.1%)	0.057
Ever worked in disaster/ humanitarian relief, n (%)	49 (4.3%)	28 (4.0%)	10 (4.1%)	2 (2.4%)	4 (9.5%)	5 (7.6%)	0.25

Abbreviations: JHHS, Johns Hopkins Health System; SD, standard deviation.

Table 4. Prior Experience, by Gender (N = 1,189)

Factor	*Total*	*Women (n = 1,012)*	*Men (n = 162)*	*P Value*
Years in this type of work or profession, mean (SD)	11.25 (10.40)	11.36 (10.33)	10.67 (10.89)	0.44
Years employed by JHHS, mean (SD)	8.22 (8.04)	8.41 (8.03)	7.06 (8.12)	0.053
Ever worked in prior outbreaks, n (%)	115 (10.1%)	98 (10.0%)	17 (11.1%)	0.68
Ever worked in disaster/ humanitarian relief, n (%)	49 (4.3%)	32 (3.3%)	16 (10.5%)	<0.001

Abbreviations: JHHS, Johns Hopkins Health System; SD, standard deviation.

Experiences with COVID-19

Of those who reported having had COVID-19, the majority reported receiving a positive test result, while a smaller group indicated that COVID-19 was suspected but they did not receive a positive test to confirm infection (Table 5). A majority (71%) of the respondents reported knowing at least 1 coworker who had been diagnosed (by a test or clinical symptoms) with COVID-19. Almost 13% of respondents reported that a household member had been diagnosed with COVID-19.

About 20% of healthcare workers were tested for SARS-CoV-2 antibodies. Of those tested, about 7% reported testing positive—almost the same percentage of respondents who reported having had an active COVID-19 infection. About 70% of those who reported testing positive for SARS-CoV-2 antibodies worked in a clinical role providing direct patient care, however, these infections may be reflective of community spread. Among those who reported being concerned about their immediate financial situation, 12% of those tested for antibodies to SARS-CoV-2 tested positive. This group was also about twice as likely to report receiving a positive test for COVID-19 infection. There were no significant differences in COVID-19 infection and seropositivity by gender; however, women were significantly more likely to report knowing a coworker who had been infected.

Table 5. COVID-19 Infection and Seropositivity (N = 1,189)

Factor	*n (%)*
Had known or suspected COVID-19	
No, I tested negative	461 (40.6)
No, no confirmed or suspected COVID-19	561 (49.4)
Yes, I tested positive	53 (4.7)
Yes, suspected but did not test	30 (2.6)
Yes, tested but have not received results	1 (0.1)
Other	30 (2.6)
Coworkers had known/suspected COVID-19	810 (71.2)
Household member had known/suspected COVID-19	145 (12.8)
Tested for SARS-CoV-2 antibodies	
No, I have not been tested	908 (80.0)
Yes, I tested positive	16 (1.4)
Yes, I tested negative	199 (17.5)
Yes, tested but have not received results	5 (0.4)
Other	7 (0.6)

COVID-19 Patient Care and Infection Concerns

Almost 64% of respondents who work in a clinical role had provided direct care to patients diagnosed with COVID-19 (Table 6). There were no significant differences by gender or race/ethnicity. However, respondents with a bachelor's degree or less were significantly more likely to provide direct patient care to COVID-19 patients compared to clinicians with graduate-level training.

A majority (74%) of respondents reported being at least moderately concerned about becoming infected with COVID-19 themselves, with a slightly higher percentage reporting concern for infecting a member of their household. Almost 14% reported feeling extremely concerned about infection themselves while 26% were extremely concerned about infecting someone in their household. Among those with an associate's degree or less, extreme concern about COVID-19 infection for themselves and household members was substantially more common.

Those reporting financial concerns were more than 3 times as likely to be extremely concerned about COVID-19 infection themselves and twice as likely to be extremely concerned about transmitting COVID-19 to someone in their household compared to those not reporting significant financial concern. This group was also twice as likely to report that someone in their household had COVID-19. Black and Hispanic/Latinx participants were also significantly more likely to report being extremely concerned about infection themselves or of transmitting to household members.

Table 6. COVID-19 Patient Care and Infection Concerns (N = 1,189)

Factor	*n (%)*
Cared for known/suspected COVID-19 patients	423 (63.5)
How concerned are you about getting infected yourself?	
Not at all concerned	59 (5.2)
Slightly concerned	241 (21.3)
Moderately concerned	425 (37.5)
Very concerned	254 (22.4)
Extremely concerned	155 (13.7)
How concerned are you about infecting someone in your household?	
Not at all concerned	111 (9.8)
Slightly concerned	158 (14.0)
Moderately concerned	281 (24.8)
Very concerned	289 (25.5)
Extremely concerned	293 (25.9)

Mental Health Diagnoses and Current Mental Distress

Overall, about one-third (34%) of respondents reporting having had a previous mental health diagnosis (Table 7). Women were twice as likely to report previous mental health diagnoses as men (36% versus 18%). Almost 22% of respondents screened positive for moderate to severe psychological distress (PHQ-4), which was more common among Hispanic/Latinx staff (29%) and among staff with concerns about finances (31%). About 30% of staff screened positive for anxiety symptoms, which was more common among women, clinical and research staff, and staff with financial concerns. Almost 18% of staff screened positive for depressive symptoms; this did not differ by race/ethnicity or gender but was more likely among those with concerns about finances (26%). Over 10% of respondents reported either starting a new mental health medication prescription or adjusting the dosing of an existing prescription during the pandemic; women more than twice as likely to report these changes than men.

Table 7. Mental Health Diagnoses, Screenings, and Medications, by Gender (N = 1,189)

Factor	*Total n (%)*	*Women (n = 1,012) n (%)*	*Men (n = 162) n (%)*	*P Value*
Previous mental health diagnosis				<0.001
No	696 (61.8)	572 (59.5)	120 (78.4)	
Yes	383 (34.0)	348 (36.2)	28 (18.3)	
Prefer not to answer	47 (4.2)	42 (4.4)	5 (3.3)	
PHQ-4 psychological distress category				0.060
None	571 (50.7)	476 (49.4)	91 (59.5)	
Mild	313 (27.8)	268 (27.8)	40 (26.1)	
Moderate	148 (13.1)	132 (13.7)	15 (9.8)	
Severe	95 (8.4)	87 (9.0)	7 (4.6)	
Positive PHQ-4 anxiety screening	336 (29.8)	306 (31.8)	26 (17.1)	<0.001
Positive PHQ-4 depression screening	198 (17.6)	169 (17.5)	26 (17.1)	0.89

Change in mental health prescription following COVID-19				0.019
No, my medications have remained the same	246 (22.1)	216 (22.6)	25 (16.8)	
Yes, my provider has adjusted my dosing	60 (5.4)	56 (5.9)	3 (2.0)	
Yes, I have started taking medication	54 (4.8)	49 (5.1)	4 (2.7)	
Not applicable (no medication)	754 (67.7)	634 (66.4)	117 (78.5)	

Abbreviation: PHQ-4, Patient Health Questionnaire 4.

Stress and Burnout

Over half (53%) of the respondents reported moderate or severe experiences of pandemic-related stress (Table 8). Experiences of stress were less commonly endorsed among staff who were men, identified as non-Hispanic Black or Asian, or had graduate-level education. Stress experiences at home and work were more common among clinical and research staff and among those with concerns about finances.

Burnout was common, with 47% of the respondents reporting some feelings of burnout. Overall, feelings of burnout were more common among clinical staff, Hispanic/Latinx staff, and staff with graduate education. However, severe levels of burnout—to the point of feeling unsure if they could go on—were more common among staff who identified as non-Hispanic Black, were less educated, were service staff, and/or had concerns about finances. Despite high levels of burnout, nearly two-thirds (63%) of respondents reported that they were happy or very happy with their decision to work in healthcare. Feelings of regret (9%), though less common, were higher among staff who identified as non-Hispanic Asian or multiracial, were less educated, or had financial concerns. Service staff were twice as likely as the overall sample to report feeling regret for working in healthcare.

Table 8. Stress and Burnout (N = 1,189)

Factor	*n (%)*
Experiences of stress related to COVID-19 pandemic	
None	100 (8.9)
Mild/occasional	434 (38.6)
Moderate/frequent	487 (43.3)
Severe/persistent	103 (9.2)
Stress and discord in the family	
None	359 (32.0)
Mild/occasional	573 (51.0)
Moderate/frequent	154 (13.7)
Severe/persistent	37 (3.3)
Self-rated level of burnout	
I enjoy my work. I have no symptoms of burnout.	125 (11.3)
Occasionally I am under stress, and I don't always have as much energy as I once did, but I don't feel burned out.	459 (41.5)
I am definitely burning out and have one or more symptoms of burnout, such as physical and emotional exhaustion.	360 (32.5)
The symptoms of burnout that I'm experiencing won't go away. I think about frustration at work a lot.	103 (9.3)

I feel completely burned out and often wonder if I can go on. I am at the point where I may need some changes or may need to seek some sort of help.	60 (5.4)
Feelings about decision to work in healthcare	
Strongly regret decision	36 (3.3)
Regret decision	60 (5.4)
Undecided	310 (28.0)
Happy with decision	441 (39.9)
Very happy with decision	259 (23.4)

Reactions to Stress

Alcohol consumption did not change substantially among respondents, although increased drinking during the pandemic was notable and more commonly reported among Hispanic/Latinx and non-Hispanic White respondents (29% and 27%, respectively) compared to other groups (Table 9). Clinical, research, and management staff also reported drinking more than other job categories.

Experiences of posttraumatic stress as a consequence of the COVID-19 pandemic were not commonly cited, reports that were made were more common among women and staff with financial concerns. A majority (63%) of respondents reported some level of avoidance behavior related to experiences during the COVID-19 pandemic. Men were less likely to report avoidance behavior, as were those with graduate degrees or those who did not have financial concerns.

Table 9. Reactions to Stress (N = 1,189)

Factor	*n (%)*
Change in alcohol consumption following COVID-19	
No, I drink about the same	477 (42.9)
Yes, I drink more	259 (23.3)
Yes, I drink less	158 (14.2)
Not applicable (do not drink)	219 (19.7)
Stress: Physical reactions	
Not at all	750 (67.0)
A little bit	220 (19.6)
Moderately	98 (8.8)
Quite a bit	36 (3.2)
Extremely	16 (1.4)
Stress: Dreams	
Not at all	614 (55.3)
A little bit	287 (25.9)
Moderately	122 (11.0)
Quite a bit	61 (5.5)
Extremely	26 (2.3)
Stress: Avoidance	
Not at all	409 (36.9)
A little bit	343 (31.0)
Moderately	196 (17.7)
Quite a bit	124 (11.2)
Extremely	35 (3.2)

Perceived Betrayal

Almost a third (31%) of respondents reported perceptions of some level of betrayal by institutional leaders, and 16% of staff expressed feeling betrayed by their fellow healthcare workers (Table 10). Feeling betrayed by leadership was more prominent with young respondents under the age of 30 years, whereas the oldest group (aged 50 years or older) showed the highest percentage of feeling betrayed by coworkers. Survey respondents who identified as non-Hispanic multiracial or Hispanic/Latinx were more likely to feel betrayed by leadership and coworkers. Clinical and service staff showed highest percentage of feeling betrayed by leaders (38% and 39%, respectively). Feelings of betrayal by coworkers were more than twice as likely among those with financial concerns (26%) compared to those without financial concerns (11%).

About one-third (32%) of staff expressed feeling betrayed by others outside healthcare. This was much higher among respondents under 30 years of age (37%) or who identified as multiracial (48%). Almost 40% of clinical staff reported perceived betrayal by others outside of healthcare, which was also more common among staff with financial concerns.

One-third of respondents reported their physical or mental health and safety were compromised. Clinical and service staff were more likely to report their physical health and safety being compromised at work, whereas management were least likely to report their physical and mental safety was being compromised at work. Respondents under 40 years of age or who identified as multiracial or Hispanic/Latinx reported higher proportion of feeling their physical or mental health were compromised.

Table 10. Prevalence of Feeling Betrayed and Health Compromised, by Demographic Characteristics (N = 1,189)

		Feeling Betrayed By		*Compromised By*		
Characteristics	*Total n (%)*	*Leaders n (%)*[a]	*Coworkers n (%)*[a]	*People Outside Healthcare n (%)*[a]	*Physical Health (n=394) n (%)*[a]	*Mental Health (n=415) n (%)*[a]
Total	1,189	372 (31.3)	196 (16.5)	382 (32.1)	394 (33.1)	415 (34.9)
Age						
<30	325	121 (37.2)	56 (17.2)	121 (37.2)	138 (42.5)	148 (45.5)
30 to 39	366	130 (35.5)	59 (16.1)	132 (36.1)	137 (37.4)	146 (39.9)
40 to 49	242	62 (26.5)	32 (13.2)	62 (25.6)	59 (24.4)	63 (26.0)
≥50	249	57 (22.9)	49 (19.7)	67 (26.9)	60 (24.1)	58 (23.3)
Gender						
Male	161	50 (31.1)	27 (16.8)	54 (33.5)	48 (29.8)	45 (28.0)
Female	1,011	317 (31.4)	165 (16.3)	323 (32.0)	340 (33.6)	363 (35.9)
Other	9	4 (44.4)	2 (22.2)	5 (55.6)	4 (44.4)	5 (55.6)
Race/ethnicity						
Non-Hispanic White	729	208 (28.9)	98 (13.4)	254 (34.8)	225 (30.9)	254 (34.8)
Non-Hispanic Black	259	86 (33.2)	57 (22.0)	65 (25.1)	90 (34.4)	80 (30.9)
Non-Hispanic Asian	83	28 (33.7)	9 (10.8)	23 (27.7)	25 (30.1)	27 (32.5)
Non-Hispanic multiracial	42	18 (42.9)	11 (26.2)	20 (47.6)	22 (52.4)	17 (40.5)
Hispanic/Latinx	69	29 (42.0)	19 (27.5)	19 (27.5)	30 (43.5)	34 (49.3)
Job categories						
Clinical	709	268 (37.8)	126 (17.8)	282 (39.8)	294 (41.5)	314 (44.3)
Administrative	140	30 (21.4)	17 (12.1)	29 (20.7)	33 (23.6)	26 (18.6)
Management	103	17 (16.5)	11 (10.7)	19 (18.5)	12 (11.7)	15(14.6)
Service	88	34 (38.6)	26 (29.6)	17 (19.3)	33 (37.5)	27 (30.7)
Other	117	22 (18.8)	15 (12.8)	35 (29.9)	21 (18.0)	32 (27.4)
Financial concern						
Moderate to severe	453	196 (43.3)	120 (26.5)	182 (40.2)	204 (45.0)	209 (46.1)
Slight or none	681	175 (25.7)	75 (11.0)	200 (29.4)	189 (27.8)	205 (30.1)

[a] Percentages of feeling betrayed or health compromised among total population in each row.

Open-Ended Survey Questions

Thematic analysis was used to analyze the 18 open-ended questions from the survey, which related to changes that the health system and/or direct units/divisions could make to improve job or working conditions during the pandemic. Respondents also had an opportunity to list positive feedback about the health system and/or their unit/division's response to the pandemic.

In analyzing the open-ended responses, 6 topics most frequently emerged:

- Access to PPE and supplies
- Inadequate staffing levels
- Salary and benefits (salary freezes, absence of hazard pay and discontinuation of retirement contributions)
- Employee need for validation, acknowledgement, and support for their efforts during the pandemic
- Access to mental health support resources and other employment support such as more frequent breaks and more empathy and compassion from leadership
- Over/under scheduling hours and the resulting scheduling changes

The most frequently mentioned issues were inadequate staffing levels, salary freezes, retirement and benefit cuts, and the absence of hazard pay. Employees also mentioned limited availability and access to PPE and cleaning supplies and inadequate frequency of cleaning patient areas. Respondents repeatedly mentioned wanting acknowledgment and validation from hospital leadership for their efforts during the pandemic. Many voiced their frustrations related to frequent schedule changes, cuts in hours, or being scheduled for too many hours. In many instances, the tone and language used by respondents when leaving comments could be characterized as angry and expressing outrage and disdain for the institution.

> *I believe if we were actually to receive our routine raises, which are generally just a dollar or 2 and occur around January, it would show my job and my effort during this pandemic has not gone unrecognized by my institution. I feel that my level of daily work effort and physical drain has only exponentially increased during the past year, and yet I am not compensated for it, even while government grants have been given to medical institutions to assist in these times.* ”

> *Would like to see a return to matching contributions to retirement plan, more incentive pay in light of the premium pay floats and travelers receive.*

> *Make the employees feel like we matter. Provide us with choices when it comes to switching our entire workflow. Some sort of financial compensation for this pandemic; not taking more away and asking for more from us.*

Respondents also cited wanting more transparency and better communication from leadership and voiced their dissatisfaction about the screening of workers for COVID-19 and notification if/when coworkers tested positive.

> *If I work a shift with someone who tests positive, I don't understand why I can't be alerted. I understand they can't say exactly who. But I think it would be worthwhile to know that someone in the unit on a day I was there was positive.*

Thematic analysis was also used to analyze open-ended question responses regarding positive feedback about the health system and/or their unit/division's response to the pandemic. Respondents mentioned the following topics most frequently:

- Better and more frequent communication was received, compared to when they worked there previously or when they worked in other hospital systems
- Unit leadership and department managers were seen as advocating for employees and their actions were seen as supportive
- Respondents appreciated the camaraderie demonstrated by coworkers and colleagues in their efforts to function as a team and support one another during extremely stressful working conditions and unknowns

> *I am so grateful to work with colleagues who have risen to the occasion so beautifully during this incredible challenge. Our group has protected some of its members from potential exposures because they or their family members are at high risk. We are all working more hours, caring for higher numbers of patients than in the past (without any added compensation) and I've heard almost zero complaining. My colleagues are true professionals and I am proud to be among their number. We have taken on this risk and accepted it as part of our mission to care for all who seek our help.*

Many also mentioned they approved of the way the hospitals developed protocols to handle COVID-19 positive and potentially positive patients, which included having designated COVID-19 units and workflows to ensure these patients were isolated from other patients and staff whenever possible. They approved of the level of communication and frequency with which protocols were shared with employees.

> *I am fortunate never to have felt like I didn't have sufficient PPE. The criteria for persons under investigation are always changing to accommodate the growing medical literature. There are weekly updates keeping us all informed. I think our team has done a very good job of coming together and working as a team.* ”

Reported less frequently, respondents mentioned that they appreciated that, in many areas, staff were retrained or redeployed to other units where they were needed to avoid furloughs and layoffs whenever possible. Additionally, incentives such as free meals delivered to units, mental health support offering onsite and free parking was mentioned numerous times as a perk that employees appreciated. Also, employees appreciated access to and policies about COVID-19 screening and testing of employees. Some also mentioned they felt lucky to have been among the first to receive a COVID-19 vaccine because they worked for the health system.

Interviews

A total of 73 semistructured interviews were conducted across 3 JHHS hospitals. The research team conducted interviews with hospital clinical staff, 2 family members of healthcare workers, and nonclinical staff, including environmental service workers, nutrition and food service workers and administrative workers in patient services and customer service roles. A qualitative analysis was conducted using NVivo (QSR International, Melbourne, Australia) on the transcriptions of 71 interviews (2 of the 73 interviews were not recorded due to technical difficulties). Major themes identified in the analysis included (1) the effects of COVID-19 on workers' mental health, (2) feelings of betrayal, (3) the prevalence of a hierarchical system, (4) communications, (5) personal protective equipment (PPE), and (6) camaraderie. Table 11 shows the demographic characteristics of and Table 12 shows the jobs held by interviewees.

Table 11. Demographic Characteristics of Interviewees (N = 66)[a]

Characteristics	*n (%)*
What is your current age? mean (SD)	36.47 (10.38)
What sex were you assigned at birth on your original birth certificate?	
Male	22 (33.3)
Female	44 (66.7)
Race/ethnicity	
Non-Hispanic White	31 (47.0)
Non-Hispanic Black	10 (15.1)
Non-Hispanic Asian	11 (16.7)
Non-Hispanic multiracial	4 (6.1)
Hispanic/Latinx	8 (12.1)
Missing	2 (3.0)
What is your marital status?	
Married	24 (36.6)
Single	28 (42.4)
Divorced	6 (9.1)
Living with partner	7 (10.5)
Widow/Widower	1 (1.4)
What is the highest level of education you received?	
Less than high school	1 (1.4)
High school graduate/GED	5 (7.6)
Some college	6 (9.1)
2-year degree	5 (7.6)
4-year degree	18 (27.3)
Graduate degree	31 (47.0)

[a] Leadership (n=3) and family members (n=2) were not included.

Table 12. Jobs Held by Interviewees (N = 71)

Job Type	*n*
Administrative (patient service workers)	5
Administrative managers	4
Environmental service technicians	6
Nursing/medical assistants	4
Laboratory/clinical	3
Medical doctor/physician assistant	11
Mental health (social workers, psychologists, counselors)	5
Registered nurses	14
Nutrition (service workers, registered dieticians)	5
Therapists (respiratory, occupational, physical)	9
Family members	2
Leadership	3

Mental Health

When discussing their mental health, many interviewees reported feeling stressed and anxious, lonely, and depressed. Many interviewees did not discuss mental health or distress in clinical or psychological terms; rather, they reported broader emotions of fear or worry, shock, irritability, and sadness, along with behaviors such as avoidance and "overthinking." Discussions of depression, sadness, or trauma did not feature as prominently as discussions of stress and anxiety. This aligns with our survey findings.

> *I definitely had a lot of anxiety and just fear about it because I'm an overthinker. I think about everything … My mom and my parents, and my siblings they're all high risk. God forbid it, if they were to catch it, it's over. I was just having that thought in my head like, "Okay, I'm scared, what if there's a hole in my PPE?" or "What if there's a hole in my hand sanitizer or I miss this step?" That was my fear. I was definitely really scared.*

Broadly, many interviewees describe feeling extremely stressed, overwhelmed, and worried. Some called these feelings "anxious," but most described it in terms of "stress." Early in the pandemic, anxiety was driven by uncertainty at multiple levels: uncertainty of the pandemic and its progression, uncertainty about PPE (both availability and how to use it), and uncertainty of whether staff were doing the "right thing."

> *At first, it was very stressful and scary because of the unknown. I know even though I had all the appropriate equipment, if I was treating a COVID[-19] patient, I was still very adamant when I came home that I was doing a 2-week quarantine. I wasn't going to see anybody; I wasn't hanging out with anybody; I wasn't going to the store. I was so nervous that I have it and give COVID[-19] to somebody else. I was just extremely paranoid.*

Constant changes at home, work, and in the community also made it hard for staff to keep up and identify helpful coping strategies. Stress about doing the right thing was particularly common. At the same time, feelings of certainty in doing the right thing were a way to relieve stress or anxiety or feel more confident amid uncertainty.

> *The greatest thing that motivates me right now, one of them is the emotional fulfillment. My patients are very appreciative as well. We've been receiving like, "Oh, you're doing great. You're doing so great. You're always in the frontline every day." That feels so much for us being said of those very kind thoughts. There's one [motivator], with the pride that you're working in the frontline.*

Leadership played a role in this issue—either reassuring staff or exacerbating their stress/anxiety. Anxiety was exacerbated by feelings of confinement or lack of the usual options for coping. Some interviewees described how, when managing typical work-related stress, they would compartmentalize it and try to leave work at the hospital. With COVID-19, this became less of an option, as the stress resulting from COVID-19 featured prominently in their home lives as well.

Stress and anxiety changed over time. Initially, staff said their stress was related to fears and uncertainties about the virus itself. Staff described being "hyperaware" and "paranoid" about the pandemic, particularly in the early days.

> *You try to be mentally prepared, but you're still not mentally prepared for it. I had a meeting, and they explained that over 100 staff members caught COVID[-19] in 10 days. That alone makes your anxiety go up, and you become more paranoid, and you're trying to make sure you do everything possible. Make sure you have everything on the correct way, make sure you got your shield, make sure you washed your hands so many times that your hands burn. I can just imagine how it is. I'm sorry, I can't imagine how it is in a hospital because I'm in outpatient. I'm pretty sure my anxiety is nothing compared to theirs because they are directly in it, and they are living with it day to day.*

Some interviewees explicitly described feeling fearful of becoming like the patients they saw or treated or fearful of their family members becoming those patients. Having firsthand knowledge of what it was like to be a COVID-19 patient made the fear more real. Respondents discussed how, early in the pandemic, seeing formerly healthy patients suddenly die was shocking. A few said that their jobs had prepared them well to handle patient death. Others, even though they had seen death before, said the suddenness of COVID-19 death—and the desolation in COVID-19 units more generally—made COVID-19 death more challenging to deal with.

> *I guess I just get the lucky draw in terms of really depressing jobs … When I worked as a nursing assistant, I was working on an oncology floor, so cancer patients. I started being exposed to, basically, people that I got to know … Watching people die became a semiregular part of the job. If I really dig back a couple of years, when I was starting out, I remember being shocked and not knowing how to process all the danger and the deaths around me. Being a little bit taken aback that people could have a light-hearted attitude in a work environment like that. I don't think that being in a pandemic where people are also dying, but in a more global community scale. I don't know, I think that there's a lot of aspects in a pandemic that have become normalized to me. I don't know. I'm not really sure.*

The trauma of witnessing COVID-19 death seemed perpetuated by the general stress of working during the pandemic. Staff did not feel they had the time or space to really process these events because of the overall stressful environment. Interviewees described growing more accustomed to the toll of the pandemic, more trusting in PPE, and more familiar with COVID-19 treatment and management over time, which somewhat abated their stress. During these later stages, though, staff described their anxiety as stemming from feelings of "powerlessness," as they grappled with schedule changes, absenteeism, and being required to take on more work than they felt they could handle.

For some staff, fear and uncertainty extended beyond the pandemic itself. Staff, especially service staff, were afraid not only of getting sick (or infecting others), but of losing their jobs, vacation time, and so on. Service staff described feeling afraid and unprepared to work around COVID-19 patients or in the hospital in general. At the same time, amid fear and uncertainty, these staff stated they needed to work. Even as they learned—through formal communication, changes in their job, or the media—about increasing numbers, they described feeling like they had no choice but to continue working. They needed to keep their jobs and could not afford to take a break.

Loneliness was common and was related not only to feeling socially isolated but also to lacking physical contact with others (including coworkers). While some staff reported that their feelings of isolation felt similar to those in the general community, many expressed feeling uniquely isolated because friends and family were afraid to interact with them as healthcare workers. Loneliness felt particularly salient for staff who were struggling with their mental health and felt in need of support. For these staff, isolation perpetuated feelings of stress and anxiety.

> *Not being able to touch people, like giving a hug or a handshake or a high five or something like that. Those things, you don't really realize how much of a social creature you are until you take that element away ... I want to say like a very human element to me was just taken away.* ”

A few staff described facing challenges meeting new people as a healthcare worker during the pandemic. For example, some had recently moved to the area and struggled to make friends or meet people outside of work, while others had difficulty trying to date or find romantic connections as a healthcare worker. New staff who did not have time to go through typical orientation procedures reported feeling disconnected from their teams.

In terms of their mental health, a number of interviewees described avoiding certain personal or professional interactions or responsibilities. Their motivations differed; some did not want to impose their own experiences on their friends, family, and/or colleagues, whereas others described how, by avoiding certain responsibilities,

they could take care of their mental health. Although a few staff described feeling more comfortable with or less impacted by the isolating nature of the pandemic, this perception was generally uncommon.

An important coping strategy for many interviewees was connecting to social support networks at home with family and friends and within the work environment. While many interviewees reported awareness of formal employee mental health counseling and support programs, few had used these services. Several interviewees described using other supportive programs, such as “buddy” programs for new hires and opportunities to meet with a chaplain during shifts taking care of COVID-19 patients.

Other coping strategies to buffer the mental health impacts of the pandemic included exercise, spirituality and meditation, looking for silver linings, and keeping busy. Less commonly reported coping behaviors included binge eating, using substances, and volunteering in the community. Older healthcare workers and those with experience in prior outbreaks and disasters expressed confidence in their ability to get through the pandemic based on their demonstrated resilience in the past.

Personal Protective Equipment

All interviewees were asked to share their thoughts and experiences about the availability of and the education and training provided to use PPE while on the job. Specifically, clinical workers mentioned that information about PPE and PPE policy and procedure changes was primarily communicated via email. These communications came from multiple people, such as their managers, supervisors, or safety officers. As a result, many interviewees reported feeling that communication concerning PPE policies and procedures was continually changing and was inconsistent.

Interviewees described instances in which employees were not able to wear or made the decision not to wear PPE in particular situations. Although most acknowledged the importance of wearing PPE, some clinical personnel tried to save PPE for others by not using it when they knew full PPE was not needed (ie, they knew the person had tested negative for COVID-19 or they did not need a gown because the person coming in due to trauma was not bleeding). Some of the nonclinical staff reported that PPE was not worn due to comfort issues. For example, kitchen staff described that they had trouble breathing in the hot kitchen while wearing a mask and reported that they were told to wear it by supervisors who did not work in the kitchen.

While wearing PPE was mandated for all staff, most interviewees reported they were told to conserve PPE when possible, to potentially not use it or use less for non-COVID-19 patients, do all they could to preserve masks and make them last as long as possible, and so on. Many clinical staff who provided less direct care to the patients (eg, mental health professionals) felt guilty about seeing patients in-person or using PPE. However, they received reassurance from colleagues that they also needed to use PPE.

Learning to Use Personal Protective Equipment

Interviewees reported that the training provided to learn to use PPE was extremely helpful. Some clinical staff were already familiar with wearing PPE, but they needed to learn new ways of donning and doffing PPE and understand the extra steps necessary for appropriate PPE use when caring for COVID-19 patients. This knowledge was obtained during provided trainings.

> *In the beginning, the transition to bio[containment] unit, of course this is new, so it was a little bit chaotic, but everyone got their PAPRs [powered air purifying respirators], and training was provided and very good, so we were able to learn the ropes. Then within maybe, I'd say, 2 months, by the third month, for sure, we were donning and doffing literally like it's our job. We came in in the morning, we knew what to do, and the day went by much smoother given the time and the experience. Yes, I think I have only good things to say about the transition to the biocontainment mode.*

In the beginning of the pandemic, the presence of safety officers was often seen as extremely helpful to workers in learning to use PPE appropriately. Several interviewees who had already received training to work in the biocontainment unit prior to the pandemic reported that the training had prepared them for COVID-19 and that they felt confident in managing COVID-19 patients, suggesting that PPE-related training during nonpandemic era may be important for the preparedness. Other interviewees who were not experienced with using PPE reported that they had to learn how to use PPE by wearing the PPE at work.

> *Because you actually learn a lot from just wearing the protective gear, and how different types of the protective gear will help you and help others by you just wearing it. You learn a lot. That's what makes it interesting.*

However, the constantly changing protocols and procedures regarding PPE use was reported to be confusing and a barrier to learning to use PPE properly.

Availability of Personal Protective Equipment

Most of the interviewees, across all job categories, reported that masks, especially early in the pandemic, were neither as available nor accessible as they were before the pandemic. They were asked to reuse masks as much as possible. Some interviewees reported that their departments kept PPE (particularly masks) locked up and that they had to request a mask from a supervisor or management when they needed them. Interviewees sometimes experienced pushback from management to provide masks; however, this was more often reported among nonclinical positions.

> *Initially, we were pretty short on masks. They would give us a mask and say, "Make it last as long as you can." There was a little bit of resistance when you'd come back and get another one. Like, "How long did you keep it? What's wrong with your other mask," stuff like that.*

In response to the restricted availability of PPE, many employees in clinical and nonclinical positions wore their own cloth masks or purchased and brought in their own supplies (eg, cleaning wipes, hand sanitizer) to feel adequately protected.

> *I think what people are doing is just buying their own stuff, basically and bringing it in. I don't think there's been a discussion altogether that we need better supplies. I don't think that's happened. Again, we're not a COVID[-19] unit, so I don't think the priority is us. I would still feel safer if we had adequate PPE.*

Clinical staff reported a great deal of variance in the availability of PPE. Some interviewees reported there was always enough PPE if they needed it and that JHHS had an adequate stockpile of PPE. Others reported there was not enough PPE and that the health system was not prepared. Some interviewees reported sharing supplies between departments so that everyone had enough. Some respondents said that shortages were primarily limited to the early days of the pandemic.

> *Certainly, the institution as a whole did a great job of providing us with enough PPE. A lot of my colleagues agree, never felt lacking for that. At the beginning we were conserving our N95 masks and having to reuse them and things like that, but there was never a point similar to these horror stories [you] hear from New York where people were wearing rain ponchos for PPE and things like that.*

At the beginning of the pandemic, the availability of PPE differed by job categories, even among interviewees in clinical roles. For example, healthcare professionals, such as social workers, mental health clinicians, and therapists, reported having a harder time securing or replacing theirs than nurses or doctors.

> *It's okay now. At the beginning, it was terrifying because most of the masks and the gowns are supplied by each unit, which is run by the nursing staff. As therapists, we were having a hard time in the beginning getting the nursing staff to give us the equipment when we were on their unit.*

> *We couldn't even find hospital-grade masks that were available to us and so we started wearing our own hand-sewn and cloth masks and that kind of stuff early on.*

These healthcare professionals described trying to avoid in-person consultations so that they could reserve PPE for those who needed it most. These participants also reported feeling guilty when using PPE if/when they felt they did not absolutely have to use it.

> *I was feeling a lot of guilt about using PPE in the beginning because I am not like a bedside nurse. Having some encouragement from those 2 physicians as well as some of the [...] saying, "No, [name withheld], we are not going to be holding this against you. We have enough and we'd rather have you here than not here." That was really helpful too because I didn't want to take resources from people who needed it. That wasn't the case and they were very reassuring.*

While the majority of interviewees reported experiencing shortage in PPE supply in the early stage of the pandemic, a few service staff described that they did not struggle to get PPE, possibly because they only needed less protective PPE such as face masks.

Betrayal

Interviewees reported that their perceptions of how they were treated by the health system largely shaped their feelings of betrayal. Many interviewees expressed that the healthcare workers' safety was not the priority of the institution and that the institution did not care about their safety as much as it did with the patients. Sometimes this was framed in terms of neglect and actual danger, and at other times it was described as showing that the institution cared. Many said they felt that the health system was untrustworthy and that they had felt that way since before the pandemic. In particular, some interviewees described that insufficient PPE and receiving emails warning not to "steal" PPE in the early pandemic made them lose trust in the institution.

The healthcare system had instituted a no visitor policy early in the pandemic but started to allow visitors when the number of COVID-19 cases began to decrease. Several interviewees perceived that the policy change compromised healthcare workers' health and safety, because more visitors meant increased chances of exposure to COVID-19. Some interviewees reported advocating their concerns to the higher administration levels in the institution. As a result of the health system reopening to visitors, many interviewees reported their feelings of being ignored and that the health system did not prioritize healthcare worker safety.

Some interviewees felt the amount of attention received and the way employees were cared for was dependent on their position within the health system, with physicians and nurses getting preference over others. This feeling of discrimination inherently induced "us versus them mentality," and some interviewees reported feeling distanced and divided from managers or coworkers. For example, some reported that they had strong feelings of betrayal when administrators or managers were allowed to work from home, while that the option was not offered to lower-level staff whose jobs might have allowed them to also work remotely.

Many interviewees stated that staffing shortages was a critical issue even before the pandemic, which resulted in employee overwork during the pandemic. They reported regularly being scheduled to work more with less staff. Salary was mentioned repeatedly as an issue that discouraged employees during the pandemic. Dissatisfaction with salary was mentioned by all cadres of employees, including physicians and nurses. Interviewees described that despite their hard work, they felt that they were not being compensated well because of the absence of hazard pay, salary freezes, and retirement and benefit cuts. Another issue reported related to salary was of workers being forced to take paid time off. Although this was considered "better than being laid off," it still felt difficult in the current situation. Additionally, nurses reported not receiving hazard pay at a time when the health system was bringing in traveling nurses who were paid twice the salaries of the health system's own nurses. This policy was seen as unfair and contributed to staff nurses' feelings of betrayal. Some interviewees reported that they felt that they were not respected by the health system, which had stated that it honored healthcare workers as "heroes" in the pandemic.

> *Even a 2% [raise] is not a lot of money, but that was always expected. That was the bare minimum. I've just noticed the last 5 years, working for the hospital that they've been slowly taking away benefits every year in sly ways. I wasn't surprised when I heard that, and I know it probably wasn't an easy decision for them to make either. I feel like the hospital does have a lot of revenue. That's probably not wise to, I don't know, I just thought that was just not honoring nurses when they have all these signs up that's saying, "Thank you. You're a healthcare hero." I don't know, I feel like it's a slap in the face.* ”

Feelings of betrayal due to salary issues was greater among healthcare workers whose friends or acquaintances were working in other healthcare institutions where employees did receive hazard pay. These interviewees expressed strong mistrust of the institution, with a few of them reporting that they were considering moving to other institutions.

Hierarchy

Many interviewees reported that they felt very supported by their supervisors and managers. Supportive actions from leadership included checking in on staff (either professionally or personally) and doing the "dirty work" together when necessary. However, some interviewees indicated strong dissatisfaction with higher levels in the hospital hierarchy because they felt that decisions were made without considering how they would affect workers. Some complaints about leadership included that managers and supervisors were just "passing the buck" so they would not have to address it or that managers were not doing all they could for their employees (eg, advocating for hazard pay or addressing the shortage of PPE).

A few interviewees in clinical roles reported tension and power dynamics with other clinicians in the hierarchy. For instance, one nurse reported her discomfort that physicians avoided coming into COVID-19 patients' rooms because they did not want to be exposed.

> *In the beginning, it was nice because the physicians, nurses, [respiratory therapists], everyone stayed in the fire units together. We all knew that everyone was there to support everyone. As time went on, the physicians got little doctor rooms outside the units that they stayed in so then stuff became like via phone calls. That added to the burnout because it felt like "us versus them" when you were in the unit and they weren't in the unit. I think, in the beginning it was a lot better when everyone is in there together.*

Another nurse described feeling ignored because some physicians did not listen to the nurses who were "in the trenches" working with COVID-19 patients and had seen what works. Nonclinical staff repeatedly reported a sense of superiority among nurses and physicians that resulted in making them feel undervalued. It was common for these workers to comment that they might feel "forgotten":

> *Other than nurses and doctors, there [are] more people who are working in the hospital pretty much every day. Maybe we are not directly involved in patient care, but we are in the hospital putting work in.*

Communication

Interviewees commonly reported that communication, whether from unit leadership, hospital leadership, or other departments, was too frequent. Thus, many reported feeling overwhelmed with too much information. They also reported receiving multiple emails with conflicting or changing information regarding policies and procedures, causing confusion and frustration.

> *Communication was good. If anything, sometimes you felt like there's too many, you couldn't wade in through all the emails every day about COVID[-19]. Yes, it just added to all the certainty of everything, or relearning everything a little bit.* ”

Additionally, interviewees in clinical positions (particularly nursing staff) were more likely to report that they were unable to check their emails throughout the day, failing to keep up with updates in policies and procedures. In an effort to consolidate communications, some interviewees noted that clarification at least from one person helped them to manage with potential confusion caused by miscommunication. For instance, some managers synthesized information into one email daily or every few days or gave highlights each morning or evening during a huddle. Additionally, many interviewees noted that sharing updates with coworkers helped everyone to adopt new policies or procedures.

> *When we first were having all this COVID[-19] stuff there were changes that would happen in the morning. Then by the evening they would change it again to something totally different. Staff tend to not read emails especially if I'm going to send an email to send an email, to send an email. Then I felt like I wasn't doing my staff any justice just to forward them an email. Most people, "I'm here at 7, tell me what I need to do, tell me what's changed." I was trying to look hard at, I would get a lot of emails, being the manager I would be the one that was getting the information that's changing. Instead of sending emails constantly every day, I would try to wait and group my emails to every couple days."* ”

Many interviewees mentioned receiving emails about the availability of mental health resources if they need it. Some reported that these mental health resources were useful. In contrast, many interviewees stated that they were unable to take time off to use these services, feeling that there was a mismatch between communication and practice.

> *I think the health system constantly sends out this communications about helping staff with resources, and with food and whatever, and make sure you call this phone line, but then when you have policies and practices that do not show that, then it does not feel very compassionate to me.*
>
> ”

Camaraderie

Healthcare workers consistently reported that work environment created by the COVID-19 pandemic strengthened coworker bonding and the atmosphere of teamwork.

> *I actually think my work friends were the most supportive just because we had that "we're all in this together" kind of mentality. We were all getting shafted and we were all having terrible experiences. There's a bond that develops when you're doing that. It can be a pretty tight bond, and I think that developed quite a lot.*
>
> ”

Many workers reported that being in the company of others undergoing the same physical and emotional demands from work made them feel that they could deal with COVID-19, just as their coworkers did. Small things, such as bantering or trying to laugh with others, enabled workers to bear and even overcome situations where otherwise they cited high levels of burnout. Examples of how employees felt they received support from coworkers included bringing PPE from home for each other, talking about and listening to each other about feelings, or sharing advice with one another. One interviewee described this camaraderie as a "special bond, special culture" among healthcare workers. One family member, who was not a healthcare worker, reported that his spouse had more close-knit networks than he did.

Individuals who had clinical roles (eg, physicians, nurses, physical therapists) were more likely to use family analogy to their peers (eg, "work family") and reported attachment or bonding with their coworkers. When some interviewees had received a COVID-19 positive test result or presented with clinical symptoms that suggested suspected COVID-19, they most commonly reported that they received emotional support from peers. Some individuals with clinical roles had to be physically present at work due to the nature of taking care of patients. Although they could not work remotely, they described that coming to work and having human interactions helped them to cope with stress caused by COVID-19.

> *I am so grateful to work with colleagues who have risen to the occasion so beautifully during this incredible challenge. Our group has protected some of its members from potential exposures because they or their family members are at high risk. We are all working more hours, caring for higher numbers of*

> *patients than in the past (without any added compensation) and I've heard almost zero complaining. My colleagues are true professionals and I am proud to be among their number. We have taken on this risk and accepted it as part of our mission to care for all who seek our help.* ”

Because COVID-19 was new to everyone, participants reported that they had to learn together and help each other, regardless of hierarchy or unit. Sharing clinical knowledge with coworkers and in team discussions to come up with solutions or ideas to deal with COVID-19, created strong bonding among colleagues and team members. The nature of clinical roles, that individuals share similar knowledge and training/work experiences, helped workers to empathize with each other. In particular, interviewees reported that coworkers were easy to talk with about what they were experiencing in the midst of the pandemic because peers knew the context of the work environment. Furthermore, interviewees did not want to scare their family members by describing what happened at work, so having coworkers who they could talk with was very much needed. Interviewees also described that support from coworkers helped them to find meaning in work and motivated them to continue to work even they had to deal with an unknown, new disease with high uncertainty.

While most interviewees reported a stronger sense of camaraderie with their fellow coworkers, a few people reported that drastic job changes during COVID-19 disrupted the teamwork that they had before the pandemic.

Discussion

Anticipating the significant impact of the COVID-19 pandemic on all healthcare workers, regardless of their specific job roles, this study was designed to seek and learn from the experiences and perspectives of employees working at 5 hospitals in an urban academic healthcare system. As expected, the findings reflect varied individual experiences from the frontlines of response to the COVID-19 pandemic. The JHHS and JHM employees who participated in this study shared information about their mental health and wellbeing as well as observations about how factors inside and outside of the health system adversely or protectively affected their lives at work and at home.

Clinical and nonclinical staff both reported high levels of stress and anxiety, and almost half of all survey respondents reported experiencing feelings of burnout. Burnout is widely known to be a major problem in the healthcare workforce, with varying estimates even prior to the onset of the pandemic. We were not able to determine incremental levels of burnout attributable to the pandemic in this study, only that the burden exists and is widespread. The results from the survey and interviews reveal the significant mental health burden created by the pandemic/infectious disease environment itself, characterized by ongoing uncertainty and ambiguity related to our understanding of the virus. With over 91% survey respondents reporting some pandemic-related psychological stress (39% mild and 52% moderate or severe), caring for COVID-19 (and other) patients clearly impacted the mental health and wellbeing of most hospital employees.

The aggregate findings from the study also suggest a likely relationship between mental health issues, arising in or exacerbated during the pandemic, and common problems noted as originating from the work environment. The most typically observed workplace problems included a lack of adequate access to PPE, mostly in the early period of the pandemic; an array of communication challenges ranging from too many messages to too few; and specific difficulties working within new teams and roles in a relatively hierarchal system. Employees who emphasized that these issues were the source of their stress, anxiety, and depression also tended to report that these issues directly contributed to the evolution of their feelings of reduced trust and sense of institutional betrayal. While some employees reported greater camaraderie in meeting the challenges of COVID-19, many reported feeling undervalued and unappreciated for the work they were doing. The hierarchal structure of the workforce within the health system contributed to these feelings. Many employees, nonclinical staff included, felt that recognition of their role in keeping the hospital functioning by health system management was lacking. Perceptions that others were treated better or differently, especially in terms of access to PPE or receipt of hazard pay, perpetuated experiences of inequities and were seen as negatively impacting trust in the system and its leaders. While the shortages that had characterized the early stages of the pandemic have passed, some of the distrust has lingered.

Other reported stressors impacting employee mental health originated outside of the health system. Commonly reported contributors to mental health issues included personal financial hardship and unemployment or illness (other than COVID-19) within families. Stressors reported outside of the home and workplace included concerns about economic decline in the community and persistent uncertainties and fears related to the ongoing pandemic itself. Employees also reported that even small personal issues became difficult to deal with, affecting mental health and wellbeing.

Prior to the onset of the pandemic, leadership of the study's setting—a large and well-resourced academic medical center—had established their commitment to employee mental health and wellbeing through substantial investments and the implementation of numerous programs to support employees. These investments continued throughout the pandemic as medical center leadership increased communications and resources for its workforce. JHM made numerous efforts to source PPE and establish virtual forums with infection control experts to answer questions about staying safe and protecting families. JHM set up food banks for staff and created programs to help employees whose families were experiencing hardships, with funds for necessities such as rent, computer access for children who had recently started homeschooling, and funeral costs of loved ones lost in the pandemic. JHM expanded access to health and wellness programming and shared recorded leadership dialogues to share appreciation for the work of employees. It also provided employees information on ways to seek additional help when needed, such as resources related to safety, mental health, and spiritual care. JHM sought to communicate dynamic information in a timely way, by creating a pandemic-related intranet site and setting up a system-level communications review process to facilitate a large volume of messaging.

Yet, even with the presence of these dedicated resources, over half of the study's respondents reported experiencing moderate to severe pandemic-related stress. While formal employee support programs are an important resource, more accessible options like chaplains or supportive supervision, were mentioned often in interviews as being much more useful for employees. In discussing coping strategies, many employees reported that they knew they had access to support such as stress reduction and mindfulness apps, meditation rooms, and other mental health support, however, they did not use them because they did not have enough free time. Additionally, the mental health resources available address issues at the individual level, while the study findings suggest that the primary source of stressors was at the institutional level. Communication during an evolving pandemic across a complex healthcare system is extremely challenging, as is providing support to a diverse hospital workforce. Future initiatives should address creating and sustaining emotionally healthy, safe working environments with mitigation or elimination of internally sourced stressors at the institutional level.

Limitations

This study used an opt-in approach and collected self-reported data and, as such, was subject to self-selection and self-reporting bias often associated with survey and interview research. Both the survey data and the interviews, of course, reflect the perceptions and experiences of the respondents; this is not a limitation per se, but it is the case that people at different levels of the health system having different perceptions of events. The study respondents and interviewees were employed at a large, well-resourced hospital system in Maryland and Washington, DC, so some findings may not be relevant or similar to what hospitals and their employees elsewhere in the United States or in other countries experienced during the COVID-19 pandemic.

Conclusion

As of September 21, 2021, more than 676,000 Americans have lost their lives and a fourth surge is now occurring as the Delta variant accelerates the pandemic's impact.[23] This study reveals that the COVID-19 pandemic has had a profound impact on the mental health and wellbeing of hospital and healthcare workers. Clinical and nonclinical staff reported high levels of stress, anxiety, and burnout. The trauma of witnessing COVID-19 death was exacerbated by the general stress of working during the pandemic. The study also revealed the significant mental health burden created by the pandemic/infectious disease environment itself, characterized by the ongoing uncertainty and ambiguity about the scientific understanding of the virus itself. Finally, stressors negatively impacting employee mental health primarily stemmed from the workplace, resulting in reduced trust in and an increased perception of institutional betrayal.

Studies such as this offer an important window into learning more about employee health from the unique stress and trauma of the COVID-19 pandemic and can facilitate progress toward achieving many health systems' aspirations to communicate value and prioritize safety for all staff. To protect and enhance employee mental health and wellbeing in everyday practice as well as under the extra pressures of any future pandemic, health organizations will need multiple strategies and approaches. Some possibilities include ensuring the availability of various levels and types of employee support programs for a diverse workforce; ensuring employees can access and are paid while accessing the mental health support they need; adopting practices that promote psychological safety in the workplace for the entire workforce; making the structural changes necessary for close and ongoing attention to communication, including better relational coordination among roles; and utilizing mechanisms to solicit feedback from nonclinical service staff regularly about their perceptions of specific impediments to inclusion in the health system's mission. Although some of the findings discussed in this report may be specific to the Johns Hopkins Health System, studies like this should be conducted in other types and sizes of hospitals and health systems, so that overall learnings can be evaluated and used to prioritize improvements for future.

References

1. Kaiser Health News, *The Guardian*. Lost on the frontline. Accessed August 6, 2021. https://khn.org/news/tag/lost-on-the-frontline/
2. Brooks SK, Dunn R, Amlôt R, Rubin GJ, Greenberg N. A systematic, thematic review of social and occupational factors associated with psychological outcomes in healthcare employees during an infectious disease outbreak. *J Occup Environ Med*. 2018;60(3):248-257.
3. Huremović D, ed. *Psychiatry of Pandemics: A Mental Health Response to Infection Outbreak*. Cham, Switzerland: Springer International; 2019.
4. De Kock JH, Latham HA, Leslie SJ, et al. A rapid review of the impact of COVID-19 on the mental health of healthcare workers: implications for supporting psychological well-being. BMC Public Health. 2021;21(1):104.
5. Shaukat N, Ali DM, Razzak J. Physical and mental health impacts of COVID-19 on healthcare workers: a scoping review. *Int J Emerg Med*. 2020;13(1):40.
6. Greenberg N, Docherty M, Gnanapragasam S, Wessely S. Managing mental health challenges faced by healthcare workers during covid-19 pandemic. *BMJ*. 2020;368:m1211.
7. Spoorthy MS, Pratapa SK, Mahant S. Mental health problems faced by healthcare workers due to the COVID-19 pandemic–a review. *Asian J Psychiatr*. 2020;51:102119.
8. Maben J, Bridges J. Covid-19: supporting nurses' psychological and mental health. *J Clin Nurs*. 2020;29(15-16):2742-2750.
9. Walton M, Murray E, Christian MD. Mental health care for medical staff and affiliated healthcare workers during the COVID-19 pandemic. *Eur Heart J Acute Cardiovasc Care*. 2020;9(3):241-247.
10. Bernstein CA, Bhattacharyya S, Adler S, Alpert JE. Staff emotional support at Montefiore Medical Center during the COVID-19 pandemic. *Jt Comm J Qual Patient Saf*. 2021;47(3):185-189.
11. Chaffee M. Willingness of health care personnel to work in a disaster: an integrative review of the literature. *Disaster Med Public Health Prep*. 2009:3(1):42-56.
12. Aoyagi Y, Beck CR, Dingwall R, Nguyen-Van-Tam JS. Healthcare workers' willingness to work during an influenza pandemic: a systematic review and meta-analysis. *Influenza Other Respir Viruses*. 2015;9(3):120-130.
13. Buselli R, Corsi M, Veltri A, et al. Mental health of health care workers (HCWs): a review of organizational interventions put in place by local institutions to cope with new psychosocial challenges resulting from COVID-19. *Psychiatry Res*. 2021;299:113847.
14. Labrague LJ. Psychological resilience, coping behaviours and social support among health care workers during the COVID-19 pandemic: a systematic review of quantitative studies. *J Nurs Manag*. April 12, 2021. doi:10.1111/jonm.13336
15. US Bureau of Labor Statistics. Labor force statistics from the current population survey: 11. employed persons by detailed occupation, sex, race, and Hispanic or Latino ethnicity. Last modified January 22, 2021. Accessed August 6, 2021. https://www.bls.gov/cps/cpsaat11.htm
16. Wexler S, Engel RJ, Laufer T, et al, "We're not the enemy and we're not asking for the world": low-wage hospital service workers' advocacy for fair wages. *J Soc Soc Welfare*. 2020;47(1),123-148.

17. Himmelstein DU, Woolhandler S. Health insurance status and risk factors for poor outcomes with COVID-19 among U.S. health care workers: a cross-sectional study. *Ann Intern Med*. 2020;173(5):410-412.

18. Kroenke K, Spitzer RL, Williams JBW, Löwe B. An ultra-brief screening scale for anxiety and depression: the PHQ-4. *Psychosomatics*. 2009;50(6):613-621.

19. National Institute of Health. [Stoddard Kaufman] Coronavirus impact scale. Accessed August 6, 2021. https://www.nlm.nih.gov/dr2/Coronavirus_Impact_Scale.pdf

20. Dolan ED, Mohr D, Lempa M, et al. Using a single item to measure burnout in primary care staff: a psychometric evaluation. *J Gen Intern Med*. 2015;30(5):582-587.

21. Wilson JP. The impact of event scale: revised. In: Wilson JP, So-Kum Tang CC, eds. *Cross-Cultural Assessment of Psychological Trauma and PTSD*. New York: Springer; 2007:219-238.

22. Nash WP, Marino Carper TL, Mills MA, Au T, Goldsmith A, Litz BT. Psychometric evaluation of the Moral Injury Events Scale. *Mil Med*. 2013;178(6):646-652.

23. Johns Hopkins University & Medicine. COVID-19 dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU). Accessed August 10, 2021. https://coronavirus.jhu.edu/

Johns Hopkins
Center for Health Security

621 E. Pratt Street, Suite 210
Baltimore, MD 21202

Tel: 443-573-3304
Fax: 443-573-3305

centerhealthsecurity@jhu.edu
centerforhealthsecurity.org

JOHNS HOPKINS
BLOOMBERG SCHOOL
of PUBLIC HEALTH

Center for Health Security