Stress, Resilience, and Coping of Healthcare Workers during the COVID-19 Pandemic

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Abstract

Objective: To estimate the health care workers (HCWs) self-reported stress, resilience, and coping during the COVID-19 pandemic, and to determine inter-professional differences. **Participants and Methods:** An email survey was sent to 474 HCW at a Midwestern HealthCare facility between April 9, 2020 and April 30, 2020. A total of 311 (65.6%) responses were received by May 31, 2020. The survey utilized 3 validated instruments: Perceived Stress Scale (PSS), Brief Resilience Scale (BRS), Brief Resilience Coping Scale (BRCS). **Results:** Of the 311 responses, 302 were evaluated: 97 from nonmedical staff with patient contact (NMPC); 86 from nonmedical staff with no patient contact (NMNPC); 62 from medical doctors (MD), physician assistants (PA) and nurse practitioners (NP); and 57 from nurses. Significant differences were noted across job categories for stress and resilience, with nurses reporting highest PSS scores (effect estimates: -2.72, $P=.009$ for NMNPC; -2.50, $P=.015$ for NMPC; -3.21, $P=.006$ for MD/NP/PA respectively), and MD/NP/PA group with highest BRS scores: nurses (-0.31, $P=.02$); NMPC (-0.3333, $P=.01$); and NMNPC (-0.2828, $P=.02$). Younger personnel had higher stress (-1.59 per decade of age, $P<.01$) and more resilience (0.11 per decade of age, $P=.002$). **Conclusion:** These self-reported data indicate that MD/NP/PA had the highest resilience scores and the nurses had highest stress levels. Efforts are warranted to include all HCWs in systematic stress mitigating interventions with particular attention to understand specific factors contributing to stress for the nursing team.

Keywords

pandemic, stress, resilience, healthcare, SARS, provider

Introduction

On December 31, 2019, the Wuhan Municipal Health Commission in China reported a cluster of cases of pneumonia.[1] This was later identified as a SARS-CoV-2, *coronavirus.*[1] On March 11, 2020, the virus, SARS-CoV-2, was declared the COVID-19 pandemic by the WHO.[2]

During this evolving world-wide health care crisis and desperate time of need, the overwhelming burden of illness and mortality has threatened operations of health care institutions worldwide and the physical, emotional, and financial health of their HCW. HCWs must grapple with fears of infection, death, and the risk of COVID-19 transmission to their families, as well as post-traumatic stress and other mental, physical, emotional, and spiritual concerns.[3] To quote Greenberg et al., "We have placed our healthcare professionals in an impossible situation of having to make life and death decisions while working under extreme pressure."[4]

Resilience refers to one's ability to bounce back from adversity and view adversity as an opportunity for growth; it is an increasingly recognized protective factor against stress.[5,6] Resilience among HCWs is influenced by multiple factors at the individual, organizational, and societal levels.[7-10] It is imperative to address issues at the organizational level, including robust structural interventions within

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the work environment.[7] It is also essential to identify individual factors that contribute to resilience in order to inform best practices for empowering HCWs to cope and optimize their well-being, especially during adversity. Prior research has identified a direct relationship between non-productive coping and stress, burnout, and other well-being measures, among HCWs.[11] Recent studies during the COVID-19 pandemic have indicated direct relationships between pandemic-related stress, anxiety and resilience among physicians in Israel.[12,13] The purpose of our project was to assess the level of stress, resilience and ability to cope among HCWs at a tertiary care academic medical center during the initial stages of the pandemic, utilizing validated assessment scales, and to determine inter-professional differences.

Methods

This survey, intended for practice-improvement was completed by general internal medicine colleagues within 1 health care institution in the midwestern United States, during the COVID-19 pandemic. This study was reviewed and approved by the General Internal Medicine Leadership and the Institutional COVID-19 taskforce.

Study Population and Survey Methods

Participants included a convenience sample of staff within the General Internal Medicine division, including medical doctors (MD), nurses (RNs, LPNs), nurse practitioners (NP), physician's assistants (PA), administrative assistants (AA), as well as other division staff.

Participants received information regarding the general purpose of the project and contact information for questions/complaints. This voluntary and anonymous survey was sent as a link through an email. The initial email went out on April 9, 2020; non-responders received reminder emails on April 16, 2020, April 23, 2020, and April 30, 2020. Study collection was closed on May 31, 2020. A detailed summary of the above is found in the consort diagram presented in Figure 1, which adheres to *Consolidated Standards of Reporting Trials* (CONSORT) guidelines.[14] All surveys were delivered as a link via email through the use of REDCap.[15] There was no compensation offered for participation.

Survey Instruments

This survey was developed utilizing *Research Electronic Data Capture* (REDCap)[15] and consisted of validated scales measuring resilience (Brief Resilience Scale (BRS)),[16] coping (Brief Resilience Coping Scale (BRCS)),[17] and stress (Perceived Stress Scale (PSS)),[18] Other measures which were included in the survey, will be reported elsewhere. Many questions had Likert scale responses such as "strongly

agree," "agree," "neutral," "disagree," and "strongly disagree." The total number of questions ranged from 44 to 54 depending on how respondents answered individual questions with branching logic. The 5 overarching components of the survey were: (1) Current task burden (direct patient contact or no patient contact); (2) stress (PSS); (3) resilience (BRS); (4) coping (BRCS); (5) socio-demographic characteristics.

Pilot testing of the survey was conducted with 4 rounds amongst 7 clinicians, nurses, and nonmedical staff to assess the acceptability, readability, and understandability of the survey. The resulting survey took 5 to 7 min to complete.

Data Analysis

For the purposes of this analysis, respondents were divided into 4 groups according to their current job description: (1) MD/PA/NP; (2) nurses; (3) non-medical health staff with patient contact (NMPC) and (4) non-medical staff with no patient contact (NMNPC).

Descriptive characteristics for the respondents were reported using frequencies and percentages for each group. For each of the 3 surveys (PSS, BRS, BRCS) a multiple linear regression model was used to compare the groups. Age and sex were adjusted for each model. Age was collected in the survey as a range of values, but for the purposes of the model was coded as a 10-year continuous variable. *P*-values of <.05 were considered statistically significant and 95% confidence intervals were reported with all point estimates. SAS statistical software (SAS version 9.4, SAS Institute Inc.)[19] was used for all analysis.

Results

Of the 474 surveys sent, a total of 311 (65.6%) responses were received. Among the 311 survey responses, 302 were evaluated. The 8 excluded from analysis did not self-identify their job role/title. Among the 302 responses included in the analysis, 86 were from NMNPC, 97 from NMPC, 62 from MD/PA/NP, and 57 from nurses.

Descriptive characteristics are reported in Table 1. A majority of those who responded were white (90%) and female (85%). A large portion of respondents (32%) had worked in the health care field for over 25 years. Overall, only 15% of the respondents were male, and for the nursing group only 4% were male. The MD/PA/NP group had the highest percentage of participants over the age of 60 (24%). A total of 129 (43%) respondents identified as caregivers outside of their job.

A higher score on the PSS survey indicates a higher level of perceived stress. Compared to the nursing group, all of the groups had significantly lesser perceived stress (Table 2, Figure 2a) with the MD/NP/PA group having the
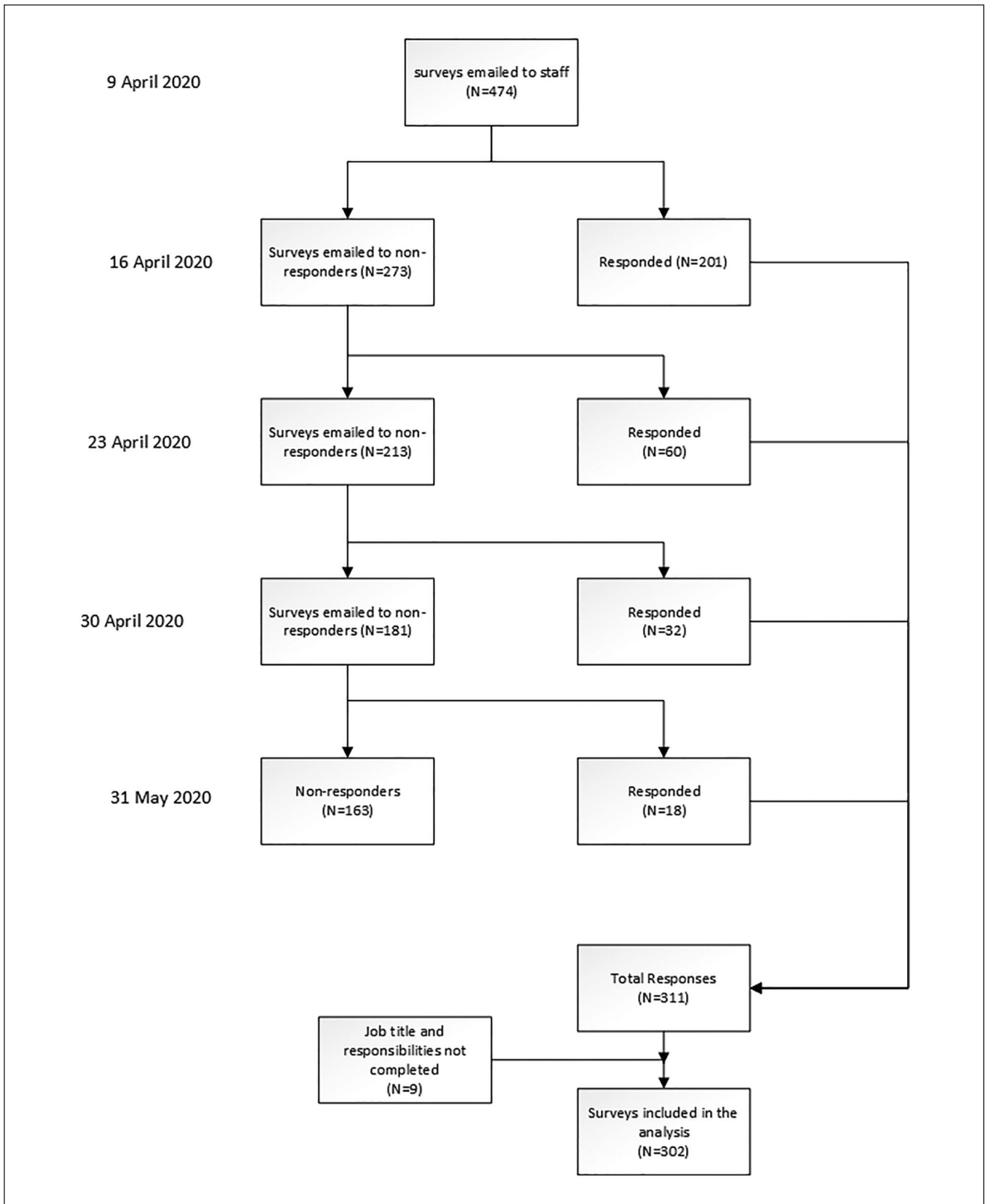
Figure 1. Consort diagram.

Table 1. Participant Characteristics.

|	Allied health: no patient contact (N=86)	Allied health: patient contact (N=97)	MD/NP/PA (N=62)	Nurse (N=57)	Total (N=302)
Age range, n (%)					
30 years or lower	14 (16.3)	17 (17.7)	2 (3.2)	3 (5.3)	36 (12.0)
31-40 years	22 (25.6)	26 (27.1)	20 (32.3)	11 (19.3)	79 (26.2)
41-50 years	26 (30.2)	20 (20.8)	10 (16.1)	16 (28.1)	72 (23.9)
51-60 years	17 (19.8)	25 (26.0)	14 (22.6)	20 (35.1)	76 (25.2)
60 years or higher	6 (7.0)	8 (8.3)	15 (24.2)	7 (12.3)	36 (12.0)
I do not wish to answer	1 (1.2)	0 (0.0)	1 (1.6)	0 (0.0)	2 (0.7)
Missing	0	1	0	0	1
Gender, n (%)					
Female	76 (89.4)	83 (87.4)	39 (63.9)	54 (96.4)	252 (84.8)
Male	9 (10.6)	12 (12.6)	21 (34.4)	2 (3.6)	44 (14.8)
I do not wish to answer	0 (0.0)	0 (0.0)	1 (1.6)	0 (0.0)	1 (0.3)
Missing	1	2	1	1	5
Race, n (%)					
White	82 (95.3)	90 (92.8)	45 (72.6)	55 (96.5)	272 (90.1)
Hispanic, Latino or Spanish origin	1 (1.2)	4 (4.1)	0 (0.0)	0 (0.0)	5 (1.7)
Black or African American	0 (0.0)	0 (0.0)	4 (6.5)	2 (3.5)	6 (2.0)
Asian	2 (2.3)	3 (3.1)	9 (14.5)	1 (1.8)	15 (5.0)
American Indian or Alaskan Native	1 (1.2)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.3)
Native Hawaiian or Other Pacific Islander	0 (0.0)	0 (0.0)	1 (1.6)	0 (0.0)	1 (0.3)
Other	0 (0.0)	0 (0.0)	2 (3.2)	0 (0.0)	2 (0.7)
Do not wish to answer	0 (0.0)	1 (1.0)	3 (4.8)	0 (0.0)	4 (1.3)
How many years have you worked in health care (in any capacity and also including employment outside of Mayo)? n (%)					
5 years or less	25 (29.4)	24 (24.7)	6 (9.7)	1 (1.8)	56 (18.6)
5-9 years	12 (14.1)	16 (16.5)	7 (11.3)	5 (8.8)	40 (13.3)
10-14 years	8 (9.4)	12 (12.4)	12 (19.4)	4 (7.0)	36 (12.0)
15-19 years	7 (8.2)	12 (12.4)	5 (8.1)	8 (14.0)	32 (10.6)
20-24 years	13 (15.3)	10 (10.3)	6 (9.7)	12 (21.1)	41 (13.6)
25 years or more	20 (23.5)	23 (23.7)	26 (41.9)	27 (47.4)	96 (31.9)
Missing	1	0	0	0	1
Has your sleep been adversely affected during this pandemic? n (%)					
No	50 (58.1)	41 (42.7)	42 (67.7)	23 (40.4)	156 (51.8)
Yes	36 (41.9)	55 (57.3)	20 (32.3)	34 (59.6)	145 (48.2)
Missing	0	1	0	0	1
Did you participate in any stress management activity or skill on a regular basis prior to the pandemic? n (%)					
No	46 (54.8)	46 (47.9)	22 (35.5)	24 (42.1)	138 (46.2)
Yes	38 (45.2)	50 (52.1)	40 (64.5)	33 (57.9)	161 (53.8)
Missing	2	1	0	0	3

largest difference from the nursing group. Age was also significantly ($P<.001$) related to PSS, with an average decrease of 1.59 points for every decade increase in age.

Just as PSS, a higher BRS score indicates a higher level of resilience. With the nurse group as the reference group, only the MD/NP/PA group was noted to have significantly higher resilience scores. When the MD/NP/PA group is used as the reference, the MD/NP/PA group was found to have higher BRS scores than nurses (−0.31, $P=.02$); non-medical staff with patient contact (−0.3333, $P=.01$); and

Table 2. Multiple Linear Regression Models.

	PSS model (N=281)		BRS model (N=290)		BRCS model (N=292)	
	Point estimate (95% CI)	P-value	Point estimate (95% CI)	P-value	Point estimate (95% CI)	P-value
Intercept	23.21		3.37		15.28	
Allied health: no patient contact	−2.72 (−4.77, −0.67)	.009	0.02 (−0.21, 0.25)	.86	−0.50 (−1.34, 0.33)	.23
Allied health: patient contact	−2.50 (−4.50, −0.50)	.01	−0.02 (−0.25, 0.21)	.85	0.15 (−0.66, 0.96)	.72
MD/NP/PA	−3.21 (−5.50, −0.92)	.006	0.31 (0.05, 0.57)	.02	0.30 (−0.62, 1.22)	.52
Nurse	Ref		Ref		Ref	
Female	1.04 (−0.98, 3.07)	.31	−0.17 (−0.40, 0.06)	.15	−0.41 (−1.23, 0.41)	.32
Male	Ref		Ref		Ref	
Age (Unit=10 years)	−1.59 (−2.17, −1.01)	<.001	0.11 (0.04, 0.17)	.002	0.02 (−0.22, 0.25)	.90
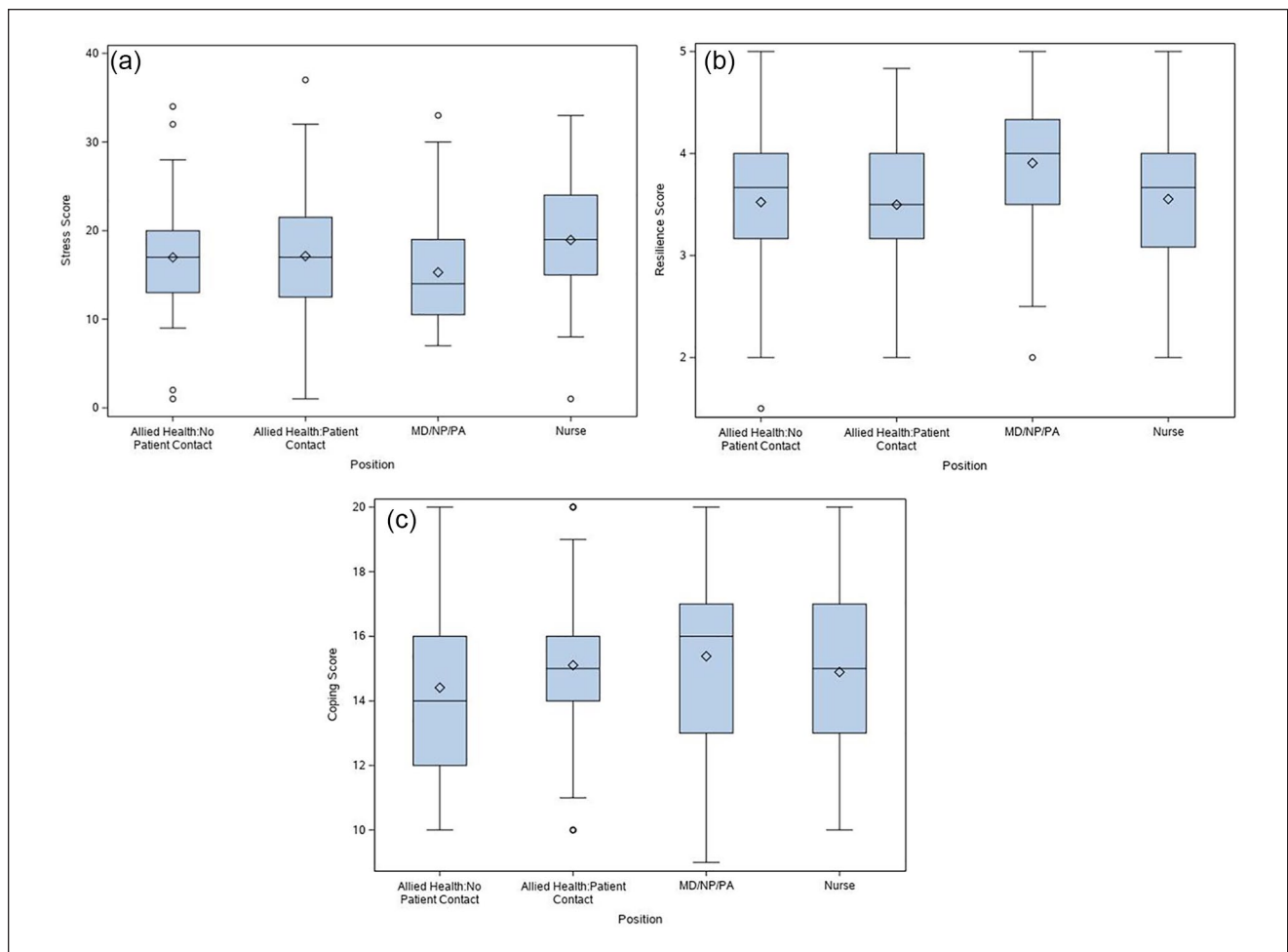
Figure 2. (a) Boxplot of PSS scores by job category, (b) Boxplot of BRS scores by job category, and (c) Boxplot of BRCS scores by job category.

nonmedical staff with no patient contact (−0.2828, *P*=.02). Age also significantly correlated to the overall BRS score, with older age associated with higher resilience (0.11 per decade of age; *P*=.002) (Table 2, Figure 2b).

For the BRCS survey, a higher score indicates that the respondent is more likely to cope effectively. For this outcome, no significant differences were detected before and after adjusting for sex and age (Table 2, Figure 2c).

Discussion

This survey in the initial stages of the pandemic was focused on self-perceptions of stress, resilience, and coping. The results indicate that while stress was rife across differing HCW, there were inter-professional differences and, in our case, nurses reported higher stress and lower resilience compared to the other job categories.

Pandemics highlight the emotional and occupational vulnerabilities of health care professionals.[20] A recent review of 14 COVID-19 related studies (N = 37-1257)[21] confirmed an extensive strain on HCWs due to stress, depression and anxiety. The severity of these mental issues was influenced by age, gender, occupation, specialization, type of activities performed and proximity to the COVID-19 patient.[21] This corroborates with our survey results and demonstrates a heightened need for organizational and individual strategies for stress management, enhancing resilience, peer support for coping and self-care among HCWs.

The COVID-19 pandemic has placed HCW in untenable stress while balancing the risk to themselves and others.[4] Stress, which may be caused by physical, mental or emotional factors[22] has both physical and psychological consequences, including increased allostatic load, fatigue, inattentiveness, mood disorders, addiction issues, job-related injuries, and absenteeism.[9,23,24] Add to this the idea of *moral injury*, which is defined as "the psychological distress that results from actions or lack of them, which violate someone's moral or ethical code."[25] Individuals who experience moral injury may develop depression, post-traumatic stress and suicidal ideation.[26] Not only are HCWs placed in a situation of personal moral injury by being in the frontline during this COVID-19 pandemic[27] but the societal burden of constant updates on death and infection, the misinformation, the added issues of protests, the divide over taking protective steps by the people at large, the shortage of medical and testing supplies, and the call to make decisions on life and death due to these shortages, has increased personal stress.

Overall, HCWs reported moderate-high self-reported stress scores in our survey (average PSS = 17.1), normal range for resilience (average BRS = 3.6) and normal range for resilience coping (average BRSC = 14.9). Further, the stress among nurses was significantly higher than that of MD/PA/NP group. Nurses also reported lower levels of resilience than the MD/PA/NP group, as well as inadequate stress management skills (prior to COVID19 pandemic) (64.25% vs 57.9%, physicians vs nurses respectively, Table 1). As in prior studies, our findings highlight the effects of how the psychosocial impact on HCW can differ by the occupation and perception of risk.[28] Similar findings were identified in previous studies in China. In one such study both the incidence and levels of anxiety were significantly higher amongst nurses in comparison to doctors,[29] and in another study, while HCWs reported low levels of stress overall; nurses reported higher levels of stress than doctors.[30] There is limited research regarding nurses' levels of resilience during the pandemic; however, 1 study demonstrated that nurses' low personal resilience predicted COVID-19 anxiety.[31]

A 2003 study within the Toronto health care system, which examined the emotional distress impact of the SARS outbreak on the HCWs, confirmed that 29% of all responders showed emotional distress. Similar to our observed inter-professional differences, in this survey, 4 factors associated with emotional distress included: (1) being a nurse; (2) part-time employment status; (3) lifestyle being affected; (4) ability to do one's job affected by the precautionary measures.[28] Finally, a 1-time cross-sectional survey during the COVID-19 pandemic conducted in China during peak months (January-Feb 2020) showed that among responders (1257/1830; 69%) 50% expressed depression, 44.6% expressed anxiety; 34% insomnia; and 71.5% distress.[32] These scores were modified by job type (nurses > physicians); sex (females > males); patient care (frontline > no direct patient care); location (Wuhan (pandemic hot spot) > outside of Wuhan); and finally years of experience (junior nurses > more experienced nurses).[32]

Nurses have been described as the backbone of the health system and outbreak responses.[33] Although the stressors are higher among physicians and nurses who are frontline (direct patient care) compared to others, it is understandable that nurses experience greater stress due to the nature of their work responsibilities which involve spending more time delivering direct patient care, and providing direct social and emotional support to patients whose families are barred from visiting.[34] Further understanding of specific factors contributing to the stress for nurses is important so that stress reduction approaches can be appropriately implemented for this population.

With regard to age differences and resilience, our findings indicated that older age was associated with higher resilience. Previous research has indicated that there is some evidence to support the premise that resilience increases with age.[35] Rational for this has not been well-studied; however, there is speculation that the improved resilience among older individuals could be contributed to the exposure to more adversity throughout their lifetime (and thus the development of strategies to overcome adversity),[35] and the tendency of older individuals to invest more time and energy in their health and family.[36] There is a lack of evidence regarding differences in resilience levels among HCWs according to age, thus this would warrant further research.

As with most studies, our study had limitations which included this being a 1-time cross-sectional survey of all individuals within 1 division (General Internal Medicine) at 1 institution. An additional limitation was the lack of

diversity, with the majority of participants being white females. The survey was delivered during the initial stage of the pandemic, wherein the staff was experiencing significant change: social distancing, mask wearing, cancellation of routing patient practices, conversion to virtual care, cancellation of time away and work related/ other travel, reduction of salaries and furloughs; creating economic uncertainty, all while the media was ripe with misinformation. It would have been ideal to deliver this survey and track outcomes at serial time points during the pandemic. This, however, was not feasible due to the decision to minimize survey burden and keep it anonymous and de-identified.

Informed by the staff and this survey, the General Internal Medicine divisional leadership took numerous proactive steps to support colleagues and mitigate the evolving impact of pandemic-induced stress across all HCWs. The leadership stepped up the communication across multidisciplinary teams with daily and weekly web-based meetings that focused on disseminating accurate and updated information related to the COVID-19 pandemic. There was timely dissemination of institutional initiatives and solutions to address emerging work-related issues, establishment of work teams addressing safety, creation of financial aid fund through the divisional social committee for staff members in need, updating of wellness websites, creation of videos and other resources for coping and resilience in addition to augmentation of opportunities for active peer support and stress management through uptake of existing programs (HELP: healing emotional lives of peers and SMART: stress management and resilience training) as well as virtual town halls to increase connection. There were more frequent check-ins across institutional and departmental administration.

Conclusion

These self-reported data indicate that while HCWs reported moderate-high stress scores, and normal levels of resilience and coping, the MD/NP/PA group had the highest resilience, while nurses had the lowest. In addition to lower resilience, nurses also had higher stress levels compared to the MD/PA/NP group. It is imperative to have robust strategies and tactics in place for early identification and mitigation of distress across job categories within health care and help enhance resilience and coping among all HCWs, with particular attention to nurses and nonmedical staff. In addition, interventions should be implemented at the individual, organizational, and societal level in order to order to address the multifactorial factors of HCW stress, resilience and coping.

Abbreviations

AA—Administrative Assistants
BRCS—brief resilience coping scale
BRS—brief resilience scale
CONSORT—Consolidated Standards of Reporting Trials
HCW—healthcare worker
MD—medical doctor
NP—nurse practitioner
REDCap—Research Electronic Data Capture
RN—Registered Nurse
LPN—Licensed Practical Nurse
PA—physician assistant
PSS—perceived stress scale

Ethics and Consent to Participate

This was a practice improvement project. As such, it did not qualify for Institutional Review Board approval. It was reviewed and

approved by the Mayo Clinic General Internal Medicine Leadership and Practice Committee, as well as the Mayo Clinic COVID-19 Taskforce.

Ethical Standards

This was a practice improvement project, which was reviewed and approved by the Mayo Clinic General Internal Medicine Leadership and Practice Committee, as well as the Mayo Clinic COVID19 Taskforce. All authors assert that all procedures contributing to this work comply with the ethical standards of the Mayo Clinic.

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Availability of Data and Materials

All data supporting the study findings are contained within this manuscript

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