LETTER TO THE EDITOR

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Initiation of a survey of healthcare worker distress and moral injury at the onset of the COVID-19 surge

To the Editor,

Medical response to episodes of disaster have been linked to increased healthcare worker (HCW) psychiatric morbidity. A recent study of clinicians caring for patients with coronavirus disease 2019 (COVID-19) in China reported high rates of symptoms of depression, anxiety, insomnia, and distress.[1] HCWs working during COVID-19 may face exposure to morally injurious events, such as provision of unsupported medical care or working with insufficient resources or staffing.[2] Moral injury has been defined as the psychological distress that results from actions, or the lack of them, which violate someone's moral or ethical code.[3,4] Traditionally evaluated in military service members at risk for post-traumatic stress disorder, moral injury might also be experienced by HCWs, particularly in provision of care during periods of heightened workplace stress. Although HCW moral injury has been explored in narrative analysis and scholarly commentary, no study, to our knowledge, has quantitatively measured moral injury outcomes among HCWs.[2,4-6]

We report initial measurements of self-reported distress and moral injury among HCWs at the onset of the COVID-19 surge in a large academic medical center in Baltimore, Maryland and evaluate their relationships with demographic, occupational and resilience-related risk factors.

Participants were recruited via departmental (Medicine, Critical Care, Emergency Medicine) email distribution lists (n = 838). A brief email included a link to an online survey, and a reminder email invitation was delivered 2 days later. The survey period spanned 20 March to 7 April 2020. Participants were asked to confirm that they had read information describing the study and the voluntary nature of participation and electronically selected "I agree" to enter the survey. This study was approved by the Institutional Review Board of the University of Maryland, Baltimore (IRB HP-00090729).

The survey assessed demographics and occupational characteristics (Table 1). Resilience was assessed via six Likert-style items based on prior research, including perceived workplace distress, perceived workplace support, social support, positive affect, history of shift work, and insomnia symptoms.[7,8] Distress associated with traumatic events was assessed via the impact of events scale—revised (IES-R[9]). Moral injury was assessed via the 9-item moral injury events scale (MIES[10]).

After assumptions for a linear regression were evaluated and found to be tenable, two separate hierarchical multiple regression analyses were performed to understand the impact of demographic, occupational, and resilience factors on distress and moral injury. For predictive analyses, sex was restricted to male/female, and proportion of inpatient time and proportion of clinical time were categorized as >50% and <50%. Having been evaluated for normality, resilience items were entered as continuous variables. To avoid confounding, sleep items were removed from the IES-R before predictive analyses. Participants with missing data were excluded from regression analysis. All analyses were performed using IBM SPSS v26.

Two-hundred nineteen respondents completed the survey (26% response rate). Table 1 presents demographic and occupational characteristics of our sample, means of resilience items, and IES-R and MIES total and subscale scores. All IES-R and MIES total scores and subscale scores demonstrated good to excellent internal reliability (IES-R α = 0.80 to 0.91; MIES α = 0.76 to 0.83).

As presented in Table 2, resilience factors explained the majority of variance in IES-R total score (ΔR^2 = 0.191; $P < .001$) and MIES score (ΔR^2 = 0.111; $P = .003$). Increased proportion of inpatient time, perceived workplace stress, and sleep troubles all demonstrated positive associations with higher total IES-R scores. Higher proportion of inpatient time and sleep troubles were associated with higher MIES score, indicating increased risk for moral injury, while perceiving a supportive workplace environment was associated with lower MIES score, although this latter was not statistically significant ($P = .068$).

At the onset of the COVID-19 surge at a Baltimore, Maryland-based academic medical center, self-reported distress was mildly elevated among HCWs. Mean distress levels (IES-R: 23) were similar in range to those in Chinese HCWs measured in late January 2020 (IES-R: 20), when confirmed COVID-19 cases in China exceeded 10 000 and the World Health Organization had declared a global pandemic.[1,11] Notably, the total number of cases in Maryland at the end of this survey had reached only 4371, but total US cases had reached 396 223. Despite case prevalence differences in China and the US contemporaneous with the respective survey collections, HCWs in both studies reported similar levels of distress. In our study, distress was significantly associated with proportion of time spent in inpatient care duties, perceived workplace stress, shift work, and

TABLE 1 Demographic and occupational characteristics, resilience factors, distress and moral injury scores in healthcare worker survey respondents, (n = 219)

	n, % or mean (SD)	
Demographic characteristics		
Sex		
Female	124	57%
Male	93	43%
Nonbinary/no answer	2	1%
Age, y	39.10	(11.10)
Occupational characteristics		
Years in healthcare	12.45	(10.33)
Professional category		
Attending physician	103	47%
Fellow physician	39	18%
Resident physician	44	20%
Other[a]	33	15%
Specialty		
Hospital medicine	34	16%
PCCM	35	16%
EM	42	19%
All other IM (primary care and subspecialty)	85	39%
Other[b]	22	10%
Proportion of working time during COVID19 response in clinical duties		
0%-25%	39	18%
25%-50%	36	17%
50%-75%	45	21%
75%-100%	98	45%
Proportion of working time during COVID19 response in inpatient care		
0%-25%	98	45%
25%-50%	31	14%
>50%	89	41%
Resilience factors		
Stressful work environment[c]	3.33	(0.93)
Supportive work environment[c]	3.73	(0.96)
Social support[d]	3.93	(0.98)
Positive affect[e]	4.16	(0.69)
Frequency of nontraditional shift work last 6 mo[e]	2.45	(1.28)
Frequency of sleep trouble[f]	3.00	(1.11)
Impact of event score-revised (IES-R)		
Total IES-R[f]	23.44	(13.80)
IES-R subscales[g]		
Intrusion	1.22	(0.76)
Avoidance	1.01	(0.68)
Hyperarousal	0.95	(0.74)
Moral injury event score (MIES)		
Total MIES (9 item)[h]	16.15	(7.80)
MIES subscales[i]		

(Continues)

TABLE 1 (Continued)

	n, % or mean (SD)	
Transgressions by self or others	1.65	(0.87)
Betrayals by others	2.10	(1.28)

Abbreviations: PCCM, pulmonary and critical care medicine; EM, emergency medicine.
[a]Other includes nurse practitioner, physician assistant, nurse, allied health, nonclinical, or other.
[b]Other includes anesthesia, surgery (general and subspecialty), neurocritical care and not applicable.
[c]1 = not at all, 5 = very.
[d]1 = not very strong, 5 = very strong.
[e]1 = never, 5 = almost always.
[f]Max score range 0 to 88 (higher = more distress).
[g]each subscale score ranges 0-4, where 0 = no distress, 4 = much distress.
[h]Score range 9 to 54 (higher = more moral injury).
[i]Each MIES subscale max score range 1 to 6, where 1 = no moral injury, 6 = more moral injury.

sleep disturbance. Somewhat surprisingly, greater frequency of shift work was protective against distress, perhaps suggesting a greater adaptability to short-term workplace change among shift working HCW in our sample.

HCW moral injury has been explored in narrative and qualitative data analysis among medical students and deployed military clinicians.[5,6] To our knowledge, our data are the first to explicitly quantify moral injury among HCW. Moral injury severity was less than that reported in Army National Guardsmen, but similar to scores in military service members exposed to 7-month war zone deployments, particularly in the reporting of betrayals by others.[10,12] Further, moral injury scores were significantly associated with sleep disturbance and proportion of inpatient clinical time, but not with other occupational or demographic factors.

The primary limitation to our study is that our use of a convenience sample limits external validity, as we cannot exclude nonresponse bias. Our sample was obtained using readily accessible listservs targeting internal medicine, emergency medicine, and critical care providers. This may either over- or under-estimate distress levels and the extent of moral injury and limit application of our findings to a broader population working during the COVID-19 pandemic. Future studies should seek to replicate these findings among a more diverse sample of HCWs and to examine moral injury and distress over time. Finally, because sleep is a modifiable target for prevention and intervention, future research should examine the potential benefit of resilience training, including sleep enhancement, to improve outcomes among HCW.

We have surveyed the same population at 4 and 12-week intervals to determine how responses change during evolution of the pandemic. Trajectories of distress and moral injury will provide important insight into opportunities to restore physician wellness.

TABLE 2 Summary of hierarchical regression for variables predicting impact of events scale—revised (IES-R) (n = 164) and total moral injury event score (MIES) 9-item (n = 161)

Variable	IES-R model			MIES (9-item) model		
	B	SE B	β	B	SE B	β
Step 1						
Constant	11.635	5.111		16.738	3.283	
Sex	5.131	1.907	0.214**	2.352	1.211	0.153
Age	0.025	0.088	0.022	−0.110	0.060	−0.143
Step 2						
Constant	7.890	7.098		18.127	5.266	
Sex	4.679	1.903	0.195*	1.73	1.227	0.112
Age	0.262	0.198	0.237	−0.133	0.160	−0.174
ICU	−3.874	2.069	−0.144	−1.85	1.357	−0.107
>50% clinical time	−4.354	2.402	−0.169	−1.992	1.607	−0.120
>50% inpatient time	6.749	2.290	0.278**	4.204	1.515	0.271*
Years in healthcare	−0.286	0.220	−0.231	0.05	0.178	0.271
Step 3						
Constant	1.619	9.492		18.415	6.884	
Sex	1.498	1.857	0.062	0.518	1.257	0.034
Age	0.113	0.181	0.102	−0.108	0.154	−0.141
ICU	−2.148	1.935	−0.080	−0.805	1.352	−0.047
>50% clinical time	−1.328	2.253	−0.052	−1.473	1.591	−0.089
>50% inpatient time	6.432	2.108	0.265**	3.524	1.473	0.227*
Years in healthcare	−0.260	0.201	−0.210	0.001	0.172	−0.001
Stressful work	3.045	0.962	0.235**	0.249	0.664	0.03
Supportive work	0.501	1.045	0.037	−1.322	0.718	−0.153
Social support	−0.803	1.056	−0.062	−0.391	0.723	−0.48
Positive affect	−0.235	1.356	−0.014	0.105	0.927	0.010
Nontraditional shifts	−1.462	0.735	−0.155*	0.356	0.510	0.058
Sleep trouble	3.404	0.857	0.314**	1.792	0.594	0.255**

Note: IES-R: R2 = 0.044 for step 1($P < .05$); ΔR2 = 0.075 for step 2 ($P < 0.05$); ΔR2 = 0.191 for step 3 ($P < .01$) MIES (9-item): R2 = 0.052 for step 1($P < .05$); ΔR2 = 0.049 for step 2 ($P > .05$); ΔR2 = 0.111 for step 3 ($P < .01$)

Abbreviation: ICU, intensive care unit.

* $P < .05$; ** $P < .01$.

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