

# Utilization of Wellness Practices For Burnout and Stress During COVID-19 Among an Interdisciplinary Cohort of Emergency Healthcare Workers

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## ABSTRACT

**Introduction:** The Coronavirus Disease (COVID-19) introduced additional stress to the baseline occupational stressors of emergency care workers. The objectives of this study were to evaluate perceived stress and burnout and the utilization and perceived benefit of wellness practices among emergency healthcare workers (EHCWs), including: emergency physicians, advanced practice providers (APPs), nurses, and departmental administrative staff during the COVID-19 pandemic.

**Methods:** A cross-sectional 28-item electronic survey of EHCWs at three hospitals in a major United States city was used to measure participants' utilization and perceived benefit of wellness practices, burnout (2-item measure), overall stress (perceived stress scale), and stress related to COVID-19.

**Results:** The sample consisted of 260 respondents (response rate 44.6%, 583 eligible). Over one-half (56.5%) reported burnout from their job and a majority (58.5%) reported moderate to high stress. Wellness activities including regular exercise and engaging in hobbies were associated with lower reports of burnout. Higher stress levels were reported by participants who had tested positive for COVID-19. Nurses reported the highest rates of burnout overall (80.6%). Females reported higher rates of burnout than males across the cohort (64.5 vs 41.9%,  $p = 0.001$ ), and female APPs reported significantly higher burnout than did male APPs (69.2 vs 38.5%,  $p = 0.048$ ). Participants reported donated personal protective equipment (PPE) and meals on shift were extremely helpful.

**Conclusion:** The COVID-19 pandemic was a significant contributor to the stress of EHCWs. Regular engagement in wellness activities was associated with lower rates of burnout. The benefit of engagement in wellness practices, both individual practices and organizational interventions are paramount to mitigate stress and burnout in EHCWs.

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## INTRODUCTION

The Coronavirus Disease (COVID-19) pandemic created additional stress to the baseline occupational stressors experienced by emergency healthcare workers (EHCWs), including: emergency physicians, advanced practice providers (APPs), nurses, and departmental administrative staff. Baseline stressors for EHCWs are well-documented and include large patient loads, lack of control, poor sleep quality, and non-circadian shift work [1–5]. New stressors, including: high risk exposures related to COVID-19, higher patient morbidity and mortality, supply shortages, frequent changes to hospital protocols, and concern about familial exposures, made working during the COVID-19 pandemic particularly stressful for EHCWs [6–11].

EHCWs are also at significant risk for burnout. Burnout is a syndrome that results from prolonged emotional and

interpersonal stressors and is defined by exhaustion, cynicism, and inefficiency [12]. Prior to the COVID-19 pandemic, burnout was well-documented in EHCWs with rates between 25-76% in emergency physicians and APPs and 26-44% in emergency department nurses [13–24]. The additional stressors of the COVID-19 pandemic placed EHCWs at an even higher risk for burnout.

Given the risk of burnout and stress for EHCWs, it is of paramount importance to identify interventions to improve wellness. Although the study of interventions to mitigate burnout prior to the COVID-19 pandemic is well-published, there is limited data investigating the efficacy of wellness interventions in EHCWs during the COVID-19 pandemic [25–36]. Other studies during pandemic outbreaks have shown that having clear communication, access to mental health support,

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confidence in infection control measures, support from colleagues, and leadership, all contribute to improved wellness in stressful work environments [37–39]. A notable study addressed the organizational response to anxiety early in the COVID-19 pandemic that included five requests from healthcare professionals to their organization: “hear me, protect me, prepare me, support me, and care for me” [40].

The COVID-19 pandemic presented a unique stressor, particularly within the healthcare community, creating a distinct opportunity to determine if any wellness interventions may reduce stress or burnout among EHCWs. Thus, our goals were to evaluate protective factors and wellness interventions that were utilized by EHCWs during the COVID-19 pandemic. Our primary objective was to determine the perceived benefit of wellness interventions by EHCWs so that recommendations for the most beneficial interventions could be prioritized. Additionally, we evaluated perceived stress and burnout among an interdisciplinary group of EHCWs during the COVID-19 pandemic in order to better understand the extent of the pandemic’s impact on wellness.

## METHODS

A cross-sectional survey of EHCWs at three large metropolitan hospital Emergency Departments (EDs) was used to measure participants’ utilization and perceived benefit of individual and institutional wellness practices and resources, burnout, overall stress, and stress related to experiences of COVID-19. Eligible participants were EHCWs, including attending emergency physicians (139), resident emergency physicians (60), emergency medicine trained fellows (7), emergency medicine physician assistants and nurse practitioners (collectively referred to as advanced practice providers) (APPs, 125), emergency nurses (156), and ED staff (research and administrative staff, 96). Physician, APP, and ED staff lists were generated by the Department of Emergency Medicine, and a list of emergency nurses was generated from the hospital (N=583). The survey was initially sent via email on July 6, 2020 to physicians, APPs, and staff. Additional hospital approval was required for the nurses’ survey resulting in a delay in distribution that also limited the nurse participants to only one of the three hospitals included. Surveys were emailed to the nurses on August 17, 2020, and the study link was closed for all participants on September 16, 2020. Any EHCW involved in the creation of this survey were excluded.

Participants completed the survey on an online and secure platform (Microsoft Forms). Most participants received seven reminders by email with a link to the survey, while nurses received four reminders due to the delay in their initial invitation. The study was approved by the academic institution’s Internal Review Board and the associated hospital’s Research Oversight Committee. No participation incentives were offered.

The survey consisted of 28 questions. Participants were asked to rate the usefulness and helpfulness of 11 different wellness

activities and offerings on a five-point Likert scale, ranging from extremely helpful to extremely not helpful, and with the additional options of “service not available or offered to me” and “did not use.” The following activities / offerings were assessed: free meals offered during clinical shifts, community-donated PPE, virtual yoga or meditation, counseling services, childcare resources, financial support, support while out due to COVID-19, flexible / reduced shift hours, other forms of community support, national / local retailer or restaurants offering free or discounted products, wellness committee buddy program, and zoom social meetings.

Additionally, the survey included the perceived stress scale (PSS) to measure general stress, a two-item inventory to measure burnout, and items to describe demographics, home and work life, and stress related to experiences of COVID-19. The authors generated subject matter questions specific to experiences of the COVID-19 pandemic and wellness interventions based on prior studies, experience in the ED, and discussions with colleagues. A statistician was consulted in the creation of the survey. The questionnaire was piloted for comprehension by six EHCWs and authors (APPs and physicians).

The PSS is a ten-item, validated questionnaire measuring the degree to which respondents find their lives unpredictable, uncontrollable, and overloaded [41]. Higher stress scores are correlated with depressive symptoms and utilization of health services [41]. Two items were used to measure emotional exhaustion and depersonalization—two widely recognized components of burnout. These items have been validated in medical professionals and found to provide meaningful information on burnout [42]. The impact of COVID-19 on EHCWs home life and work life was measured using a five-point Likert scale, ranging from very unconcerned to very concerned. Participants rated concern regarding: contracting COVID-19, being overwhelmed at work, changes in work productivity, access to personal protective equipment (PPE), and the financial impact of COVID-19.

The response rate was calculated using the American Association for Public Opinion Research response rate definition which includes complete and incomplete responses divided by the sum of complete and incomplete responses, breakoffs, and all other non-respondents [43]. Surveys were distributed only to eligible participants via their work email address; therefore, partial responses were included. Categorical variables were described using frequencies and percentages. Continuous / scale variables were described using medians and interquartile ranges. Comparisons between categorical variables were conducted using  $\chi^2$  tests / Exact tests and comparisons of continuous / scale variables were conducted using Kruskal-Wallis and Mann-Whitney U tests. Odds ratios and 95% confidence intervals were computed using logistic regressions. Across the entire data set, 1.4% of the data were missing (range across variables: 0% - 6.4%). Ten complete data sets (including partial responses) were imputed using fully conditional specification [44]. All variables in the data set were used in the imputation models.

## RESULTS

Of 583 EHCWs eligible, 262 responded (response rate of 44.9%). Two of the respondents did not consent to participate, making the total number of participants 260 (44.6%). Respondent characteristics are displayed in **Table 1**. Response rates by EHCW role were as follows: attending physicians 51.8%, resident physicians 50.0%, registered nurses 46.2%, APPs 41.6%, staff 37.6%, and fellows 0%.

Table 1: Demographic Characteristics of Participants

Participants	N (%)
Attending Physicians	72 (27.7)
Resident Physicians	30 (11.5)
Registered Nurses	72 (27.7)
Advance Practice	53 (20.4)
• Nurse practitioners	34 (13.1)
• Physician assistants	19 (7.3)
Staff	33 (12.7)
<b>Gender</b>	
Women	172 (66.5)
Men	86 (33.1)
Transgender	2 (0.8)
<b>Race/Ethnicity</b>	
White/European American	151 (58.1)
Black/Afro-Caribbean/African American	74 (28.5)
Asian or Asian American	15 (5.8)
Middle Eastern or Arab American	4 (1.5)
Native Hawaiian/Pacific Islander	1 (0.4)
Native American/American Indian	1 (0.4)
Mixed	13 (5.0)
Other	35 (13.5)
Hispanic/Latino	15 (5.8)

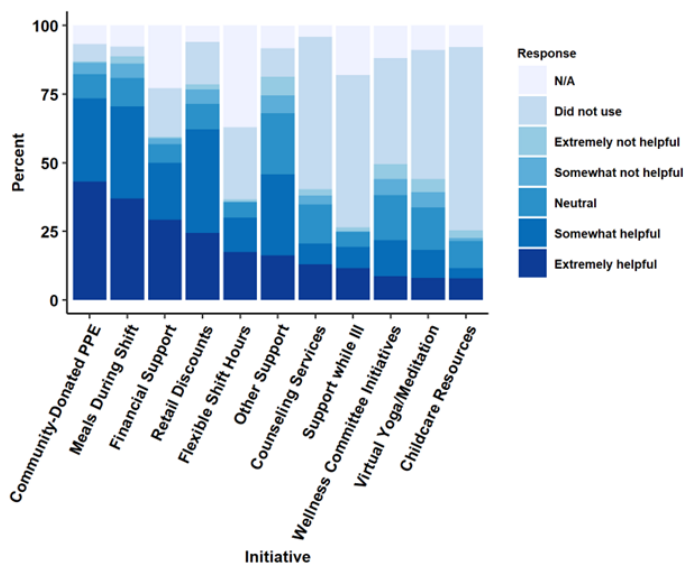


Figure 1: Perceived Helpfulness of Wellness Activities Related to COVID-19

Table 2: Association between Wellness Activities and Burnout

Wellness Activity	Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Spending time with friends or family	0.79 (0.59 - 1.06)	0.79 (0.54 - 1.17)
Exercise	0.77 (0.59 - 0.99)	0.81 (0.55 - 1.18)
Engaging in hobbies/recreation	0.79 (0.63 - 0.99)	0.83 (0.62 - 1.09)
Reflection activities e.g. journaling	1.01 (0.86 - 1.19)	0.92 (0.74 - 1.15)
Spending time in nature	0.92 (0.72 - 1.18)	0.96 (0.68 - 1.34)
Engaging in religious/spiritual practices	1.03 (0.88 - 1.21)	1.08 (0.86 - 1.36)
Spending time with pet	1.18 (1.03 - 1.35)	1.19 (1 - 1.41)
Seeing a counselor/therapist	1.31 (1.02 - 1.69)	1.37 (1 - 1.86)

## Wellness Activities/Interventions

Participants reported engaging in a variety of individual-level wellness activities, as summarized in Figure 1. Wellness offerings that were rated as extremely helpful included community-donated PPE (43.1%), meals offered during clinical shifts (36.9%), financial support such as government stimulus checks (29.2%), and retail / restaurant discounts or free items (24.2%) (**Figure 1**).

## The Impact of Wellness Activities on Burnout

**Table 2** presents the relationship between self-reported wellness activities and burnout. Most wellness activities were associated with lower reports of burnout but were not statistically significant. Exercise and engaging in hobbies were associated with lower burnout in unadjusted analysis, although this finding did not remain significant in the regression model. In the unadjusted analysis, respondents who spent more time with pets and respondents who saw a therapist / counselor regularly were more likely to report burnout. Following adjustment for: other wellness activities, age, gender, race, and EHCW role, these associations were still significant.

## Burnout and Perceived Stress

Burnout rates and median PSS scores are reported in **Table 3 (next page)**. Burnout varied significantly by gender and EHCW role. Females reported significantly higher rates of burnout than males across the cohort. The highest rates of burnout were noted in RNs, and this relationship was independent of gender. In subgroup analysis by EHCW role, female APPs had significantly higher burnout than did male APPs. A majority (58.5%) of respondents reported moderate to high or high stress overall, and half (50.0%) stated that they had felt nervous or stressed fairly often or often over the

Table 3: Report of burnout and median perceived stress scale according to healthcare role, gender and race

Group	Percentage reporting burnout	P value	Median PSS	P value
All participants	56.5%		18 (IQR: 13 - 22)	
<b>Role</b>		$p < 0.001$		$p < 0.001$
RNs	80.6%		22, IQR: 15 - 26	
APPs	58.5%		16.5; IQR: 13 - 21	
Attending physicians	52.8%		16; IQR: 12 - 21	
Staff	48.5%		19, IQR: 11 - 22	
Resident physicians	13.3%	14, IQR: 11 - 19		
<b>Role By Gender Overall</b>				
Female	64.5%	$p = 0.001$	19, IQR: 13 - 24	$p = 0.007$
Male	41.9%		16, IQR: 12 - 20	
<b>RN</b>				
Female	83.9%	$p = 0.539$	32, IQR: 27-36	$p = 0.529$
Male	75.0%		31, IQR: 25-32.75	
<b>APPs</b>				
Female	69.2%	$p = 0.048$	27, IQR: 23-31	$p = 0.198$
Male	38.5%		26, IQR: 20-30	
<b>Attending physicians</b>				
Female	57.6%	$p = 0.845$	26, IQR: 22-32.5	$p = 0.874$
Male	55.3%		26, IQR: 23-30	
<b>Staff</b>				
Female	65.0%	$p = 0.784$	29.5, IQR: 18.75-32	$p = 0.637$
Male	63.6%		29, IQR: 25-31.5	
<b>Resident Physicians</b>				
Female	25.0%	$p = 0.464$	27, IQR: 23.25-32.5	$p = 0.054$
Male	14.3%		22, IQR: 21.25-25.5	
<b>Race</b>				
White	60.3%	$p = 0.31$	18, IQR: 12 - 23	$p = 0.88$
Other group	57.1%		18.5, IQR: 14 - 22	
Black	50.0%		17.5, IQR: 13 - 22	

\*Other group = Asian or Asian American; Middle Eastern or Arab American; Mixed; Other

last month. Nurses (both female and male) reported the highest median score on the PSS. In subgroup analysis by EHCW role, the median PSS for female residents was nearly significantly higher than median PSS for male residents. A majority (61.5%) also stated that they felt confident about their ability to handle their personal problems fairly often or often.

### Stress related to COVID-19

The majority (70.8%) reported moderate to high or high stress resulting from COVID-19 with 28.8% very concerned about contracting the virus and 59.6% very concerned about a family member or friend contracting the virus. Other elements that resulted in high levels of concern included availability of PPE at work (28.8%) and the personal financial impact of the pandemic (31.2%) (Figure 2).

Many (75.0%) of those who tested positive for COVID-19 rated their overall stress as moderate-high or high, compared to 63.6% of those who tested negative and 52.5% of those who had never been tested ( $p = 0.04$ ).

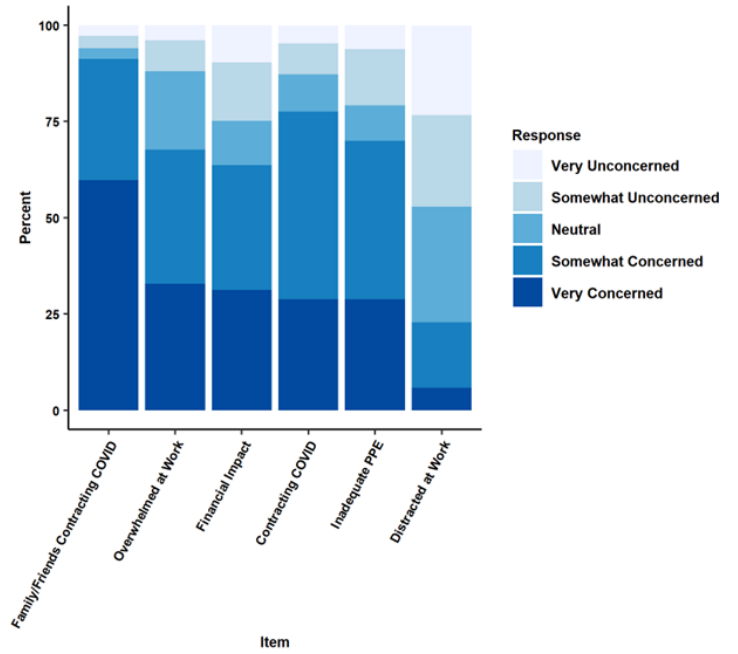


Figure 2: Degree of Concerns Regarding COVID-19

### Work-life

Most participants reported no change in their work hours: 175 (67.3% of the total sample), including 80.0% of attendings, 73.6% of APPs, and 61.1% of registered nurses. Only 25 participants (9.6%) stated that their work hours decreased, 44% of whom were residents. About a quarter (23.1%) reported an increase in work hours, which was most common among staff (39.4%) and RNs (37.5%). Few APPs (20.3%), attending physicians (15.3%), and resident physicians (6.7%) reported increases in work hours.

Nearly a quarter (24.1%) of participants reported missing work due to testing, symptoms, or confirmed COVID-19. Almost one-half of participants had already been tested for COVID-19 (121, 46.5%) and of those tested, 101 reported negative results, and 20 (7.7% of all participants) reported testing positive. Of the 120 participants who were tested for COVID-19 antibodies in Spring 2020: 110 tested negative and 10 tested positive. Of all the EHCWs who responded, one NP, one resident, three attendings (4.2% of attendings), 11 registered nurses (15.3%), and four other staff (12.1%) had tested positive for acute COVID-19.

### Home Life

A large minority (40%) of participants reported changing their living situation to avoid exposing others to the virus, and 27.3% reported difficulty with adult or childcare. A majority (77.7%) of participants reported feelings of loneliness during the pandemic.

## DISCUSSION

EHCWs are exposed to a wide range of stressors and often more severe stressors than their colleagues in other departments [1–5]. Our results suggest that burnout rates among EHCWs have not meaningfully deviated from the pre-pandemic nationally reported rates, despite the high rates of reported stress related to the COVID-19 pandemic. However, our reported rates of burnout are higher than other studies of EHCWs during COVID [25].

A critical and novel aim of this study was to determine the most commonly utilized and beneficial wellness activities by EHCWs. During the early pandemic response, an increased number of interventions were offered at the organizational level to provide support and improve wellness. These included meals offered during clinical shifts, community-donated PPE, virtual yoga or meditation, counseling services, childcare resources, a departmental wellness committee buddy program, and other social zoom meetings. Much of the recent literature on healthcare provider wellness has focused on shifting to an organizational / cultural approach and away from an emphasis on individual level initiatives and activities to mitigate burnout and improve wellness [45–48]. A group of academic hospitals found success in utilizing wellness rounds, a wellness consult service for departments, and targeted wellness interventions for healthcare workers who were at risk of burnout [49]. Others have identified a physical activity intervention to potentially improve wellness and reduce burnout during the early phase of the pandemic [50]. In this study, participants reported high satisfaction with the helpfulness of several organization-level initiatives, including increasing PPE supplies from community donations, free on-shift meals, and financial support. We postulate that these interventions had high satisfaction as they offer not only tangible support but also a sense of recognition and gratitude for the work performed and risk of exposure experienced as EHCWs.

While institutional approaches to wellness remain very important, our results highlight the importance of meeting individual needs during periods of crisis, including protection against contracting the virus; this is documented in previous studies, as well [28, 37–40]. Of note, some EHCWs surveyed received additional financial support from their employers during the pandemic, but the study question also referenced the spring 2020 United States (U.S.) government stimulus payments to individuals. Given the satisfaction with additional financial support, organizations may consider whether hazard pay would contribute to the wellness of EHCWs during future public health emergencies [51–53].

Participants also utilized individual level strategies to improve their wellness. The individual activities associated with lower reports of burnout were exercise, spending time with family / friends, spending time in nature, reflection activities, and engaging in hobbies or recreation. However, none were statistically significant in the adjusted analysis, highlighting the need for organizational level interventions and support. Since spending time with family / friends was associated with lower reports of burnout, it should be considered how the limitation in those activities during the pandemic may have contributed to decreased wellness. Nearly three-quarters of participants

reported feeling lonely due to the social distancing guidelines, highlighting the importance of remaining connected with family, friends, and colleagues virtually or via socially-distanced events.

A scoping review of strategies for healthcare worker wellness during the pandemic identified the importance of access to mental health resources and addressing the stigma of mental health in healthcare [54–57]. Despite the significant stress and burnout reported, only about a quarter of respondents were seeking the assistance of therapists, which is consistent with prior studies on the attitudes toward and the utilization of mental health resources by HCWs [58–62]. A 2020 survey by the American College of Emergency Physicians found that, despite higher levels of stress and burnout, 45% of emergency physicians did not feel comfortable seeking mental health treatment, and 73% felt there is a stigma of mental health treatment by others in their workplace [63].

A contributing factor to the stigma of the utilization of mental health resources in healthcare involves the questions that are asked on medical licensing applications. Work by Schroeder, et. al. demonstrated that 96% of allopathic medical licensing applications asked questions pertaining to the physical health, mental health, or substance use history of the applicant and that 69% of state medical licensing applications contained at least one item that was likely impermissible or impermissible based on the Americans with Disabilities Act (ADA) and appropriate case law [64]. Despite the ADA, which has been in effect since 1990, there is ongoing concern that the presence of these types of questions on medical licensing applications may discourage and prevent physicians from seeking appropriate treatment due to fear of stigmatization, public disclosure, and impacts on licensure [64, 65]. There remains a call to action for state medical licensing boards to modify questions to address the issue of physician competence rather than medical history to protect applicant privacy and mitigate barriers to physicians seeking treatment for mental health concerns [64, 66, 67].

In our study, relatively few participants found counseling or mental health services to be helpful. In unadjusted analysis, we found that therapy was associated with a slightly increased risk of burnout, although we believe this association likely represents selection bias among those who choose to attend therapy. Alternatively, this finding may signify that participants with higher burnout were more likely to access mental health resources. Although there is less evidence to support a commensurate impact on burnout, several studies have found the benefit of mental health resources in reducing stress and anxiety [68–70]. Given the elevated stress levels in our cohort, it remains important to eliminate the stigma of therapy and treatment for mental health concerns among EHCWs.

The COVID-19 pandemic resulted in an additional stress burden for EHCWs, including risks to personal and families' / friends' health [7, 71]. Participants who contracted COVID-19 were more likely to rate their overall stress as moderate-high or high. This may be due to the aforementioned stressors that are heightened when one has tested positive for COVID-19, including a higher likelihood of missing work, potentially infecting family / friends, having to change their living situation to avoid exposing others, and loneliness during isolation. Although not

included in the survey, special consideration should be given to individuals who have suffered from chronic residual symptoms of COVID-19 (i.e., “long-haulers”) [72]. Institutions must have plans in place to support not only those with acute COVID-19 but also those who suffer from chronic residual symptoms of COVID-19 which may entail workplace modifications [72].

Burnout is well-documented and highly prevalent in EHCWs [13–24]. Our results demonstrated an average burnout rate of 56.5%, consistent with prior studies [13–19]. Prior studies have used varying methodologies to determine burnout, including self-report or the use of validated burnout instruments. However, burnout appears to have remained persistently high among EHCWs over the last decade [13–19]. When stratified by role in the ED, registered nurses reported the highest level of burnout, above levels reported in pre-pandemic studies [20–24]. Nurses also reported the highest median score on the PSS. In subgroup analysis, gender did not appear to be an effect modifier for nursing burnout or perceived stress. These findings may have been due to increased work hours, more interface with patients than other providers, and the subsequent higher risk of contracting COVID-19 [73].

Interestingly, female APPs reported significantly higher burnout than did male APPs. This, along with the overall finding of higher burnout in females, may be due to the additional stressors of family care obligations. In future pandemics, organizations should consider stressors unique to individual employees and employee groups, which could include the need to address child and family care obligations.

### Limitations

There are several limitations to this study. The primary limitation is a moderate response rate of 44.6%. While the reasons for the lower response rate are unknown, it is likely attributable to a combination of email fatigue, increased work stress, and the lack of incentives for study participation. It is also possible that those with higher rates of stress or burnout may have been more likely to respond to the survey.

Although the nurses’ response rate of 46.2% was similar to the response rate across the entire cohort, it should be noted that nurses were emailed one month after the other participants due to a separate approval needed by the hospital’s research committee. This resulted in less time for the nurses to complete the survey and may have contributed to their non-response rate.

This study was conducted in three academic hospitals in a large metropolitan area and our results may not be generalizable to non-academic, suburban, or rural hospitals.

The survey was administered from July to September 2020 which was several months after the first case of COVID-19 in the U.S.. However, it did correlate with the second viral wave in the U.S., and one of the highest peaks in the state where the hospitals are located. [74, 75]. Thus, our survey may not have completely captured the study participants’ stress and burnout levels from the initial pandemic response which included the acute shortages of PPE, lack of knowledge about the emerging disease, government-imposed shelter-in-place orders, and rapid changes in department operating procedures. Given the three-month response time for most participants, we may have captured data during fluctuations in participant wellness and

burnout, which may have further influenced our results.

Although we utilized validated tools to measure stress and burnout, some of our data relies on participants’ perceptions. We did not find a significant correlation between wellness activities and reduction in burnout as measured by the two-item inventory used. This is possibly due to the multifactorial nature of burnout which may limit the impact of any single wellness intervention. Because of this, our findings of the most helpful wellness interventions were primarily based on participant perception, which limits the reliability of our findings. There is the additional potential for recall bias (although this was mitigated by the use of validated instruments which targeted participants’ current state).

### CONCLUSION

The COVID-19 pandemic represented a significant public health crisis in the United States and was a significant contributor to the stress of EHCWs in 2020. Our study found that community and financial support were perceived as helpful to EHCW wellness, and personal activities such as exercise were inversely correlated with burnout. The survey found higher rates of burnout in female participants and nurses, and higher levels of stress were reported in those who were diagnosed with acute COVID-19 and nurses. The higher rates of burnout and stress in nurses compared to other EHCWs highlights the need for additional wellness education, resources, and interventions specifically intended for the nursing profession. Additionally, organizations should consider ways to evaluate and support the unique needs of female EHCWs. While the need for systemic / organizational changes to support and improve wellness are of paramount importance, our study highlights that individual wellness practices should also be encouraged as they were perceived as helpful. We suggest future studies evaluate the benefit of individual wellness practices on stress mitigation and burnout reduction in EHCWs.

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### REFERENCES

1. Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Res.* 2020 Jun;288:112954. <https://doi.org/10.1016/j.psychres.2020.112954> PMID:32325383
2. Smith-Coggins R, Rosekind MR, Hurd S, Buccino KR. Relationship of day versus night sleep to physician performance and mood. *Ann Emerg Med.* 1994 Nov;24(5):928–34. [https://doi.org/10.1016/S0196-0644\(94\)70209-8](https://doi.org/10.1016/S0196-0644(94)70209-8) PMID:7978567
3. Balmer C, Pollina E. Italy’s Lombardy asks retired health workers to join coronavirus fight [Internet]. *World Economic Forum.* [cited 2023 Jan 15]. Available from: <https://>

- www.weforum.org/agenda/2020/03/italys-lombardy-etired-health-workers-coronavirus-covid19-pandemic/
4. Nguyen LH, Drew DA, Graham MS, Joshi AD, Guo CG, Ma W, et al.; COReonavirus Pandemic Epidemiology Consortium. Risk of COVID-19 among front-line health-care workers and the general community: a prospective cohort study. *Lancet Public Health*. 2020 Sep;5(9):e475–83. [https://doi.org/10.1016/S2468-2667\(20\)30164-X](https://doi.org/10.1016/S2468-2667(20)30164-X) PMID:32745512
  5. Adriaenssens J, De Gucht V, Maes S. Causes and consequences of occupational stress in emergency nurses, a longitudinal study. *J Nurs Manag*. 2015 Apr;23(3):346–58. <https://doi.org/10.1111/jonm.12138> PMID:24330154
  6. Greenberg N, Docherty M, Gnanapragasam S, Wessely S. Managing mental health challenges faced by health-care workers during covid-19 pandemic. *BMJ*. 2020 Mar;368:m1211. <https://doi.org/10.1136/bmj.m1211> PMID:32217624
  7. Shechter A, Diaz F, Moise N, Anstey DE, Ye S, Agarwal S, et al. Psychological distress, coping behaviors, and preferences for support among New York healthcare workers during the COVID-19 pandemic. *Gen Hosp Psychiatry*. 2020;66:1–8. <https://doi.org/10.1016/j.genhosppsych.2020.06.007> PMID:32590254
  8. Ranney ML, Griffith V, Jha AK. Critical Supply Shortages - The Need for Ventilators and Personal Protective Equipment during the Covid-19 Pandemic. *N Engl J Med*. 2020 Apr;382(18):e41. <https://doi.org/10.1056/NEJMp2006141> PMID:32212516
  9. Chen Q, Liang M, Li Y, Guo J, Fei D, Wang L, et al. Mental health care for medical staff in China during the COVID-19 outbreak. *Lancet Psychiatry*. 2020 Apr;7(4):e15–6. [https://doi.org/10.1016/S2215-0366\(20\)30078-X](https://doi.org/10.1016/S2215-0366(20)30078-X) PMID:32085839
  10. Grimm C. Hospital Experiences Responding to the COVID-19 Pandemic: February 2021 Pulse Surveys [Internet]. 2021 [cited 2023 Jan 15]. Available from: <https://oig.hhs.gov/reports-and-publications/workplan/summary/wp-summary-0000560.asp>
  11. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. *JAMA Netw Open*. 2020 Mar;3(3):e203976. <https://doi.org/10.1001/jamanetworkopen.2020.3976> PMID:32202646
  12. Maslach C, Schaufeli WB, Leiter MP. Job burnout. *Annu Rev Psychol*. 2001;52(1):397–422. <https://doi.org/10.1146/annurev.psych.52.1.397> PMID:11148311
  13. Kane L. Medscape National Physician Burnout & Suicide Report 2020: The Generational Divide [Internet]. Medscape. 2020 [cited 2020 Aug 18]. Available from: <http://www.medscape.com/slideshow/2020-lifestyle-burnout-6012460>
  14. Lin M, Battaglioli N, Melamed M, Mott SE, Chung AS, Robinson DW. High Prevalence of Burnout Among US Emergency Medicine Residents: Results From the 2017 National Emergency Medicine Wellness Survey. *Ann Emerg Med*. 2019 Nov;74(5):682–90. <https://doi.org/10.1016/j.annemergmed.2019.01.037> PMID:30879701
  15. Zdradzinski M, O'Shea J, Moran T, Caro D, Gomes P, Huskey R, et al. A Comprehensive Residency Wellness Curriculum [Internet]. *J Wellness*. 2020 Jan;2(1):1–6. Available from: <https://ir.library.louisville.edu/jwellness/vol2/iss1/1> <https://doi.org/10.18297/jwellness/vol2/iss1/1>
  16. Shanafelt TD, Hasan O, Dyrbye LN, Sinsky C, Satele D, Sloan J, et al. Changes in Burnout and Satisfaction With Work-Life Balance in Physicians and the General US Working Population Between 2011 and 2014. *Mayo Clin Proc*. 2015 Dec;90(12):1600–13. <https://doi.org/10.1016/j.mayocp.2015.08.023> PMID:26653297
  17. Dyrbye LN, West CP, Halasy M, O'Laughlin DJ, Satele D, Shanafelt T. Burnout and satisfaction with work-life integration among PAs relative to other workers. *JAAPA*. 2020 May;33(5):35–44. <https://doi.org/10.1097/01.JAA.0000660156.17502.e6> PMID:32345947
  18. Ashooh MP, Barnette K, Moran TP, O'Shea J, Lall MD. Advanced Practice Provider Burnout in a Large Urban Medical Center. *Adv Emerg Nurs J*. 2019;41(3):234–43. <https://doi.org/10.1097/TME.0000000000000255> PMID:31356250
  19. Bell RB, Davison M, Sefcik D. A first survey. Measuring burnout in emergency medicine physician assistants. *JAAPA Off J Am Acad Physician Assist*. 2002 Mar;15(3):40–2, 45–8, 51–52 passim.
  20. Gómez-Urquiza JL, De la Fuente-Solana EI, Albendín-García L, Vargas-Pecino C, Ortega-Campos EM, Cañadas-De la Fuente GA. Prevalence of Burnout Syndrome in Emergency Nurses: A Meta-Analysis. *Crit Care Nurse*. 2017 Oct;37(5):e1–9. <https://doi.org/10.4037/ccn2017508> PMID:28966203
  21. Adriaenssens J, De Gucht V, Maes S. Determinants and prevalence of burnout in emergency nurses: a systematic review of 25 years of research. *Int J Nurs Stud*. 2015 Feb;52(2):649–61. <https://doi.org/10.1016/j.ijnurstu.2014.11.004> PMID:25468279
  22. Browning L, Ryan CS, Thomas S, Greenberg M, Rolniak S. Nursing specialty and burnout. *Psychol Health Med*. 2007 Mar;12(2):248–54. <https://doi.org/10.1080/13548500600568290> PMID:17365896
  23. Melby V, Harkin M. Comparing burnout in emergency nurses and medical nurses. *Clin Nurs Stud*. 2014 Jun;2:152–63.
  24. Li H, Cheng B, Zhu XP. Quantification of burnout in emergency nurses: A systematic review and meta-analysis. *Int Emerg Nurs*. 2018 Jul;39:46–54. <https://doi.org/10.1016/j.ienj.2017.12.005> PMID:29361420
  25. Kelker H, Yoder K, Musey P Jr, Harris M, Johnson O, Sarmiento E, et al. Prospective study of emergency medicine provider wellness across ten academic and community hospitals during the initial surge of the COVID-19 pandemic. *BMC Emerg Med*. 2021 Mar;21(1):36. <https://doi.org/10.1186/s12873-021-00425-3> PMID:33761876
  26. Monette DL, Macias-Konstantopoulos WL, Brown DF, Raja AS, Takayesu JK. A Video-based Debriefing Program to Support Emergency Medicine Clinician Well-being During the COVID-19 Pandemic. *West J Emerg Med*. 2020 Sep;21(6):88–92. <https://doi.org/10.5811/westjem.2020.8.48579> PMID:33052815
  27. Richman N, McNaughton CD, Wolfe C, Overbeeke TM, McCoin N. A novel wellness intervention: A virtual

- hangout from coast to coast using video conferencing platforms to increase physician wellness during the COVID-19 pandemic. *AEM Educ Train*. 2021 Mar;5(3):e10579. <https://doi.org/10.1002/aet2.10579> PMID:33821228
28. Shreffler J, Petrey J, Huecker M. The Impact of COVID-19 on Healthcare Worker Wellness: A Scoping Review. *West J Emerg Med*. 2020 Aug;21(5):1059–66. <https://doi.org/10.5811/westjem.2020.7.48684> PMID:32970555
  29. Sheer AJ, Estores IM, Nickels R, Radhakrishnan N, Goede DL, Mramba LK, et al. Improving burnout and well-being among medicine residents: impact of a grassroots intervention compared to a formal program curriculum. *J Educ Health Promot*. 2021 Jul;10:250. PMID:34485547
  30. Williamson K, Lank PM, Hartman N, Lu DW, Wheaton N, Cash J, et al.; Emergency Medicine Education Research Alliance (EMERA). The Implementation of a National Multifaceted Emergency Medicine Resident Wellness Curriculum Is Not Associated With Changes in Burnout. *AEM Educ Train*. 2019 Oct;4(2):103–10. <https://doi.org/10.1002/aet2.10391> PMID:32313856
  31. Martins AE, Davenport MC, Del Valle MP, Di Lalla S, Domínguez P, Orlando L, et al. Impact of a brief intervention on the burnout levels of pediatric residents. *J Pediatr (Rio J)*. 2011;87(6):493–8. <https://doi.org/10.2223/JPED.2127> PMID:22170452
  32. Wilson PM, Kemper KJ, Schubert CJ, Batra M, Staples BB, Serwint JR, et al.; Pediatric Resident Burnout and Resilience Study Consortium (PRBRSC). National Landscape of Interventions to Improve Pediatric Resident Wellness and Reduce Burnout. *Acad Pediatr*. 2017;17(8):801–4. <https://doi.org/10.1016/j.acap.2017.09.012> PMID:28919483
  33. Gregory ST, Menser T, Gregory BT. An Organizational Intervention to Reduce Physician Burnout. *J Healthc Manag*. 2018;63(5):338–52. <https://doi.org/10.1097/JHM-D-16-00037> PMID:30180032
  34. Wiederhold BK, Cipresso P, Pizzioli D, Wiederhold M, Riva G. Intervention for Physician Burnout: A Systematic Review. *Open Med (Wars)*. 2018 Jul;13(1):253–63. <https://doi.org/10.1515/med-2018-0039> PMID:29992189
  35. Sexton JB, Adair KC, Cui X, Tawfik DS, Profit J. Effectiveness of a bite-sized web-based intervention to improve healthcare worker wellbeing: A randomized clinical trial of WISER. *Front Public Health*. 2022 Dec;10:1016407. <https://doi.org/10.3389/fpubh.2022.1016407> PMID:36568789
  36. Sexton JB, Adair KC. Forty-five good things: a prospective pilot study of the Three Good Things well-being intervention in the USA for healthcare worker emotional exhaustion, depression, work-life balance and happiness. *BMJ Open*. 2019 Mar;9(3):e022695. <https://doi.org/10.1136/bmjopen-2018-022695> PMID:30898795
  37. Chan AO, Huak CY. Psychological impact of the 2003 severe acute respiratory syndrome outbreak on health care workers in a medium size regional general hospital in Singapore. *Occup Med (Lond)*. 2004 May;54(3):190–6. <https://doi.org/10.1093/occmed/kqh027> PMID:15133143
  38. Chua SE, Cheung V, Cheung C, McAlonan GM, Wong JW, Cheung EP, et al. Psychological effects of the SARS outbreak in Hong Kong on high-risk health care workers. *Can J Psychiatry*. 2004 Jun;49(6):391–3. <https://doi.org/10.1177/070674370404900609> PMID:15283534
  39. Ripp J, Peccoraro L, Charney D. Attending to the Emotional Well-Being of the Health Care Workforce in a New York City Health System During the COVID-19 Pandemic. *Acad Med*. 2020 Aug;95(8):1136–9. <https://doi.org/10.1097/ACM.0000000000003414> PMID:32282344
  40. Shanafelt T, Ripp J, Trockel M. Understanding and Addressing Sources of Anxiety Among Health Care Professionals During the COVID-19 Pandemic. *JAMA*. 2020 Jun;323(21):2133–4. <https://doi.org/10.1001/jama.2020.5893> PMID:32259193
  41. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav*. 1983 Dec;24(4):385–96. <https://doi.org/10.2307/2136404> PMID:6668417
  42. West CP, Dyrbye LN, Sloan JA, Shanafelt TD. Single item measures of emotional exhaustion and depersonalization are useful for assessing burnout in medical professionals. *J Gen Intern Med*. 2009 Dec;24(12):1318–21. <https://doi.org/10.1007/s11606-009-1129-z> PMID:19802645
  43. Standard Definitions - Final dispositions of case codes and outcome rates for surveys, The American Association for Public Opinion Research [Internet]. [cited 2023 Jan 15]. Available from: [https://www-archive.aapor.org/Standards-Ethics/Standard-Definitions-\(1\).aspx](https://www-archive.aapor.org/Standards-Ethics/Standard-Definitions-(1).aspx)
  44. Liu Y, De A. Multiple Imputation by Fully Conditional Specification for Dealing with Missing Data in a Large Epidemiologic Study. *Int J Stat Med Res*. 2015;4(3):287–95. <https://doi.org/10.6000/1929-6029.2015.04.03.7> PMID:27429686
  45. Schwartz R, Shanafelt TD, Gimmler C, Osterberg L. Developing institutional infrastructure for physician wellness: qualitative Insights from VA physicians. *BMC Health Serv Res*. 2020 Jan;20(1):7. <https://doi.org/10.1186/s12913-019-4783-9> PMID:31900137
  46. Tawfik DS, Profit J, Webber S, Shanafelt TD. Organizational factors affecting physician well-being. *Curr Treat Options Pediatr*. 2019 Mar;5(1):11–25. <https://doi.org/10.1007/s40746-019-00147-6> PMID:31632895
  47. Kruskal JB, Shanafelt T, Eby P, Meltzer CC, Rawson J, Essex LN, et al. A Road Map to Foster Wellness and Engagement in Our Workplace-A Report of the 2018 Summer Intersociety Meeting. *J Am Coll Radiol*. 2019 Jun;16(6):869–77. <https://doi.org/10.1016/j.jacr.2018.10.025> PMID:30559039
  48. Shanafelt T, Trockel M, Ripp J, Murphy ML, Sandborg C, Bohman B. Building a Program on Well-Being: Key Design Considerations to Meet the Unique Needs of Each Organization. *Acad Med*. 2019 Feb;94(2):156–61. <https://doi.org/10.1097/ACM.0000000000002415> PMID:30134268
  49. AdibeBryant, HebertCharles, PeticoneKathryn, M D. Creating Wellness in a Pandemic: A Practical Framework for Health Systems Responding to Covid-19. *NEJM Catal Innov Care Deliv* [Internet]. 2021 Mar 24 [cited 2023 Jan 6]; Available from: <https://catalyst.nejm.org/doi/full/10.1056/CAT.20.0218>
  50. Calderón C, Kosoko A, Bhandari S, Lesnick J, Herkes D, Huebinger R. Resident-Led Physical Wellness Initiative Linked to Less Burnout for Emergency Physicians during



- COVID-19 Pandemic [Internet]. *J Wellness*. 2021 Nov;3(3): Available from: <https://ir.library.louisville.edu/jwellness/vol3/iss3/1> <https://doi.org/10.18297/jwellness/vol3/iss3/1>.
51. Ruhnke GW. Physician Supply During the Coronavirus Disease 2019 (COVID-19) Crisis: the Role of Hazard Pay. *J Gen Intern Med*. 2020 Aug;35(8):2433–4. <https://doi.org/10.1007/s11606-020-05931-x> PMID:32524249
  52. Hecker S. Hazard Pay for COVID-19? Yes, But It's Not a Substitute for a Living Wage and Enforceable Worker Protections. *New Solut J Environ Occup Health Policy NS*. 2020 Aug;30(2):95–101.
  53. McConnell D, Wilkinson D. Compensation and hazard pay for key workers during an epidemic: an argument from analogy. *J Med Ethics*. 2020 May;47(12):784–7. <https://doi.org/10.1136/medethics-2020-106389> PMID:32467290
  54. Brooks SK, Gerada C, Chalder T. Review of literature on the mental health of doctors: are specialist services needed? *J Ment Health*. 2011 Apr;20(2):146–56. <https://doi.org/10.3109/09638237.2010.541300> PMID:21275504
  55. Brower KJ. Professional Stigma of Mental Health Issues: Physicians Are Both the Cause and Solution. *Acad Med*. 2021 May;96(5):635–40. <https://doi.org/10.1097/ACM.0000000000003998> PMID:33885412
  56. Gold KJ, Andrew LB, Goldman EB, Schwenk TL. “I would never want to have a mental health diagnosis on my record”: A survey of female physicians on mental health diagnosis, treatment, and reporting. *Gen Hosp Psychiatry*. 2016;43:51–7. <https://doi.org/10.1016/j.genhosppsych.2016.09.004> PMID:27796258
  57. Haque S. Stigma of mental health amongst physicians: one resident's experience about stigma in psychiatry among physicians, possible causes and a possible solution. *Asian J Psychiatr*. 2018 Aug;36:128–9. <https://doi.org/10.1016/j.ajp.2018.07.015> PMID:30172966
  58. Baldwin PJ, Dodd M, Wrate RM. Young doctors' health-II. Health and health behaviour. *Soc Sci Med* 1982. 1997 Jul;45(1):41–4.
  59. Hassan TM, Ahmed SO, White AC, Galbraith N. A postal survey of doctors' attitudes to becoming mentally ill. *Clin Med (Lond)*. 2009 Aug;9(4):327–32. <https://doi.org/10.7861/clinmedicine.9-4-327> PMID:19728504
  60. Tyssen R. Health problems and the use of health services among physicians: a review article with particular emphasis on Norwegian studies. *Ind Health*. 2007 Oct;45(5):599–610. <https://doi.org/10.2486/indhealth.45.599> PMID:18057803
  61. Stanton J, Randal P. Doctors accessing mental-health services: an exploratory study. *BMJ Open*. 2011 Feb;1(1):e000017. <https://doi.org/10.1136/bmjopen-2010-000017> PMID:22021726
  62. Dyrbye LN, West CP, Sinsky CA, Goeders LE, Satele DV, Shanafelt TD. Medical Licensure Questions and Physician Reluctance to Seek Care for Mental Health Conditions. *Mayo Clin Proc*. 2017 Oct;92(10):1486–93. <https://doi.org/10.1016/j.mayocp.2017.06.020> PMID:28982484
  63. 10-26-20 As Stress during the Pandemic Grows, Nearly Half of Nation's Emergency Physicians Uncomfortable Seeking Mental Health Care [Internet]. [cited 2023 Jan 15]. Available from: <https://www.emergencyphysicians.org/press-releases/2020/10-26-20-as-stress-during-the-pandemic-grows-nearly-half-of-nations-emergency-physicians-uncomfortable-seeking-mental-health-care>
  64. Schroeder R, Brazeau CM, Zackin F, Rovi S, Dickey J, Johnson MS, et al. Do state medical board applications violate the Americans with Disabilities Act? *Acad Med*. 2009 Jun;84(6):776–81. <https://doi.org/10.1097/ACM.0b013e-3181a43bb2> PMID:19474558
  65. Hansen TE, Goetz RR, Bloom JD, Fenn DS. Changes in questions about psychiatric illness asked on medical licensure applications between 1993 and 1996. *Psychiatr Serv*. 1998 Feb;49(2):202–6. <https://doi.org/10.1176/ps.49.2.202> PMID:9575005
  66. Coleman P, Shellow R. Ask about Conduct, Not Mental Illness: A Proposal for Bar Examiners and Medical Boards to Comply with the ADA and Constitution. *J Legis*. 1994 May;20(2):147.
  67. Miles S. Do state licensing procedures discriminate against physicians using mental health services? One physician calls for reform. *Minn Med*. 1997 Jan;80(1):42–3. PMID:9009612
  68. Sims J. The evaluation of stress management strategies in general practice: an evidence-led approach. *Br J Gen Pract*. 1997 Sep;47(422):577–82. PMID:9406495
  69. Romani M, Ashkar K. Burnout among physicians. *Libyan J Med*. 2014 Feb;9(1):23556. <https://doi.org/10.3402/ljm.v9.23556> PMID:24560380
  70. Kumar S. Burnout and Doctors: Prevalence, Prevention and Intervention. *Healthcare (Basel)*. 2016 Jun;4(3):37. <https://doi.org/10.3390/healthcare4030037> PMID:27417625
  71. Hennein R, Lowe S. A hybrid inductive-abductive analysis of health workers' experiences and wellbeing during the COVID-19 pandemic in the United States. *PLoS One*. 2020 Oct;15(10):e0240646. <https://doi.org/10.1371/journal.pone.0240646> PMID:33104711
  72. Rubin R. As Their Numbers Grow, COVID-19 “Long Haulers” Stump Experts. *JAMA*. 2020 Oct;324(14):1381–3. <https://doi.org/10.1001/jama.2020.17709> PMID:32965460
  73. Kambhampati AK, O'Halloran AC, Whitaker M, Magill SS, Chea N, Chai SJ, et al.; COVID-NET Surveillance Team. COVID-19-Associated Hospitalizations Among Health Care Personnel - COVID-NET, 13 States, March 1–May 31, 2020. *MMWR Morb Mortal Wkly Rep*. 2020 Oct;69(43):1576–83. <https://doi.org/10.15585/mmwr.mm6943e3> PMID:33119554
  74. Harcourt J, Tamin A, Lu X, Kamili S, Sakthivel SK, Murray J, et al. Severe Acute Respiratory Syndrome Coronavirus 2 from Patient with Coronavirus Disease, United States. *Emerg Infect Dis*. 2020 Jun;26(6):1266–73. <https://doi.org/10.3201/eid2606.200516> PMID:32160149
  75. Dong E, Du H, Gardner L. An interactive web-based dashboard to track COVID-19 in real time. *Lancet Infect Dis*. 2020 May;20(5):533–4. [https://doi.org/10.1016/S1473-3099\(20\)30120-1](https://doi.org/10.1016/S1473-3099(20)30120-1) PMID:32087114