


# The First COVID-19 Pandemic Wave and the Effect on Health Care Trainees: A National Survey Study

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## Abstract

**Background:** This study observes the trends and patterns among trainees during the coronavirus disease 2019 (COVID-19) pandemic and their response to resident education and hospital/program support.

**Methods:** An anonymous online 31-question survey was distributed to medical students and postgraduate year residents. Topics included were demographics, clinical responsibilities, educational/curricula changes, and trainee wellness. Descriptive analysis was performed for each set of demographic groupings as well as 2 and 3 group comparisons.

**Results:** Total 1051 surveys collected, 930 used for analysis: 373 (40.1%) male, 434 (46.6%) aged 30-34 years, 588 (63.2%) white, 417 (44.8%) married, 168 (18%) with children, and 323 (34.7%) from the Northeast region. The Northeast experienced difficulty sleeping, feelings of guilt, hopelessness, and changes in appetite ( $P = .0077$ ). The pandemic interfered significantly with relationships and living situations ( $P < .0001$ ). Trainees 18-34 years believed the pandemic affected residency training ( $P < .0001$ ). Surgical residents were concerned about reaching numbers of operative procedures to graduate ( $P < .0001$ ). Residency programs adhered to ACGME work restrictions ( $P < .0001$ ).

**Conclusion:** We aim to provide continued educational support for our trainees' clinical development and well-being during the COVID-19 pandemic.

## Keywords

coronavirus disease 2019, residency, training, pandemic, wellness, education

## Introduction

Coronavirus disease 2019 (COVID-19) has led to a dramatic reconstruction and adaptation among the health care system.<sup>1-4</sup> This has resulted in significant burdens globally, including but not limited to high mortality rates,<sup>5</sup> financial hardships, and social unrest. Within a limited time, it became clear that the alarming rise of this virus generated fear and despair.

The evolution of the pandemic, especially in regions of the country with significant exposure to the virus, required redistribution of health care human resources. Outpatient clinical facilities were closed and elective staff physician were brought to the front lines. Resident physicians were reallocated depending upon the hospital need, often regardless of their background training. In addition, early matriculation was offered to medical students across

several institutions for early recruitment and deployment to the work task force to assist with patient care.

The condition from the initial deployment of health care workers may have led to hardships unexpressed.<sup>6-8</sup>

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The occupational stress of the ongoing pandemic could amount an overwhelming and adaptive response emotionally and behaviorally; studying this allows us to cater support for the frontline workers during this challenging time.<sup>9,10</sup>

Due to the dramatic reallocation of medical trainees and in-service changes, the considerable impact on this unique cohort led to the creation of this study. A particular concern is the stress and demand, knowledge deficit, and competency to care for COVID-19 patients. The objective was to determine the perspectives of trainees regarding the impact of the pandemic on their education and well-being.

## Methods

This study was approved by the New York University Institutional Review Board. An anonymous 31-question online survey was developed using the platform Qualtrics; 22 questions were multiple choice, 8 were Likert-type scale (1 = not at all, 5 = extremely), and 1 open-ended question. The survey collected demographic information and medical training experience and asked about ones' exposure and experience with COVID-19 patients. The survey also asked about the effect COVID-19 played regarding his or her residency training and well-being during the months of the initial pandemic wave ([Supplementary Appendix 1](#)). The questionnaire was reviewed by 4 teaching experts (Associate Dean, Graduate Medical Education; Director of Surgical Residency; Director of the International Research Fellowship Program; and Chairman, Department of Surgery), resulting in modifications to improve clarity, and was checked for face validity prior to administration. Questions explored fear, coping, and confidence during the pandemic.

Health care trainees for this study were defined as medical students in their final year of training who attended an accredited Liaison Committee of Medical Education (LCME), the Commission on Osteopathic College Accreditation (COCA), as well as all post-graduate resident physicians of all years through the Accreditation Council for Graduate Medical Education (ACGME).

The survey was electronically distributed from March 1, 2020, through June 30, 2020, to program directors and program coordinators to share at his or her designated individual sites. Contact information was obtained from program Web sites as well as online networking services for medical professionals, and program directors and program coordinators were contacted to share the survey with residents at their designated individual sites. For medical students, the contact address for the Office of the Registrar (or equivalent concerned authority) was obtained from the medical school Web site or the Association of American Medical Colleges (AAMC) Web site, which then distributed it electronically to medical students

working clinically. The initial distribution of the survey occurred within the first few weeks of the distribution period. Each institution received only one distribution of the survey in the form of a standardized email invitation; subsequent distribution to the learners from the program director and coordinators were subjective. The survey was open and available online until June 30, 2020.

The US Census Bureau considers there to be 4 regions of the US: the Northeast, the Midwest, the South, and the West. Based on the state that the participant provided in Q10, we divided them into these 4 regions.

## Statistical Analysis

Descriptive statistics (mean,  $\pm$  standard deviation for continuous/ordinal variables; frequencies and percentages for categorical variables) were calculated separately for each set of demographic groupings.

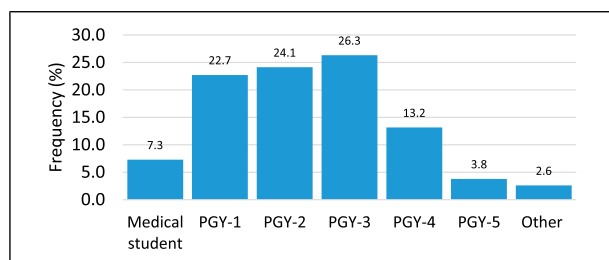
Separate analyses were performed by the following group comparisons of interest: age (18-29, 30-34, 35+), gender (males vs females), race/ethnicity (white vs non-white), region (Northeast, Midwest, South, West), Do you have children? (yes vs no), and US citizen vs immigrant/other. The groups were compared using the chi-square test or Fisher's exact test, as deemed appropriate, for categorical variables. For 2 group comparisons, the Mann-Whitney test was used for continuous and ordinal (ie, Likert scale) data. For 3 or more group comparisons, the Kruskal-Wallis test was employed. All analyses were performed using SAS version 9.4 (SAS Institute Inc., Cary, NC).

## Results

A total of 1051 surveys were collected over the survey period from March 1 2020, to June 30, 2020. One thousand and three (95%) surveys were fully completed (1003/139,848 = .72%). After excluding fourth year medical students and early graduates (n = 73), 930 were used for analysis.

## Demographics

Three hundred seventy three survey respondents (40.1%) identified male while 557 (59.9%) respondents were female. Respondents between 30 and 34 years of age were the largest group (n = 434, 46.6%). Eight hundred forty eight (91.1%) were United States citizens. The predominant race was white (n = 588, 63.2%), followed by Asian or Asian American (n = 181, 19.4%), Hispanic or Latino (n = 44, 4.7%), and black (n = 30, 3.2%). More than half of survey respondents were single or single and co-inhabiting with a partner (n = 487, 52.3%) and majority did not have children (n = 762, 81.9%).



**Figure 1.** Survey response rate distribution of health care trainee experience and training level.

Regarding year in training, health care trainees ranged from being in the final year of medical school training to postgraduate training. There were only 73 participants who classified as fourth year medical students; they were excluded from subsequent analysis. “Other” referred to those either taking a gap year, participating in research years, or were past the postgraduate fifth year. [Figure 1](#) shows the distribution of trainee level experience. Postgraduate years (PGY) 1 through 3 comprised of most of the respondents ( $n = 734$ , 78.9%). The specialty that participated with the highest frequency was Internal Medicine ( $n = 124$ , 13.3%) followed by Family Medicine ( $n = 104$ ; 11.1%) and Emergency Medicine ( $n = 103$ , 11%) ([Figure 2](#)). The highest frequency of respondents from a state was New York ( $n = 195$ , 20.9%) followed by Ohio ( $n = 79$ , 8.5%).

### Regional Experience With COVID

Regions of the country were divided into 4 categories: Northeast, Midwest, South, and West. Trainees in the Northeast were assigned to hospital inpatient floors, which included but was not limited to the operating room, wards, the emergency room, or any critical care unit ( $P = .2247$ ). Health care trainees largely had direct contact with COVID-positive patients, with the Northeast having the highest exposure ( $n = 288$ , 30.9%).

Health care trainees in the Northeast experienced increased difficulty sleeping, feelings of guilt, hopelessness, and changes in appetite compared to other regions in the country ( $P = .0013$ ). The pandemic significantly interfered with relationships, including family, friends, and partners ( $P < .0001$ ) as well as living situations ( $P < .0001$ ). Trainees in the Northeast were more likely to receive hazard pay that was deemed appropriate (versus other regions), but overall, most respondents did not receive additional pay ( $P < .0001$ ).

[Table 1](#) shows that trainees felt most confident with donning and doffing personal protective equipment across all regions of the country ( $P < .05$ ). Trainees tended to have the most confidence with caring for COVID-positive patients in the Northeast, but scored lowest in confidently

knowing hospital protocols. On the other hand, [Table 2](#) looks at trainees’ response to fear in caring for COVID-positive patients. These results suggest trainees feared spreading COVID to their loved ones the most among all regions. There was not as much concern for individual death, but the reported mean was higher for concern for death of loved ones.

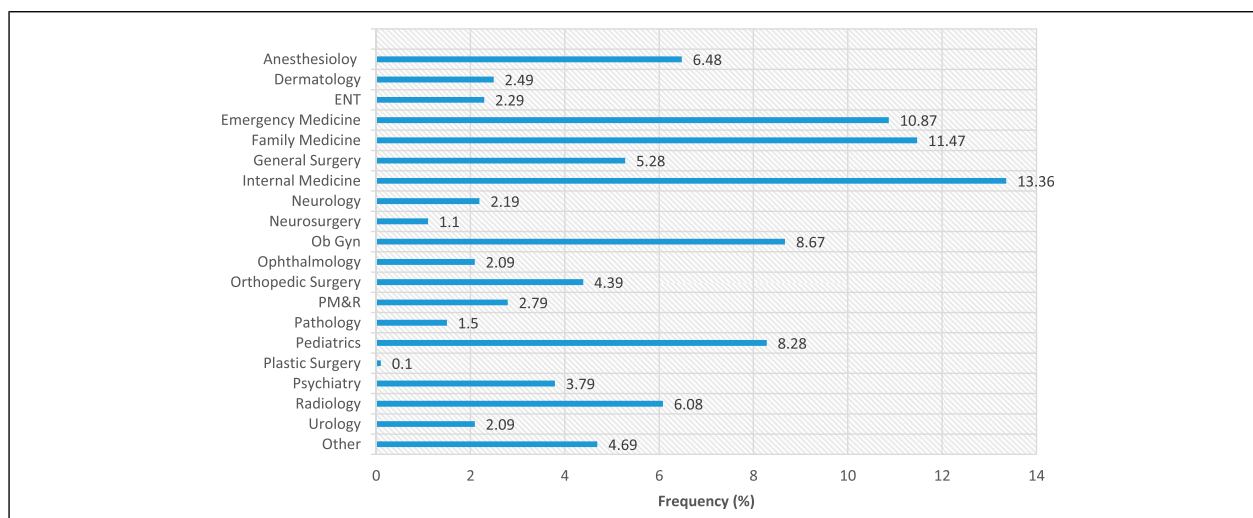
Trainees were also asked questions regarding moral distress and belief in resource allocation. One question asked respondents to rank in a “drag and drop” format on a preassigned scale from 1 to 6 the decision whom to allocate ventilator treatment depending upon the patient age, highest survival, whether the patient was a health care worker or first responder, in critical condition, or based upon a first come first serve method. Trainees tended to agree that patients with the “highest survival probability” was ranked highest for receiving invasive ventilatory support, while the last criteria used was based upon a first come first serve method ([Table 3](#), [Figure 3](#)). Another question asked health care trainees to select whether a COVID-19 patient should be fully resuscitated. Majority of respondents ( $n = 473$ , 50.9%) elect that COVID-19 patients should be provided full cardiopulmonary resuscitation (CPR); however, with limited health care providers (attending providers) and use of the Lund University Cardiac Assist System (or LUCAS), almost a quarter of response report that they were unsure ( $n = 199$ , 21.4%) whether COVID-19 patients should be provided with full CPR.

### Surgical Trainees Experience With COVID

Trainees in age groups between 18 and 29 years expressed greatest concern of the pandemic affecting residency training ( $P < .0001$ ). Between surgical and nonsurgical residents, nonsurgical trainees expressed more concern for COVID-19 affecting the residency training program ( $P < .03$ ). Of the surgical health care trainees, 33.3% were concerned about acquiring enough surgical cases in order to graduate after formal completion of residency training. Despite the allocation of health care trainees, 95.7% respondents reported residency programs adhered to the Accreditation Council for Graduate Medical Education (ACGME) work restrictions ( $P < .0001$ ).

### Discussion

The COVID-19 pandemic has presented challenges for our health care trainees. In fact, the occupational stress of the ongoing pandemic shows the resiliency and adaptive response within this unique cohort. The generalized climate of stress from the initial rise in COVID cases, followed by the depletion in PPE, and the rapidly changing information during this first wave left some trainees feeling inadequately supported.<sup>11</sup>



**Figure 2.** Survey response rate by different specialties, with internal medicine, family medicine, and emergency medicine being top 3.

**Table 1.** Trainee Response to Level of Confidence in Caring for COVID+ Patients by Region (1 = Not at All Confident; 5 = Extremely Confident).

|  | Northeast (n = 323) | Midwest (n = 260) | South (n = 185) | West (n = 162) | P-value |
|--|---------------------|-------------------|-----------------|----------------|---------|
| Caring for COVID+ patients                   | 3.13 ± 1.13         | 2.95 ± 1.06       | 2.98 ± 1.19     | 2.62 ± 1.03    | <.0001  |
| Don/Doff personal protective equipment       | 3.68 ± 1.06         | 3.69 ± .89        | 3.73 ± 1.07     | 3.48 ± .05     | .033    |
| Hospital preparedness and response protocols | 2.74 ± 1.14         | 3.05 ± 1.05       | 3.01 ± 1.07     | 2.71 ± 1.09    | .0002   |

All results are reported as mean ± the standard deviation.

**Table 2.** Trainee Response to Level of Fear in Caring for COVID+ Patients by Region (1 = Not at All Fearful; 5 = Extremely Fearful).

|                                   | Northeast (n = 323) | Midwest (n = 260) | South (n = 185) | West (n = 262) | P-value |
|-----------------------------------|---------------------|-------------------|-----------------|----------------|---------|
| Taking care of COVID+ patients    | 3.15 ± 1.15         | 3.09 ± 1.14       | 3.11 ± 1.21     | 3.10 ± 1.09    | .944    |
| Contracting COVID                 | 3.32 ± 1.15         | 3.26 ± 1.09       | 3.16 ± 1.14     | 3.08 ± 1.14    | .095    |
| Spreading COVID to family/friends | 4.29 ± 1.02         | 4.09 ± 1.03       | 4.10 ± 1.04     | 4.07 ± 1.06    | .004    |
| Dying from COVID                  | 2.88 ± 1.37         | 2.75 ± 1.22       | 2.60 ± 1.21     | 2.60 ± 1.27    | .047    |
| Death of loved ones from COVID    | 4.22 ± 1.01         | 4.05 ± 1.02       | 3.97 ± 1.11     | 4.03 ± 1.06    | .022    |

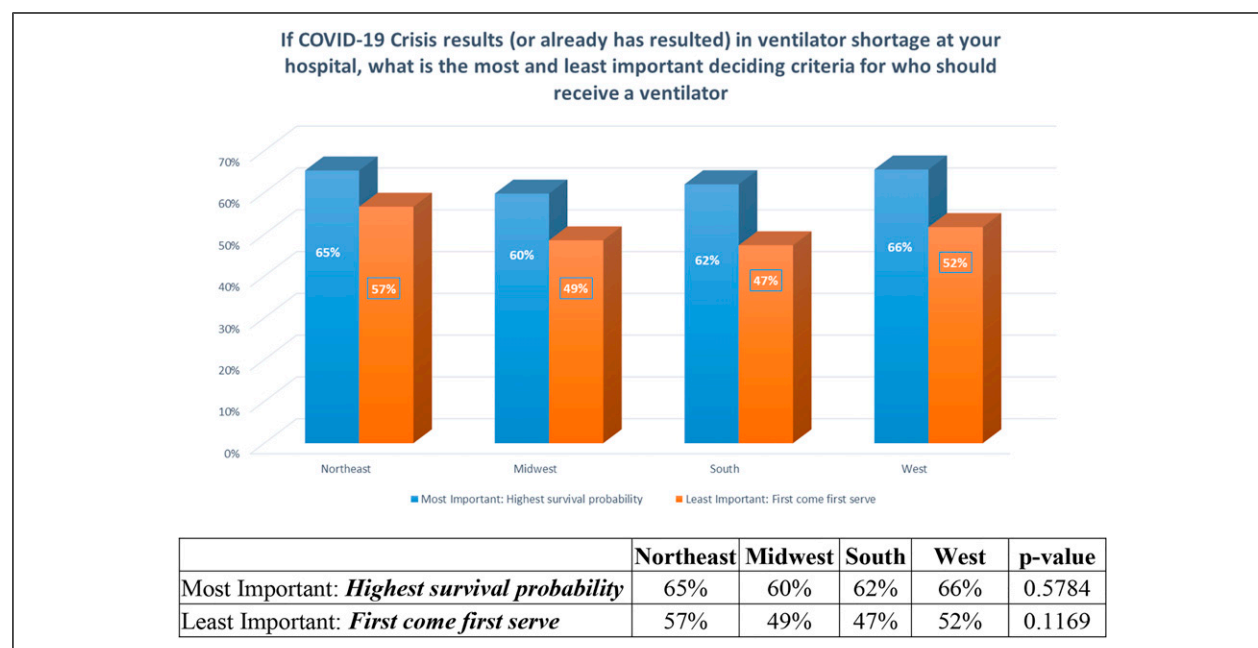
All results are reported as mean ± the standard deviation.

Nationwide, our medical trainees have voiced their experience and concerns. Using this survey as a platform, we examined several categories that most directly affected our respondents while working during the pandemic. At the time of creation, the survey aimed to provide quantitative insight on all resident physicians during the height of the initial wave of the pandemic, but to also capture a cohort of early-graduated medical students. While medical students were not promoted to patient care activities in many regions to limit their exposure and preserve PPE resulting in loss of clinical rotations,<sup>12</sup> in some other institutions like our own, they were given the

opportunity for early matriculation and same responsibilities as a first year resident physician. As the pandemic swooped through large metropolitan hubs, it became apparent that trainees from various geographic regions would be impacted differently. The Northeast region of the country emerged as a leading region for COVID and therefore also provided the most correspondence when analyzed regionally. The added calling for additional medical professionals brought forth a wave of medical schools to allow learners early graduation and deployment during the COVID pandemic. While the initial thoughts on decreased supervision and lack of

**Table 3.** Trainee Response on Ventilator Allocation for Patients With COVID-19.

|   | Northeast (n = 288) | Midwest (n = 241) | South (n = 171) | West (n = 145) | P-value |
|---|---------------------|-------------------|-----------------|----------------|---------|
| Patient age (1)                             | 3.18 ± 1.24         | 3.25 ± 1.24       | 3.04 ± 1.23     | 3.17 ± 1.20    | .406    |
| Highest survival probability (2)            | 1.48 ± .79          | 1.56 ± .82        | 1.50 ± .82      | 1.49 ± .76     | .581    |
| Health care workers or first responders (3) | 3.43 ± 1.46         | 3.51 ± 1.51       | 3.64 ± 1.40     | 3.51 ± 1.37    | .498    |
| Clinical critical condition of patient (4)  | 3.18 ± 1.24         | 2.97 ± 1.30       | 3.03 ± 1.33     | 2.85 ± 1.28    | .491    |
| First come first serve (5)                  | 5.15 ± 1.30         | 4.92 ± 1.40       | 4.92 ± 1.37     | 5.09 ± 1.22    | .084    |
| Multiple chronic comorbidities (6)          | 4.72 ± 1.21         | 4.79 ± 1.27       | 4.86 ± 1.19     | 4.90 ± 1.21    | .257    |

**Figure 3.** Trainee response on ventilator allocation for patients with COVID-19.

training would be detriments, these junior physicians anecdotally reported increased confidence and comfort in patient care.<sup>13</sup>

More residents outside of their selected fields were caring for COVID-positive patients and dealt inpatient clinical responsibilities, with decreased outpatient office experience. This is not the first study to report relevant psychological impacts on health care workers during the pandemic. In fact, the occupational burden of stress on health care workers has been studied during previous pandemics. Pollock et al<sup>14</sup> performed a meta-analysis of health care workers during the severe acute respiratory syndrome (SARS) outbreak, the Middle East respiratory syndrome (MERS) outbreak, as well as the current COVID-19 outbreak, looking at psychological outcomes through validated measures. Each outbreak has exacerbated the response of our system and created additional distress and untoward suffering.

Our results identified regional distinctions in health care trainees regarding depressive and burnout symptoms. Health care trainees in the Northeast experienced depressive symptoms (eg, feelings of guilt and hopelessness), that could be concerning for mental health suffering.<sup>15</sup> Greatest concerns included health of self, fear of bringing home the infection to family members, or the fear of death of loved ones. Health care workers with direct contact with infected patients experienced significantly higher level of burnout, specifically emotional exhaustion. Other factors reported include loss of control, concern for transmission to family, and vulnerability to the infection, which is similar to the experience of our health care trainees during the COVID-19 pandemic. The working environment during the peak of COVID has been equated to environments of combat, leaving residual post-traumatic stress symptoms and maladaptive response reactions 6 months to up to 3 years post-outbreak.<sup>16</sup>

Results from our survey are consistent with the level of exposure to the front line and other studies that speak to post-traumatic stress.<sup>17,18</sup>

During the height of the initial wave, many resident physicians were assigned to the critical care units, with limited supervision, and being asked for the first time to make life-altering decisions on patients who were unresponsive to standard therapeutic options. Such decisions were never asked of these junior physicians, and in the survey,<sup>19-22</sup> we asked our learners to identify factors important to allocation of ventilators at a time when medical and human resources were stretched to the limit. The results showed congruent decisions nationally made for patient selection in ventilatory support; trainees used highest probability of survival as the initial preference, followed by clinical critical condition, age, health care worker, multiple comorbid conditions, and first come first serve method.

The rapidity of patients' decline with COVID-19 and provider fear of aerosolized transmission also created ethical dilemmas for providing life-sustaining care.<sup>23,24</sup> Our survey showed that health care trainees believed full resuscitation be provided, but limited to attending staff and if possible with the use of a LUCAS device. Interestingly, almost a quarter of respondents selected "unsure." In a time where there are doubts surrounding the futility of patient survival outcomes with COVID and CPR,<sup>24</sup> more emphasis should be provided on educating our junior physicians in aligning goals of care with patient values. Learners in medical school and residency programs could gain benefit from being provided early palliative care education outside of a pandemic.<sup>25</sup>

In addition to the perceived stress and psychological impact experienced among our trainees, these workers are just that—still in training.<sup>26-28</sup> Studies have shown that there is an inverse correlation between adequacy of training and stress levels.<sup>29</sup> The anxiety of the unknown and the unprepared ensemble of the administration have left many resident physicians nervous about graduating and passing their licensing examinations. Many trainees were repurposed during the first phase of the pandemic, feeling helplessly out of control. Particularly, those in surgical or procedural specialties have expressed concern about acquiring the necessary surgical procedures to graduate and feel comfortable out in practice.<sup>30</sup> Coleman et al<sup>31</sup> echoed these concerns in a survey focused on surgical residents and early-career surgeons. There are distinct challenges faced by surgical providers, who reported profound negative impacts on clinical and personal experiences. In addition to residents reporting decreased operative experience, early-career surgeons worried about decreased compensation and future job prospects.

Many health care trainees chose to pursue this profession and upheld a duty and oath sworn to care for the sick. As this was many health care trainees' first

experience as frontline workers, on a positive note, some providers felt an increased sense of vocation and purpose of work. Future directions and the long-term impact from the initial pandemic remain to be seen. Being in a profession where there are many willing and eager to be involved, it is imperative that health care trainees are provided with the adequate resource and support to continue one's duty to the profession. We recommend support strategies be delivered at an enterprise-wide level in an ongoing fashion. Providing accessible PPE for those working in high volume areas highlights an emphasis on safety. Many trainees did spend more time away from family and loved ones and therefore had built a support community where they work. So, gestures of appreciation in the form of extended resources would have a great impact. Options for nutrition, assistance in meal or donations helps alleviate external stressors. Finally, hospitals should develop mental health task forces, with additional resources for pandemic-related issues related to coping with family and work responsibilities, difficulties with sleep, anxiety to encourage the development of a community to reduce the burdens of isolation and stress.<sup>32</sup>

### Limitations

While survey research tends to be a cost-effective manner to acquire large population data collection, it renders itself to multiple limitations. Such limitations include incomplete questionnaires and variability in question interpretation. Additionally, respondents for the survey were self-selected based (eg, those interested in the survey respond) and generates a non-random sampling error. Furthermore, the cascading distribution methodology limits the control of subjectivity at a higher level of administration, and that the surveys may have never been distributed to the learners. The effects of the COVID-19 pandemic were rapidly evolving, and therefore, the perspective and impact factor of response is variable upon the time the survey was taken. Lastly, the low response rate lessens the generalizability of the findings.

### Conclusions

Stress, burnout, and the emotional burden of caring for the ill have long affected health care trainees but have been amplified in these trying times. Although the participants have in common the field of medicine and the COVID-19 pandemic, the respondents were heterogeneous in terms of age range, gender, race, medical residencies specialties, and year of training, which may have affected the level of response. The first wave of the COVID-19 pandemic will be etched in the memory of those who endured the front line and will shape the outlook of an unforeseeable future. These survey results are echoed by those who have

dedicated the time to help health care trainees. We must continue to acknowledge the requisites of our health care trainees and provide the support and assistance on an institutional level.

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### Supplemental Material

Supplemental material for this article is available online.

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