

Emergency Medicine Shift Factors Causing the Most Stress Among Emergency Medicine Residents

Mohamad Moussa, MD¹, Kristen Hayden, BS^{1*}, Chia-Hao Shih, PhD¹, Sadik Khuder, PhD¹, Zayd Safadi, MD², Connor Parsell, MD³

ABSTRACT

Introduction: Past studies demonstrate that stress and anxiety affect emergency medicine physicians, but the causal factors identified are usually from sources outside the work shift. We attempt to show the relationship between intrinsic factors of a work shift and anxiety perceived by residents, while also examining differing gender responses.

Methods: In 2018, a cross-sectional survey of emergency medicine residents in the United States was distributed anonymously through the Emergency Medicine Residents Association. The survey consisted of demographic questions, novel questions identifying intrinsic factors, and the Generalized Anxiety Disorder 7-item (GAD-7) scale. Spearman correlation, independent t-test, and multivariate analysis of variance were performed.

Results: Data from 573 residents found several stressful factors: working with a nurse perceived to be inefficient, working with no inpatient beds available, and working with a colleague perceived to be inefficient. The majority of respondents reported some general anxiety on the GAD-7 assessment. There was no difference on anxiety level as a function of year of residency ($p > .05$). There was a significant gender difference on anxiety level, $t(571) = -4.8689$, $p < .05$, where male residents reported lower anxiety levels (mean=5.15) as compared to female residents (mean=7.02). Lastly, post-hoc analyses revealed that male and female respondents reported differing levels of stress in response to several intrinsic stress factors.

Conclusion: We identified several intrinsic factors during a shift that contribute to resident anxiety and analyzed differing gender responses to these factors; this may provide a framework for residency programs to minimize stressors in the future.

DOI: 10.18297/jwellness/vol3/iss2/8

Received Date: May 26, 2021
Accepted Date: Sept 1, 2021
Publication Date: Sept 13, 2021

Website: <https://ir.library.louisville.edu/jwellness/>

Recommended Citation: Moussa, Mohamad, Hayden, Kristen, Shih, Chia-Hao, Khuder, Sadik, Safadi, Zayd, Parsell, Connor; (2021) "Emergency Medicine Shift Factors Causing the Most Stress Among Emergency Medicine Residents," *Journal of Wellness*: Vol. 3 : Iss. 2, Article 8.

Affiliations: ¹University of Toledo College of Medicine and Life Sciences, ²Ascension St. John Hospital, ³University Hospitals Cleveland Medical Center



INTRODUCTION

Wellness among emergency medicine (EM) physicians has been a popular topic recently, with a plethora of research discussing attending physician wellness. EM physicians have increased risk for chronic stress, possibly due to increased encounters with workplace violence, emotional exhaustion, and exposure to traumatic injuries and child/adolescent mortality. Research has demonstrated that EM physicians are at higher risk for post-traumatic stress disorder (PTSD) as compared to other specialties due to exposure to violence, trauma, and death beginning in residency [1-4]. Therefore, EM physicians leave their specialty at higher rates than other physicians possibly due to the high stress of the field [5]. The Coronavirus Disease 2019 pandemic has affected frontline workers [6]. EM physicians expressed increased anxiety and depression disproportionately, with concerns related to personal health, exposing family members, and social isolation [7, 8]. However, a majority of EM physicians reported that their symptoms of burnout began

prior to the pandemic [9]. Despite extensive research regarding attending physician wellness, research regarding wellness specifically of resident emergency physicians has only recently begun to be explored, and there is no standardized approach to improve wellness in resident education [10, 11].

Another crucial topic in the discussion of EM physician wellness is burnout, which describes a state of emotional exhaustion, depersonalization, and low personal accomplishment [12]. Burnout is prevalent among EM attending and resident physicians, is positively correlated with medical errors, and poses great danger to patients [12-16]. Studies have also demonstrated that some EM residents turn to alcohol and other maladaptive strategies to cope [1, 17]. The process leading to increased burnout may begin in medical school, with overall burnout being more widespread among medical students and residents than population control samples [18]. Changes must occur in the training of EM residents, as burnout remains prevalent with

*Correspondence To: Kristen Hayden
Email: kristen.hayden@utoledo.edu

Copyright: © 2021 The author(s). This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

67.1% of surveyed EM residents meeting burnout criteria compared to 45% of residents nationally reporting at least one symptom of burnout [19-21].

A recent study examined stressful events occurring outside of and during an EM work shift and how perceptions have changed over time [22]. "Feeling overwhelmed at work" complicates the relationship between work and burnout [23]. In the same context, the current study investigated factors occurring during EM work shifts and their relationship to stress by identifying specific stressful events during a work shift and evaluating the overall level of anxiety among EM residents.

METHODS

Setting and Participants

We conducted an anonymous survey study of emergency medicine resident physicians (PGY-1 to PGY-4) training in the United States. The invitation to participate in the study was sent via email with the assistance of the Emergency Medicine Residents' Association (EMRA) to their membership list. Exclusion criteria included: a) physicians in other medical specialties, b) EM attendings, c) medical students, and d) all other hospital staff. A pilot study was conducted in a local EM residency program to prove the validity of the survey and determine the estimated completion time. This study was approved by the University of Toledo Biomedical Institutional Review Board, #202154.

Outcomes Measured

The primary outcome of this study was to quantify the level of stress associated with each of the identified intrinsic factors of a work shift in the emergency department (ED). The secondary outcome of this study was to examine differences in stress responses and anxiety levels as a function of residents' gender and years in residency. The survey utilized the General Anxiety Disorder 7 (GAD-7) assessment, a widely used tool to detect those with anxiety disorders [24-26], along with novel questions regarding intrinsic factors of a shift in the ED. These questions were presented as a 4-point Likert-type scale, with options ranging from the factor causing no stress/anxiety (score of 0) up to the factor causing severe stress/anxiety (score of 3). In addition, demographic information was collected for age, gender, year of residency, and location of residency.

Data Analysis

Independent t-test, analysis of variance (ANOVA), and multivariate analysis of variance (MANOVA) were used to examine differences with anxiety level and perceived stress from intrinsic factors based on gender or years in residency. Additionally, Spearman correlation was used to evaluate the linear relationships among anxiety level and stress responses to intrinsic factors. Statistical significance level was set at $\alpha = .05$, two-tailed. Bonferroni correction was applied for multiple comparisons. All data analyses were performed with the statistical software R [27].

RESULTS

Characteristics of Study Participants

An email containing a link to complete the survey was sent to 6059 addresses. Of the emails sent, 2960 emails were opened, and 617 surveys were returned (response rate = 20.84%). Additionally, data from 44 respondents were further excluded due to missing values in variables of interest, leaving data from 573 respondents in the analyses. Demographic information of survey respondents is presented in **Table 1**. Respondents consisted of 57% male (n=327) and 43% female (n=246), with a mean age of 30.66 ± 3.95 years, and represented 44 out of 50 states. Post-Graduate Year 1 to 3 residents comprised the majority of respondents (90%).

Table 1: Demographic Information of Survey Respondents

	N	%
Gender		
Male	327	57.07
Female	246	42.93
Age		
25-29	251	43.80
30-34	253	44.15
35-39	52	9.08
40-44	11	1.92
45 and over	5	0.88
Not provided	1	0.17
Year of Residency		
PGY1	208	36.30
PGY2	164	28.62
PGY3	143	24.96
PGY4	50	8.73
Not provided	8	1.39

General Anxiety Among EM Residents

More than half of respondents reported anxiety based on the GAD-7 assessment. Specifically, 33.51% (n=192), 13.61% (n=78), and 6.63% (n=38) of respondents reported mild, moderate, and severe anxiety, respectively. Additionally, there was a significant gender difference on anxiety level, $t(571) = -4.8689$, $p < .05$. Male EM residents reported lower anxiety levels (mean=5.15) as compared to female EM residents (mean=7.02). There was no difference on anxiety level as a function of year of residency ($p > .05$).

Stress Responses to Work Shift-Related Factors

With regard to intrinsic stress factors, MANOVA showed a statistically significant effect of gender on intrinsic stress factors ($F(1,571)=1.92$, $p<.05$, Pillai's Trace=0.06). **Table 2** provides mean values of stress responses for each factor broken down by male, female, and all respondents and denotes significant gender differences.

Table 2: Stress Response of Males, Females, and Overall to Each Intrinsic Factor

Intrinsic Stress Factor	Stress Response Score		
	Male	Female	Overall
EMS phone interruptions ^a	0.61	0.76	0.68
Patients to be seen in the waiting room	1.30	1.41	1.35
Working with a colleague who you perceive to be inefficient ^a	1.31	1.46	1.38
Working with a nurse who you perceive to be inefficient ^a	1.59	1.77	1.67
Providing care to high acuity patients ^a	1.26	1.44	1.34
Providing care to low acuity patients	0.82	0.73	0.78
Managing agitated patients	1.15	1.27	1.20
Shift that begins in the morning	0.49	0.60	0.54
Shift that begins in the afternoon	0.66	0.73	0.69
Shift that begin at night	0.76	0.88	0.81
Working in a setting with no open inpatient beds available ^a	1.42	1.57	1.48
Using an electronic medical record system	0.76	0.71	0.74
Evaluating patients in the hallway ^a	0.86	1.01	0.92
The practice of having EKGs interrupt you during a shift	0.63	0.72	0.67
Pharmacy phone calls interrupting your workflow	0.53	0.63	0.58
Personal cell phone texts, calls, and alerts	0.25	0.29	0.27
Teaching while on a standing work shift	0.70	0.83	0.75

^a Indicates significant gender difference

Table 3: Correlation Coefficients Between General Anxiety Level and Intrinsic Stress Factors

Intrinsic Stress Factor	Correlation Coefficients ^a		
	Male	Female	Overall
EMS phone interruptions	0.18	0.15	0.19
Patients to be seen in the waiting room	0.23	0.20	0.23
Working with a colleague who you perceive to be inefficient	0.14	0.15	0.17
Working with a nurse who you perceive to be inefficient	0.20	0.21	0.22
Providing care to high acuity patients	0.23	0.14	0.22
Providing care to low acuity patients	0.23	0.28	0.24
Managing agitated patients	0.25	0.17	0.23
Shift that begins in the morning	0.23	0.13	0.20
Shift that begins in the afternoon	0.34	0.30	0.32
Shift that begins at night	0.31	0.22	0.28
Working in a setting with no open inpatient beds available	0.28	0.27	0.28
Using an electronic medical record system	0.26	0.11	0.19
Evaluating patients in the hallway	0.23	0.24	0.25
The practice of having EKGs interrupt you during a shift	0.18	0.20	0.20
Pharmacy phone calls interrupting your workflow	0.18	0.09	0.15
Personal cell phone texts, calls, and alerts	0.11	0.13	0.12
Teaching while on a standing work shift	0.11	0.21	0.17

^a Bold values indicate significant correlation with Bonferroni correction

As seen in **Table 2**, post-hoc analyses revealed that female residents reported higher stress than male residents on: EMS phone interruptions ($F(1,571)=5.83, p<.05$), working with a colleague who you perceive to be inefficient ($F(1,571)=5.04, p<.05$), working with a nurse who you perceive to be inefficient ($F(1,571)=8.17, p<.01$), providing care to high acuity patients ($F(1,571)=6.44, p<.05$), working in a setting with no open inpatient beds available ($F(1,571)=3.94, p<.05$), and evaluating patients in the hallway ($F(1,571)=4.86, p<.05$).

Correlations Between General Anxiety and Stress Responses to Work Shift-Related Factors

Correlation analyses showed that general anxiety level was significantly associated with all intrinsic stress factors (r range between 0.17 and 0.32, $ps < .05$, Bonferroni-corrected) except pharmacy phone calls interrupting workflow and personal cell phone texts, calls, and alerts ($ps > .05$, Bonferroni-corrected). **Table 3** presents correlations among general anxiety level and intrinsic stress factors for male, female, and overall respondents.

Gender specific correlation analysis showed different correlation patterns (Table 3). For male residents, general anxiety level was significantly associated with patients to be seen in the waiting room ($r=.23, p<.05$, Bonferroni-corrected), working with a nurse who you perceive to be inefficient ($r=.20, p<.05$, Bonferroni-corrected), providing care to high acuity patients ($r=.23, p<.01$, Bonferroni-corrected), providing care to low acuity patients ($r=.23, p<.01$, Bonferroni-corrected), managing agitated patients ($r=.25, p<.01$, Bonferroni-corrected), shift that begins in the morning ($r=.23, p<.01$, Bonferroni-corrected), shift that begins in the afternoon ($r=.34, p<.01$, Bonferroni-corrected), shift that begins at night ($r=.31, p<.01$, Bonferroni-corrected), working in a setting with no open inpatient beds available ($r=.28, p<.01$, Bonferroni-corrected), using an electronic medical record system ($r=.26, p<.01$, Bonferroni-corrected), and evaluating patients in the hallway ($r=.23, p<.01$, Bonferroni-corrected).

For female residents, general anxiety level was significantly associated with providing care to low acuity patients ($r=.28, p<.01$, Bonferroni-corrected), shift that begins in the afternoon ($r=.30, p<.01$, Bonferroni-corrected), working in a setting with no open inpatient beds available ($r=.27, p<.01$, Bonferroni-corrected), and evaluating patients in the hallway ($r=.24, p<.05$, Bonferroni-corrected).

DISCUSSION

This study aimed to determine which intrinsic factors of an EM work shift cause subjective stress in EM residents. Responses from 573 EM residents were analyzed, resulting in identification of six critical factors that cause higher reported stress responses: managing agitated patients, caring for high acuity patients, working with many patients waiting to be seen, working with a colleague who is perceived to be inefficient, working with no inpatient beds available for patient admission, and working with a nurse who is perceived to be inefficient.

Threats to efficiency, such as working with a nurse or colleague who is perceived to be inefficient, produced high reported stress response scores in this study. When working in a busy ED, residents may feel burdened or slowed down by inefficient coworkers, leading to poor job satisfaction, which is correlated with burnout [14, 28]. Team-based models (i.e., physicians, nurses, and techs working together) have been shown to decrease self-reported burnout, demonstrating that staff cohesiveness is essential for reducing stress [29].

Job satisfaction can also be negatively affected by resource scarcity, such as access to ED beds [30]. Although scarcity of inpatient beds was not found to impact job satisfaction in EM physicians in a previous study, working with no inpatient beds available was the second most stressful intrinsic factor measured in this study [30]. This discrepancy suggests an area for future research regarding EM physicians faced with a shortage of hospital beds for admission. Additionally, boarding patients in the ED while waiting for inpatient beds to become available has been an increasing concern among EM residents over the past ten years [22]. The drive for efficiency can also impact patients as some are seen as “bed blockers” or admitted with less diagnostic testing in extreme examples [30, 31]. These previous studies in conjunction with our data point to the need for increased attention to hospital resources, with ED and inpatient beds being critically important to mediate physician stress.

The fourth and fifth most stressful factors in this study related directly to patients. These factors were: working while there are patients waiting to be seen in the waiting room and caring for high acuity patients. This finding relates to a previous study that found a connection between increased workload, as would be seen with a full waiting room and complex patient cases, and burnout [32]. A large percentage of EM physicians experience feelings of depersonalization when working with patients, both as a defense mechanism and due to the nature of EM affecting the ability to form long-term relationships with patients [33]. The high reported stress response to providing care to high acuity patients can also be viewed in conjunction with a previous study that showed that residents who cared for a greater number of patients with trauma had more self-reported near misses in patient care [34]. Caring for complex patients cannot be avoided in EM, but improvements must be made. A possible solution would be to use a tiered approach to increase the number of high acuity patients seen in a shift as residents progress through each year of training. With this approach, residents would still be supported by attending physicians while learning to manage more complex patients, and they would be adequately prepared to work independently following residency.

Many of the factors described above have been shown to cause increased medical errors or near-misses. While this is certainly a concern for patient safety, it is essential to also consider the impact these medical errors have on residents themselves. Second victim syndrome was first described in 2000 and characterizes the negative cognitive, psychological, and physical reactions in health care providers who were part of a serious adverse event. They become the second victim of a medical error, with the patient being the first victim [35, 36].

Various factors intrinsic to an ED shift have been identified as causing increased stress, leading to future avenues of research and possibilities for programs to improve the wellness of their residents. Performing a more comprehensive screen for generalized anxiety disorder in EM residents, with additional information on previous mental health diagnoses of each respondent, would help elucidate whether stressors during residency were the causal factor of any positive anxiety screens or if students with past mental health diagnoses are simply more likely to choose an EM residency.

LIMITATIONS

Despite identifying multiple promising findings useful for improving EM resident stress, some limitations should be noted. First, our results rely on subjective answers inherent in survey-based research. Due to the nature of using an optional survey to collect data, bias may be introduced. For example, residents who chose to respond may have intrinsic differences when compared to the target population of all US EM residents. It was determined that a survey would be used for data collection to include as many EM residents as possible.

Another limitation is the suboptimal response rate achieved in this study. Not utilizing stratification to determine which users were active versus dormant when sending the survey via the EMRA listserv may have contributed to a low response rate. Many residents on the listserv may automatically have emails from EMRA sent to a spam folder or ignored. The overwhelming number of emails and surveys EM residents receive could be another factor affecting this number. Sending the survey out to active EMRA members only would help to achieve a higher response rate.

This survey had a completion rate of 73.9% (835 participants accessed the survey, 617 completed the survey). Some residents did not complete the survey once starting it, possibly due to the length of the survey. Future survey-based research on this topic could be improved by focusing on fewer intrinsic factors. This would achieve a larger completion rate as the survey would be shorter.

The difference in number of male (57.07%) versus female (42.93%) respondents could be due to a variety of factors, including general differences in behaviors regarding surveys and gender disparity in EM residencies across the country [37]. These percentages are similar to results from a study in 2017 which found that out of 143 residency programs analyzed, 38% of residents were female [38].

Although non-ED related stress factors such as issues with family, financial stress, and overall health status are outside the

scope of the current study, these factors could influence general anxiety and stress level of residents. Future studies incorporating this information are warranted.

CONCLUSION

The results of this survey demonstrate the high prevalence of stress and anxiety among US EM residents and the specific intrinsic factors of a shift, particularly interpersonal concerns and resource scarcity, that contribute to this. Female residents reported a significantly higher score on the Generalized Anxiety Disorder-7 assessment and reported higher stress response scores to several intrinsic shift factors compared to male residents, suggesting a need to consider gender when addressing anxiety in EM residents. As many risk factors for anxiety and burnout are intrinsic to medicine and the specialty of EM in particular, the topic of EM resident wellness should receive further exploration to provide programs with data to realistically address this issue in their own departments.

Acknowledgments

Margaret Hoogland, MLS, AHIP: Assistant Professor, Clinical Medical Librarian

REFERENCES

1. Zafar W, Khan UR, Siddiqui SA, Jamali S, Razzak JA. Workplace Violence and Self-reported Psychological Health: Coping with Post-traumatic Stress, Mental Distress, and Burnout among Physicians Working in the Emergency Departments Compared to Other Specialties in Pakistan. *J Emerg Med.* 2016 Jan;50(1):167–77.e1.
2. Erdur B, Ergin A, Yüksel A, Türkçüer İ, Ayrik C, Boz B. Assessment of the relation of violence and burnout among physicians working in the emergency departments in Turkey. *Ulus Travma Acil Cerrahi Derg.* 2015 May;21(3):175–81.
3. Somville FJ, De Gucht V, Maes S. The impact of occupational hazards and traumatic events among Belgian emergency physicians. *Scand J Trauma Resusc Emerg Med.* 2016 Apr;24(1):59.
4. Vanyo L, Sorge R, Chen A, Lakoff D. Posttraumatic Stress Disorder in Emergency Medicine Residents. *Ann Emerg Med.* 2017 Dec;70(6):898–903.
5. Lee YK, Lee CC, Chen CC, Wong CH, Su YC. High risk of 'failure' among emergency physicians compared with other specialists: a nationwide cohort study. *Emerg Med J.* 2013 Aug;30(8):620–2.
6. 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.
7. Lu W, Wang H, Lin Y, Li L. Psychological status of medical workforce during the COVID-19 pandemic: A cross-sectional study. *Psychiatry Res.* 2020 Jun;288:112936.
8. Rodriguez RM, Medak AJ, Baumann BM, Lim S, Chinnock B, Frazier R, et al. Academic Emergency Medicine Physicians' Anxiety Levels, Stressors, and Potential Stress Mitigation Measures During the Acceleration Phase of the COVID-19 Pandemic. *Acad Emerg Med.* 2020 Aug;27(8):700–7.
9. Martin KL, Koval ML. Medscape Emergency Medicine Physician Lifestyle, Happiness & Burnout Report 2021. Available from: <https://www.medscape.com/slideshow/2021-lifestyle-emergency-medicine-6013508>
10. Taher A, Hart A, Dattani ND, Poonja Z, Bova C, Bandiera G, et al. Emergency medicine resident wellness: lessons learned from a national survey. *CJEM.* 2018 Sep;20(5):721–4.
11. Schmitz GR, Clark M, Heron S, Sanson T, Kuhn G, Bourne C, et al. Strategies for coping with stress in emergency medicine: early education is vital. *J Emerg Trauma Shock.* 2012 Jan;5(1):64–9.
12. Shanafelt TD, Boone S, Tan L, Dyrbye LN, Sotile W, Satele D, et al. Burnout and satisfaction with work-life balance among US physicians relative to the general US population. *Arch Intern Med.* 2012 Oct;172(18):1377–85.
13. Peckham C. Race and Ethnicity, Bias and Burnout. Medscape Lifestyle Report 2017 [Internet]. 2017. Available from: <https://www.medscape.com/features/slideshow/lifestyle/2017/overview>
14. Kimo Takayesu J, Ramoska EA, Clark TR, Hansoti B, Dougherty J, Freeman W, et al. Factors associated with burnout during emergency medicine residency. *Acad Emerg Med.* 2014 Sep;21(9):1031–5.
15. Aala A. Frequency of Burnout, Sleepiness and Depression in Emergency Medicine Residents with Medical Errors in the Emergency Department. *Adv Biosci Clin Med.* 2014;2(2).
16. Kharasch M, Aitchison P, Pettineo C, Pettineo L, Wang EE. Physiological stress responses of emergency medicine residents during an immersive medical simulation scenario. *Dis Mon.* 2011 Nov;57(11):700–5.
17. Hoonpongsimanont W, Murphy M, Kim CH, Nasir D, Compton S. Emergency medicine resident well-being: stress and satisfaction. *Occup Med (Lond).* 2014 Jan;64(1):45–8.
18. Dyrbye LN, West CP, Satele D, Boone S, Tan L, Sloan J, et al. Burnout among U.S. medical students, residents, and early career physicians relative to the general U.S. population. *Acad Med.* 2014 Mar;89(3):443–51.
19. Nordenholz KE, Alvarez Aa, Lall MD, Stehman C, Bitter CC, Hirsh EL, et al. Optimizing Wellness in Academic Emergency Medicine *Journal Of Wellness* [Internet]. 2020; 2(2). Available from: <https://ir.library.louisville.edu/jwellness/vol2/iss2/8>
20. 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.
21. Collier R. Burnout symptoms common among medical residents but rates vary across specialties. *CMAJ.* 2018 Oct;190(41):E1239.
22. Perina DG, Marco CA, Smith-Coggins R, Kowalenko T,

- Johnston MM, Harvey A. Well-Being among Emergency Medicine Resident Physicians: Results from the ABEM Longitudinal Study of Emergency Medicine Residents. *J Emerg Med*. 2018 Jul;55(1):101–109.e2.
23. Thomas NK. Resident burnout. *JAMA*. 2004 Dec;292(23):2880–9.
 24. Jordan P, Shedden-Mora MC, Löwe B. Psychometric analysis of the Generalized Anxiety Disorder scale (GAD-7) in primary care using modern item response theory. *PLoS One*. 2017 Aug;12(8):e0182162.
 25. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med*. 2006 May;166(10):1092–7.
 26. Löwe B, Decker O, Müller S, Brähler E, Schellberg D, Herzog W, et al. Validation and standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the general population. *Med Care*. 2008 Mar;46(3):266–74.
 27. Team RC. R: A language and environment for statistical computing. R Foundation for Statistical Computing.
 28. Tarcan M, Hikmet N, Schooley B, Top M, Tarcan GY. An analysis of the relationship between burnout, socio-demographic and workplace factors and job satisfaction among emergency department health professionals. *Appl Nurs Res*. 2017 Apr;34:40–7.
 29. Chang BP, Cato KD, Cassai M, Breen L. Clinician burnout and its association with team based care in the Emergency Department. *Am J Emerg Med*. 2019 Nov;37(11):2113–4.
 30. Rondeau KV, Franciscutti LH. Emergency department overcrowding: the impact of resource scarcity on physician job satisfaction. *J Healthc Manag*. 2005 Sep-Oct;50(5):327–40.
 31. Webster F, Rice K, Dainty KN, Zwarenstein M, Durant S, Kuper A. Failure to cope: the hidden curriculum of emergency department wait times and the implications for clinical training. *Acad Med*. 2015 Jan;90(1):56–62.
 32. Watson AG, McCoy JV, Mathew J, Gundersen DA, Eisenstein RM. Impact of physician workload on burnout in the emergency department. *Psychol Health Med*. 2019 Apr;24(4):414–28.
 33. Keller KL, Koenig WJ. Management of stress and prevention of burnout in emergency physicians. *Ann Emerg Med*. 1989 Jan;18(1):42–7.
 34. Arnetz BB, Lewalski P, Arnetz J, Breejen K, Przyklenk K. Examining self-reported and biological stress and near misses among Emergency Medicine residents: a single-centre cross-sectional assessment in the USA. *BMJ Open*. 2017 Aug;7(8):e016479.
 35. Ozeke O, Ozeke V, Coskun O, Budakoglu II. Second victims in health care: current perspectives. *Adv Med Educ Pract*. 2019 Aug;10:593–603.
 36. Wu AW. Medical error: the second victim. The doctor who makes the mistake needs help too. *BMJ*. 2000 Mar;320(7237):726–7.
 37. Saleh A. Examining Factors Impacting Online Survey Response Rates in Educational Research: Perceptions of Graduate Students. *J Multidiscip Eval*. 2017;13(29):63–74.
 38. DeFazio CR, Cloud SD, Verni CM, Strauss JM, Yun KM, May PR, et al. Women in Emergency Medicine Residency Programs: An Analysis of Data From Accreditation Council for Graduate Medical Education-approved Residency Programs. *AEM Educ Train*. 2017 May;1(3):175–8.