High Prevalence of Burnout Among US Emergency Medicine Residents: Results From the 2017 National Emergency Medicine Wellness Survey

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Study objective: Previous work shows that emergency medicine attending physicians have higher-than-average rates of burnout. Preliminary data suggest that emergency medicine residents are also at risk for burnout. The objective of this study was to conduct the first national survey assessment of US emergency medicine residents to determine the prevalence of burnout.

Methods: This prospective 2017 National Emergency Medicine Resident Wellness Survey study was conducted through the Wellness Think Tank, whereby emergency medicine residents from 247 residencies across the United States were invited to participate in a national survey. The primary measure of burnout was the Maslach Burnout Inventory–Human Services Survey. In accordance with others' work, "burnout" was defined as a dichotomous variable represented by high levels of emotional exhaustion or depersonalization. Because of interpretative variability with the survey tool, we also calculated burnout rates by using a more restrictive definition and a more inclusive definition that have been reported in the literature.

Results: Surveys were completed by 1,522 residents (21.1% of all US emergency medicine residents), representing 193 of 247 US emergency medicine residency programs (78.1%). Within this sample, the prevalence of burnout was 76.1% (95% confidence interval 74.0% to 78.3%). With alternative definitions applied, burnout prevalence rates for this same sample were 18.2% (95% confidence interval 16.3% to 20.1%) with the more restrictive definition and 80.9% (95% confidence interval 78.9% to 82.9%) with the more inclusive definition.

Conclusion: The majority of US emergency medicine residents responding to this survey reported symptoms consistent with burnout, highlighting that physician burnout in the emergency medicine profession seems to begin as early as residency training. These findings may provide a baseline against which future work can be compared. [Ann Emerg Med. 2019;74:682-690.]

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INTRODUCTION

Background

Physician burnout has been defined as a complex, multidimensional, psychological syndrome resulting from long-term stress during one's career. The 22-item Maslach Burnout Inventory–Human Services Survey (MBI-HSS) is the most widely used validated tool to measure burnout in health care professionals. It assesses 3 subscale domains: emotional exhaustion, which means being emotionally depleted at work; depersonalization, which means a lack of feelings or negative, cynical feelings toward others; and personal accomplishment, which is a positive sense of self-evaluation and success at work. The authors of the MBI-HSS suggested that high emotional exhaustion, high depersonalization, and low personal accomplishment scores are correlated with burnout.[1,2]

The MBI-HSS authors originally designed the tool with burnout subscale scores reported as a continuum. They subsequently proposed that, if a dichotomous definition is used (such as for clinically relevant reporting), a more restrictive approach should be taken to avoid overestimation. Specifically, burnout exists if all 3 criteria of a high emotional exhaustion, high depersonalization, and low personal accomplishment score are present. They validated definitions of low, moderate, and high scores for each of the subscales.[1] Despite this recommendation and because there is no criterion standard definition for burnout, many study authors have defined burnout as a dichotomous variable (burned out or not burned out) and applied their own definitions for burnout, using the

Editor's Capsule Summary

What is already known on this topic

Burnout is common among practicing emergency physicians.

What question this study addressed

This cross-sectional survey measured prevalence of burnout symptoms among emergency medicine residents in the United States.

What this study adds to our knowledge

A total of 1,522 residents (21.1% of all emergency medicine residents) representing 78.1% of emergency medicine programs completed the survey. Of these residents, three quarters met criteria for burnout, according to the most common definition. With a more conservative definition, 18% of residents met criteria for burnout. Burnout prevalence was higher among postgraduate year 2 and 3 residents than postgraduate year 1 residents.

How this is relevant to clinical practice

Burnout symptoms were reported by the majority of US emergency medicine residents responding to this survey. The results may serve as a baseline against which future emergency medicine resident burnout research can be compared.

MBI-HSS subscales.[3-5] This has since muddied the burnout research literature, with at least 47 distinct definitions reported.[6-14]

Regardless of how burnout is defined, emergency physicians appear particularly vulnerable to burnout compared with physicians in other specialties, with reported rates of greater than 60%, and previous literature suggests burnout may start earlier during residency training.[7,8,11,14-23] Previous research in emergency physician burnout has been restricted to a small subset of physicians from a single program, single sex, single geographic region, mix of independently practicing and resident trainee physicians, and type of licensure, in addition to being subject to the implementation of a variety of burnout survey tools.[15,16,24,25] This limits generalizability to the emergency medicine and broader graduate medical education community as a whole.

Importance

Physician burnout negatively affects not only physicians but also their colleagues and patients. It has been associated with perceptions of providing suboptimal patient care,[16,24] lack of empathy,[26-28] perceived and self-reported medical errors,[9,17,26] intent to leave the profession,[1,29] poor job satisfaction,[8,24] and lack of professionalism.[30-32]

Goals of This Investigation

We aimed to evaluate the current state of burnout in US emergency medicine residents by launching the 2017 National EM Resident Wellness Survey, which incorporated the MBI-HSS tool. To our knowledge, our study is the first national-level assessment of burnout rates for emergency medicine residents. We hypothesized that burnout is prevalent during emergency medicine residency training before residents become independently practicing emergency physicians.

MATERIALS AND METHODS

Study Design

In this prospective survey study, US emergency medicine residents completed a self-administered, incentivized online questionnaire, conducted by the Academic Life in Emergency Medicine's (ALiEM's) Wellness Think Tank volunteer organization from March 20 to 31, 2017. ALiEM is a nonprofit, health professions, education organization focused on social media technologies and community building. The Wellness Think Tank is a virtual community of more than 100 emergency medicine residents and 12 emergency medicine supervising faculty from across North America who are interested in physician wellness. This study was granted expedited approval by the institutional review board of New York–Presbyterian Brooklyn Methodist Hospital.

The 2017 National EM Resident Wellness Survey included demographic questions, the MBI-HSS tool, an inventory of active residency program wellness initiatives, and the Life Orientation Test–Revised tool. The initial survey design was created by one investigator (M.M.), and subsequent iterative refinements for clarity and brevity were completed by the remaining investigators. This study focuses solely on the MBI-HSS tool, which can be licensed from MindGarden.com.

The validated 22-item MBI-HSS tool scores each item on a 7-point Likert scale. Items are categorized into 1 of 3 subscales (emotional exhaustion, depersonalization, and personal accomplishment), each of which can be classified as low, moderate, or high, according to cutoff ranges (Table 1). These ranges were derived from normative data originally studied and validated by Maslach et al[1] and based on 1,104 physicians.

For our study, we defined burnout as a high emotional exhaustion score or high depersonalization score to mirror

Table 1. Cutoff ranges for each MBI-HSS subscale.

Subscale	Low	Moderate	High
EE	≤ 18	19–26	≥ 27
DP	≤ 5	6–9	≥ 10
PA	≤ 33	34–39	≥ 40

EE, Emotional exhaustion; *DP*, depersonalization; *PA*, personal accomplishment.

other landmark burnout studies by Dyrbye et al,[7] Shanafelt et al,[8] and other burnout researchers in the graduate medical education domain.[10-13,21-23]

Selection of Participants

US emergency medicine residents were informed of the online survey through multiple online channels. These included announcements on the ALiEM blog Web site (https://www.aliem.com) on March 20, 2017; Twitter and Facebook, led by members of ALiEM and the Wellness Think Tank teams; the Council of Emergency Medicine Residency Directors organizational listserv; and the Emergency Medicine Residents' Association organization listserv. The complete survey was hosted online with Research Electronic Data Capture (version 8.1.4), a secure Web application for building and managing online surveys and databases.[33] All participants were provided a $5 Starbucks gift card and coupon codes to meal delivery services. Furthermore, programs with more than 90% survey completion rates were entered into a lottery for a free pizza party and access to live-streamed recordings from a national emergency medicine education conference.

Participant status as a current US emergency medicine resident was verified by the Wellness Think Tank members by obtaining and cross-referencing resident rosters from program directors, residency coordinators, or chief residents of accredited emergency medicine residency programs. Submissions were reviewed against program rosters to ensure resident status and that each resident responded only once. Submissions made by unconfirmed participants, duplicate submissions, and residents from dual or triple residency programs, such as combined emergency medicine/internal medicine programs, were excluded. Although demographic information was collected on the participants, all data were anonymized before analysis.

Outcome Measures

The primary outcome measure was the proportion of burned-out emergency medicine residents, using the definition of having a high emotional exhaustion (≥27) or high depersonalization (≥10) subscale score on the MBI-HSS tool. Because the definition of burnout with the MBI-HSS tool varies in the literature across medical specialties and in graduate medical education,[7-25] we also calculated burnout rates with 2 alternative formulas that have been reported in the literature. The more restrictive definition, which was originally proposed by the MBI-HSS tool authors, is a high emotional exhaustion score (≥27) and high depersonalization (≥10) and low personal accomplishment (≤33) scores[1]; the more inclusive definition is a high emotional exhaustion score (≥27) or high depersonalization (≥10) or low personal accomplishment (≤33) score. Secondary outcomes included differences in burnout rates by geographic region and postgraduate year (PGY) of residency training.

Primary Data Analysis

Survey data collected on Research Electronic Data Capture were exported to Excel (version 15.4; Microsoft, Redmond, WA) spreadsheets and analyzed with R (version 3.4.2).[34] Burnout was defined as a dichotomized yes/no variable. Standard descriptive statistics were used to report burnout rates (with 95% confidence intervals [CIs] calculated with Taylor approximation series) and demographic characteristics.

Sensitivity analyses were performed with inverse probability weighting to calculate adjusted estimates that would account for nonresponse in residents potentially underrepresented in the sample, based on the best available evidence for the age, sex, PGY class, and geographic region for the national population of emergency medicine residents. We used logistic regression to explore the relationships between the reported burnout rate (using primary outcome definition) and training years and geographic region. These variables were selected a priori as relationships of interest according to a review of the existing literature and assessed individually with a likelihood ratio test against the null hypothesis of no association. We also analyzed early and late survey responders during the 12-day survey period, comparing the first 50% versus last 50%, as well as the first 25% versus last 25% of responders.

RESULTS

Characteristics of Study Subjects

A total of 1,522 of 7,186 independently verified US emergency medicine residents (21.2%) representing 193 of 247 residency programs (78.1%) participated in the survey, after exclusion of 394 respondents (5.5%). A range of 1 to 44 residents (median 6, mean 8.8) per program participated in the survey. The participants were geographically distributed in similar fashion to the locations of emergency medicine residency programs according to demographic

data from 2016 to 2017 Accreditation Council for Graduate Medical Education reports of US emergency medicine PGY 1 residents and Association of American Medical Colleges Workforce Reports.[35-37] Demographic data of the study participants are listed in Table 2.

Main Results

The prevalence of burnout among emergency medicine residents responding to our survey was 76.1% (95% CI 74.0% to 78.3%), as defined by a high emotional exhaustion score (≥27) or high depersonalization score (≥10) on the MBI-HSS tool. In accordance with the best available evidence for age, sex, PGY class, and geographic region for the national population of emergency medicine residents, we recalculated burnout rates with inverse probability weighting and report an adjusted burnout rate of 75.1% (95% CI 71.3% to 78.9%), which is similar to the unadjusted burnout rate of 76.1%.

Applying the alternative more restrictive and more inclusive definitions for burnout, we report an 18.2% (95% CI 16.3% to 20.1%) and 80.9% (95% CI 78.9% to 82.9%) burnout rate, respectively, among our survey participants. The Figure summarizes these findings, and Table 3 reports the raw data on a more granular level, with each MBI-HSS subscale reported individually and stratified by PGY class. The raw data can be viewed in the supplemental section (Table E1, available online at http://www.annemergmed.com).

Compared with PGY 1 residents, PGY 2 and 3 (or longer) residents were more likely to report burnout, with adjusted odds ratios for primary burnout of 1.7 (95% CI 1.1 to 2.8) and 2.0 (95% CI 1.2 to 3.2), respectively. There was, however, no indication of a difference between the burnout reported in PGY 2 and 3 (or longer) residents (80.3% [95% CI 76.6% to 84.1%] versus 79.5% [95% CI 76.2% to 82.9%]). When the alternative, more restrictive and more liberal definitions of burnout were applied, there was no difference in burnout rates between any of the training years. The burnout rates by geographic region were 69.9% (95% CI 62.3% to 77.5%), 77.1% (95% CI 71.5% to 82.7%), 74.1% (95% CI 66.3% to 81.9%), and 80.5% (95% CI 73.4% to 87.7%) for the Midwest, Northeast, South, and West, respectively, and did not differ by region (P=.22).

The internal reliability of the MBI-HSS tool was measured by Cronbach's α and showed that the measurements were not item specific, but rather a measure of the underlying constructs of burnout. The Cronbach's α for emotional exhaustion, depersonalization, and personal accomplishment was 0.92, 0.81, and 0.85, respectively, which is greater than the general acceptability standard of greater than or equal to 0.70.

There were no significant differences between the early and late responders when the first 50% versus last 50% were compared, as well as first 25% versus last 25% of responders.

Table 2. Demographic data of survey participants (n=1,522).

Characteristic	Criteria	No. (%)
Sex	Women	643 (42.2)
	Men	879 (57.8)
Age, y	20–29	739 (48.6)
	30–39	753 (49.5)
	40–49	21 (1.3)
	50–59	1 (0.07)
	Not provided	8 (0.53)
PGY of training	1	523 (34.4)
	2	437 (28.7)
	≥3	562 (36.9)
No. of unique residency programs represented by geographic region	Midwest	58 of 69 (84.1)
	Northeast	55 of 70 (78.6)
	South	58 of 76 (76.3)
	West	22 of 32 (68.8)

LIMITATIONS

Our study had several limitations specifically in regard to generalizability, which is a common problem for survey-based research methodologies.[38] Our response rate of 21.2% introduces nonresponse bias and may represent a skewed population, although this mirrors other survey response rates of 19.2%[8] and 22.5%[7] in landmark studies for burnout research. Because there is no scientifically proven lower limit for an accepted survey response rate, sensitivity analyses and other approaches, such as early- to late-responder comparisons, may help address nonresponse bias and determine the representativeness of the survey respondents.[39] For our study, there were no significant differences between the early and late responders, and our inverse probability weighting sampling adjustments resulted in a similar burnout rate. This suggests that our responders may be a representative sample of US emergency medicine residents.

We excluded 394 of 7,186 survey responses (5.5%) because their emergency medicine resident status could not be confirmed, they were duplicate entries, or the residents belonged to dual- or triple-residency programs. This may have inadvertently excluded some emergency medicine residents, resulting in a sampling bias; however, we noted a trend in which the e-mail addresses of many of the unconfirmed responders did not include names but rather numbers, symbols, and .net accounts, suggesting that spammers potentially wanted to obtain the gift cards.

Some programs had higher rates of respondents than others, which may have overly weighted the data toward

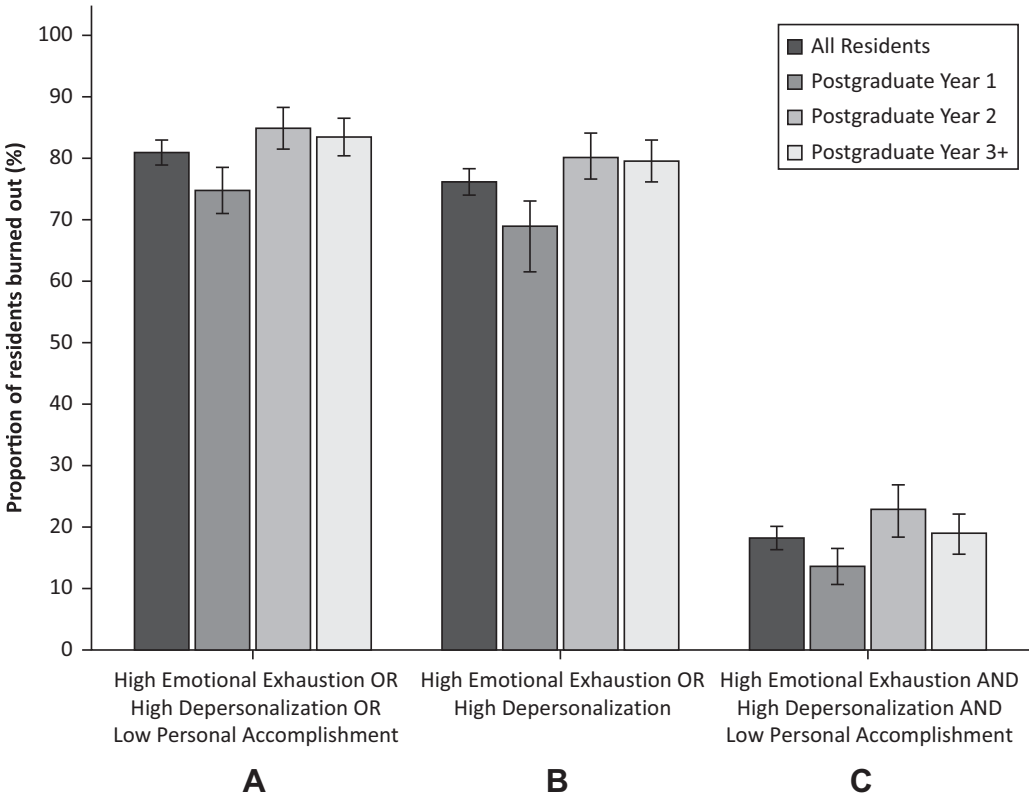

Figure. Prevalence of emergency medicine resident burnout, based on 3 different definitions of burnout in the literature, stratified by residency training year (raw data in Table E1, available online at http://www.annemergmed.com). *A*, More inclusive definition. *B*, Study definition. *C*, More restrictive definition. The vertical brackets denote 95% CIs.

certain residency programs. Generalizability may also be a limitation according to when the survey was conducted. The national survey data were collected during March, which may not be representative of the burnout rates across the entire academic year. In one study, internal medicine residents demonstrated a significant increase in rates of anger, depression, and fatigue during the course of their intern year.[28] Although to our knowledge patterns of changes in mood, energy, and wellness have not been studied in emergency medicine residents during the course of an academic year, it may be that our reported burnout data in March would differ if collected in a different month.

Incentives for survey research may have introduced additional bias. A $5 gift card and entry into a larger lottery-based prize were provided to confirmed US

Table 3. MBI-HSS subscale scores for emotional exhaustion, depersonalization, and personal accomplishment, stratified by residency PGY.

	Burnout Severity	PGY 1 (n=523), No. (%)	PGY 2 (n=437), No. (%)	PGY ≥3 (n=562), No. (%)	All Residents (n=1,522), No. (%)
EE	Low (≤18)	169 (32.3) [28.3–36.3]	98 (22.4) [18.5–26.4]	140 (24.9) [21.3–28.5]	407 (26.7) [24.5–29.0]
	Moderate (19–26)	145 (27.7) [23.9–31.6]	115 (26.3) [22.2–30.5]	154 (27.4) [23.7–31.1]	414 (27.2) [25.0–29.4]
	High (≥27)*	209 (40.0) [37.8–44.2]*	224 (51.3) [46.6–56.0]*	268 (47.7) [43.5–51.8]*	701 (46.1) [43.6–48.6]*
Depersonalization	Low (≤5)	85 (16.3) [13.1–19.4]	37 (8.5) [5.6–11.1]	54 (9.6) [7.2–12.1]	176 (11.6) [10.0–13.2]
	Moderate (6–9)	95 (18.2) [14.9–21.5]	66 (15.1) [11.7–18.5]	82 (14.6) [11.7–17.5]	243 (16.0) [14.1–17.8]
	High (≥10)*	343 (65.6) [61.5–69.7]*	334 (76.4) [72.4–80.4]*	426 (75.8) [72.2–79.4]*	1,103 (72.5) [70.2–74.7]*
Personal accomplishment	High (≥40)	211 (40.3) [36.1–44.6]	154 (35.2) [30.7–39.7]	197 (35.1) [31.1–39.0]	562 (36.9) [34.5–39.4]
	Moderate (34–39)	170 (32.5) [28.5–36.5]	131 (30.0) [25.7–34.3]	193 (34.3) [30.4–38.3]	494 (32.5) [30.1–34.8]
	Low (≤33)*	142 (27.2) [23.3–31.0]*	152 (34.8) [30.3–39.3]*	172 (30.6) [26.8–34.4]*	466 (30.6) [28.2–32.9]*

The denominator used to calculate percentages is the number of residents (n) in that PGY class. Numbers within brackets denote 95% CI.
*At high risk for burnout according to MBI-HSS definitions.

Table 4. Key US survey-based studies on burnout in graduate medical education outside of emergency medicine, using the full 22-item MBI-HSS tool in comparison with our national survey study results of 1,522 emergency medicine residents.

Study	Definition of Burnout	Study Population (Sample Size)	Prevalence of Burnout, %	National Prevalence of Emergency Medicine Resident Burnout, Using Similar Burnout Definition, %
Dyrbye et al (2014)[7]	High EE or high DP	Medical students (4,402), residents/fellows (1,701), and early career (first 5 y) physicians (880) across all specialties	55.9 students, 60.3 residents and fellows, 51.4 physicians	76.1
Pantaleoni et al (2014)[21]		Pediatric residents (232)	37–46	
Guenette and Smith (2017)[13]		Radiology residents (94)	51	
Chaukos et al (2017)[22]		PGY 1 psychiatry residents (68)	28	
Ramey et al (2017)[12]		Radiation oncology residents (205)	33.2	
Attenello et al (2018)[10]		Neurological surgery residents (346)	67	
Kemper et al (2018)[23]		Pediatric residents (1,758)	56 in 2016; 54 in 2017	
Lebares et al (2018)[11]		Surgery residents (566)	69	
Williford et al (2018)[9]		Surgery residents (92)	75	
Elmore et al (2016)[14]	High EE or high DP or low PA	Surgery residents (665)	69	80.9
Garza et al (2004)[50]	High EE and high DP and low PA	Obstetrics and gynecology residents (136)	17.6	18.2

EE, Emotional exhaustion; *DP*, depersonalization; *PA*, personal accomplishment.

emergency medicine residents who completed the entire survey. Because of concerns that respondents might provide more favorable survey answers to obtain the gift card and larger prize, participants were informed that they would receive the gift card regardless of how they answered the questions. The literature suggests that such financial incentives may not significantly alter survey responses.[40,41]

DISCUSSION

To our knowledge, this is the first national emergency medicine resident cross-sectional survey on burnout, with 1,522 residents enrolled. Among survey respondents, 76.1% met criteria for burnout. Although our national survey study was not designed as a comparative study, emergency medicine residents in our study population seemed to have a burnout rate as high as that in previous studies of emergency medicine residents and attending physicians (65% to 73.9%).[8,15,16] Studies on resident burnout rates in other medical specialties, when compared with our study findings, suggest that emergency medicine residents have among the highest rates of burnout (Table 4).

The underlying cause for burnout may not be the same for residents and independently practicing physicians. The majority of residents in our study (72.5%) reported a high degree of depersonalization, according to a high depersonalization score versus lower depersonalization scores in other studies of attending emergency physicians (38.9%)[16] and of other specialties (34.6%).[8] We hypothesize that this more negative and cynical attitude toward patients results from working more clinical hours in the emergency department (ED) as a resident, having a greater clerical burden, and interacting more with consultants, admitting services, and ancillary staff as a trainee.[16,42] This hypothesis is indirectly supported by our identified trend that PGY 1 residents are less burned out than more senior residents. These first-year residents are typically less often working in the ED and instead are on off-service rotations. Thus, they presumably have fewer clinical responsibilities, have fewer interactions with the broader health care team, are not responsible for ED throughput despite crowding, and do not manage higher-acuity patients. Also, they have not yet accumulated years of working in the stressful ED environment. Future research might study the underlying root cause and potential interventions necessary to minimize depersonalization while improving engagement as residents progress through training.

The standard definition of burnout used in this study (high emotional exhaustion or high depersonalization) was the only one to differentiate between burnout status of different PGY classes. Our findings align with those of the

larger field of burnout research, which has expanded beyond the traditional, restrictive definition of burnout. The definition of burnout used in our study may allow identification of practitioners who would be missed by other definitions. For example, individuals with high depersonalization scores may not necessarily be emotionally exhausted or have a low sense of personal accomplishment. These individuals may still be at risk for negative downstream effects on professionalism, empathy, and patient care. Nonetheless, the more restrictive definition (high emotional exhaustion, high depersonalization, and low personal accomplishment) may still have practical value. Individuals who are more severely burned out likely need closer monitoring and outreach. In our study, we identified that 18.2% of emergency medicine residents could be classified into this more concerning category.

A common complaint about the MBI-HSS involves the length of the survey instrument, with 22 items. This has led to abbreviated versions, such as the shorter 2-item modified version of the MBI survey used in a 2018 *Journal of the American Medical Association* study, which reported a 53.8% burnout prevalence among 301 emergency medicine residents.[29] Although these shorter versions are less cumbersome, we still advocate the full-length MBI-HSS instrument in burnout research because of the complicated psychosocial phenomenon of physician burnout. A more detailed tool seems better positioned to detect new, subtle, and unpredictable trends.

Because no consensus has been reached about a criterion standard definition for burnout, we reported our data in more granular form to allow external comparative use, regardless of how one defines burnout.[43] We plan to repeat this study periodically to better track the burnout landscape and inform national residency-based interventions conducted in emergency medicine. We concur with previous calls for reporting transparency[3] and advocate that future burnout researchers follow a reporting construct similar to that in our Figure and Table 3 to aid in reporting consistency.

The high burnout rates for emergency medicine residents underscores the importance of the 2017 Accreditation Council for Graduate Medical Education common program requirements mandate focusing on improved resident well-being and wellness education across the health profession specialties.[35] Solutions will likely involve a multiprong, stepwise approach. Wellness and resiliency training initiatives for the individual have been proposed to improve physician burnout but in isolation may not be influential.[27,44-46] At best, because wellness programs for physicians seem to have little to modest improvements in burnout metrics,[46,47] it will likely require concurrent organizational and strategic overhaul efforts for significant improvements to occur. The focus should potentially be less on "blaming the individual" for being burned out and more on changing a traditional, time-honored, and often inefficient culture.[42,48] Targets for improvement have included fewer administrative and clerical tasks, more efficient electronic medical records charting, more autonomy and flexibility over shift and call scheduling, productivity and reimbursement expectations, and use of scribes.[31,49] Fortunately, despite high burnout rates among emergency medicine residents, they have significantly lower specialty choice regret, at 3.3% compared with other specialties.[29]

This national study demonstrating high emergency medicine resident burnout rates provides a springboard for future research. This same MBI-HSS survey can be conducted annually or every few years to trend burnout patterns, especially with the 2017 Accreditation Council for Graduate Medical Education wellness mandate and ongoing national initiatives.

This study reports the results of the largest national survey of emergency medicine residents to date, to our knowledge. Among respondents, 76.1% met criteria for burnout. Burnout within the emergency medicine specialty seems to begin as early as residency training, although PGY 1 residents seem less burned out. Our results provide baseline data that can inform and allow objective evaluation of future individual-, programmatic-, and systems-level burnout prevention interventions.

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Author contributions: All authors conceived the study and study design, iteratively drafted the article, and approved the final article. ML and MM obtained sponsors to purchase the gift cards and rewards for survey respondents. MM obtained institutional review board approval. ML, NB, MM, SEM, and ASC coordinated data collection, social media awareness of the survey, response monitoring, confirmation of the residents, and distribution of the gift cards by e-mail. ML, MM, and DWR coordinated discussions with statisticians and performed the analyses. ML takes responsibility for the paper as a whole.

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