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A National Survey of Burnout and Depression Among Fellows Training in Pulmonary and Critical Care Medicine



A Special Report by the Association of Pulmonary and Critical Care Medicine Program Directors

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BACKGROUND: The prevalence of burnout and depressive symptoms is high among physician trainees.

RESEARCH QUESTION: What is the burden of burnout and depressive symptoms among fellows training in pulmonary and critical care medicine (PCCM) and what are associated individual fellow, program, and institutional characteristics?

STUDY DESIGN AND METHODS: We conducted a cross-sectional electronic survey of fellows enrolled in pulmonary, PCCM, and critical care medicine training programs in the United States to assess burnout and depressive symptoms. Burnout symptoms were measured using the Maslach Burnout Index two-item measure. The two-item Primary Care Evaluation of Mental Disorders Procedure was used to screen for depressive symptoms. For each of the two outcomes (burnout and depressive symptoms), we constructed three multivariate logistic regression models to assess individual fellow characteristics, program structure, and institutional policies associated with either burnout or depressive symptoms.

RESULTS: Five hundred two of the 976 fellows who received the survey completed it—including both outcome measures—giving a response rate of 51%. Fifty percent of fellows showed positive results for either burnout or depressive symptoms, with 41% showing positive results for depressive symptoms, 32% showing positive results for burnout, and 23% showing positive results for both. Reporting a coverage system in the case of personal illness or emergency (adjusted OR [aOR], 0.44; 95% CI, 0.26-0.73) and access to mental health services (aOR, 0.14; 95% CI, 0.04-0.47) were associated with lower odds of burnout. Financial concern was associated with higher odds of depressive symptoms (aOR, 1.13; 95% CI, 1.05-1.22). Working more than 70 hours in an average clinical week and the burdens of electronic health record (EHR) documentation were associated with a higher odds of both burnout and depressive symptoms.

ABBREVIATIONS: aOR = adjusted OR; APCCMPD = Association of Pulmonary and Critical Care Medicine Program Directors; CCM = critical care medicine; EHR = electronic health record; IRB-X = institutional review board-X; MBI = Maslach Burnout Index;

PCCM = pulmonary and critical care medicine; PRIME-MD = Primary Care Evaluation of Mental Disorders Procedure

AFFILIATIONS: From the Division of Pulmonary and Critical Care Medicine (Drs Sharp, Daugherty Biddison O'Toole, Rand, Riekert,

INTERPRETATION: Given the high prevalence of burnout and depressive symptoms among fellows training in PCCM, an urgent need exists to identify solutions that address this public health crisis. Strategies such as providing an easily accessible coverage system, access to mental health resources, reducing EHR burden, addressing work hours, and addressing financial concerns among trainees may help to reduce burnout or depressive symptoms and should be studied further by the graduate medical education community.

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KEY WORDS: burnout; depression; trainees

FOR EDITORIAL COMMENT, SEE PAGE 479

Physician burnout has been declared a public health crisis in the United States,¹ with more than 40% of physicians experiencing burnout.² Burnout syndrome is defined as: “a work-related constellation of symptoms and signs that usually occurs in individuals with no history of psychological or psychiatric disorders.”³ In addition, depression, a clinical disorder with hallmark symptoms of anhedonia and feelings of sadness, has been reported in 25% of physicians.^{4,5} Burnout and depression may have overlapping symptoms and clinical features.^{6,7} Physician suicide,^{8,9} physician turnover,¹⁰⁻¹² decreased patient satisfaction,⁸ and increased medical errors¹³⁻¹⁵ are some of the measurable repercussions of physician burnout and depression. Given that burnout is

a work-associated syndrome and depression is a medical condition with evidence-based treatments, it is important to evaluate both conditions in physicians to inform individual and organizational interventions.⁶

Critical care physicians experience rates of burnout between 25% and 71%.^{16,17} Resident and fellow trainees in the United States likewise have been shown to have high rates of burnout and depression, with 60% reporting burnout and 50% showing positive screening results for depression.¹⁸ Because burnout and depression are prevalent among critical care physicians^{16,17} and trainees,¹⁸ fellows training in pulmonary and critical care medicine (PCCM) may be at substantial risk of burnout and depression.

The Accreditation Council for Graduate Medical Education revised the Core Program Requirements for physician training programs in 2017, creating new requirements aimed at recognizing and addressing trainee and faculty risk of burnout and depression.¹⁹ Graduate medical training programs are deploying resources to combat the burnout crisis, although little evidence informs which factors to target. In attending physicians, loss of autonomy, decreased control of environment, lack of time, asymmetrical rewards, negative leadership characteristics, and cognitive scarcity have been associated with increased burnout symptoms.²⁰⁻²² Previous research with residents has shown that financial stress,²³ work hours,²⁴ and lack of autonomy²⁵ are associated with worse physician wellness, but little investigation has been undertaken into the organizational policies that may impact fellow well-being.

Several studies found improved burnout rates in trainees²⁶⁻²⁸ and faculty²⁹ after the 80-hour work week duty hour changes. Mindfulness and stress relief interventions are common strategies offered; however, study findings have been mixed regarding their efficacy for improving burnout and depressive symptoms for both

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trainees and attending physicians.³⁰⁻³³ This in part may be the result of not identifying the individual, structural, and institutional factors contributing to burnout and depressive symptoms and tailoring interventions to address them directly. One study that examined this data-driven strategy implemented practice changes (hired high-quality staff and prioritized clinical duties over administrative tasks), which resulted in reduced burnout symptoms among attending physicians.³⁴ Our study is the first to our knowledge to identify extensively individual characteristics, fellowship program structure, and institutional policies associated with burnout and depressive symptoms in a nationwide sample of trainees.

A priori, we hypothesized that financial concern and programmatic and institutional factors including

rotating in the ICU at the time of the survey, greater number of weekends and hours worked, electronic health record (EHR) burden, longer rotations, and less elective time would be associated with increased odds of burnout. We hypothesized that individual characteristics, including caregiving status and financial concern, would be associated with depressive symptoms. Our hypothesis was that the lack of a coverage in case of a personal emergency or illness would be associated with increased odds of burnout, whereas the lack of access to mental health resources would be associated with increased odds of depressive symptoms. Identifying factors associated with burnout and depressive symptoms among fellows in training will inform strategies to address both burnout and depression.

Methods

The study was reviewed by the Johns Hopkins University Institutional Review Board (Identifier: IRB-X 00163987) and determined to be exempt. This was a cross-sectional study conducted as a Qualtrics survey (Qualtrics Survey Software)³⁵ from January 2019 through February 2019. Survey items were developed by a panel of fellows, program directors, and psychologists involved in medical education and were revised iteratively through cognitive interviewing and pilot testing with trainees and pulmonary critical care fellows from the Association of Pulmonary and Critical Care Medicine Program Directors (APCCMPD) fellow workgroup to identify and revise the survey questions. Cognitive interviewing using a talk out loud method was carried out with five individuals to describe how they interpreted each item.³⁶ The survey was deployed through the Johns Hopkins Qualtrics³⁵ survey software program to fellows enrolled in pulmonary, PCCM, and critical care medicine (CCM) fellowship training programs in the United States by using a member list available through the APCCMPD. Four weekly reminder e-mails were sent to individuals who had not completed the survey. An incentive of a \$10 Amazon voucher was provided on survey completion.

Outcome Measures

Burnout symptoms were measured using the Maslach Burnout Index (MBI) two-item measure, previously adapted from the full MBI, which is considered a gold standard for assessing burnout^{18,37} and has been shown to correlate with the 22-item MBI in physicians.^{38,39} Participants were categorized as showing positive screening results for burnout symptoms if they responded to either item on the MBI with a frequency of weekly or more often.¹⁸

The two-item Primary Care Evaluation of Mental Disorders Procedure (PRIME-MD) was used to screen for depressive symptoms⁴⁰ and was chosen because it has been used widely in previous national surveys of physicians and medical trainees.^{18,41,42} Fellows were categorized as showing positive screening results for depressive symptoms if they answered yes to either item in the PRIME-MD.

Individual Characteristics

Participants provided the following information: age, sex, race or ethnicity, marital or relationship status, caregiving status (eg, caring for children or elders), current fellowship rotation, and geographic

region (state grouped into Association of American Medical Colleges regions) (e-Appendix 1).

Financial information was assessed in two ways: (1) a single-item question asking the amount of student loan debt: none, < \$50,000, \$50,000-\$99,999, \$100,000-\$199,999, \$200,000-\$299,999, \$300,000-\$399,999, > \$400,000, or "prefer not to answer"; and (2) a single-item financial concern question asking, "How concerned are you about your financial future on a scale of 1 to 10? (1 = not at all concerned, 10 = most concerned)" (e-Appendix 1).

Fellowship Program Structure

The following fellowship program structure characteristics were collected: hours worked per week in a typical inpatient rotation, the length of typical inpatient rotations, average number of weekends worked in an academic year, report of a night coverage system including home call responsibilities, amount of clinical elective and research time during fellowship program, and report of having a structured program to provide coverage in case of a personal emergency or illness (e-Appendix 1).

Institutional Factors

Fellows were asked to report institutional factors and resources, including access to mental health resources and comfort accessing these resources, EHR use asking amount of time spent on EHR at home (minimal/none, modest, satisfactory, moderately high, excessive), EHR impact on joy in medicine (very negative, somewhat negative, neutral, somewhat positive, very positive), and the presence of institutional activities designed to promote physician well-being (e-Appendix 1).

Data Analysis

Descriptive statistics were conducted to evaluate distribution of all data, with median (interquartile ranges) for continuous variables and frequency (percent) for categorical variables. Analyses were limited to fellows who completed both the MBI and PRIME-MD because burnout and depressive symptoms were the primary outcomes. Data were missing for up to 8% of the included variables. Individuals with missing data for sex, race, fellow type, fellowship year, marital or relationship status, and caregiving status were more likely to show positive screening results for depression (all $P < .05$). Therefore, we created a missing category for demographic data to allow for inclusion in the analyses. For continuous variables including

financial concern, hours worked per week in a typical rotation, length of inpatient rotation, home call responsibilities, and EHR use and impact, we used median imputation of the missing data.⁴³ All analyses were performed using Stata version 15 software (StataCorp).

We tested the correlation between reporting burnout and depressive symptoms using a Pearson correlation test. For each of the two outcomes (burnout and depressive symptoms), we constructed three multivariate logistic regression models. Model 1 assessed the association between individual fellow characteristics, including fellow type (pulmonary, PCCM, or CCM), fellowship year, sex, race or ethnicity, caregiving status, geographic region, current rotation, and financial concern and the odds of reporting burnout or depressive symptoms, respectively. Age was not included in the models because of collinearity with fellowship year. Model 2 assessed the association between program structure and burnout and depressive symptoms, respectively. Model 2 variables included number of weekends worked per year, number of hours worked per week, presence of an attending in the ICU overnight, rotation length, report of a coverage system in case of a personal emergency or illness, and amount of clinical elective and research time, on the odds of reporting burnout

or depressive symptoms. The individual characteristics from the first model were included as covariates to control for the contribution of individual characteristics to the odds of reporting burnout or depressive symptoms. Model 3 assessed the association between institutional characteristics and burnout and depressive symptoms, respectively. Model 3 variables included access to mental health resources, EHR impact, use of EHR time at home, and the presence of wellness activities at the institution on the odds of reporting burnout or depressive symptoms, with individual characteristics from the first model included as covariates. A Bonferroni correction was applied, given the multiple models conducted. A *P* value of less than .0167 was considered significant.

Given the a priori hypothesis that report of financial concern was associated with higher odds of burnout or depressive symptoms, or both, in fellowship, a multiple linear regression model was performed to investigate the association between the single-item financial concern rating with report of student loan debt, caregiving status, and geographic region. Marriage or cohabitating status was collinear with caregiving status and was not included in the model.

Results

The APCCMPD provided 1010 e-mail addresses for pulmonary, PCCM, and CCM fellows nationwide. Thirty-four e-mail addresses were inaccurate; thus, 976 surveys were delivered. Of the 976 fellows who received the survey, 509 initiated the survey. Seven responses were excluded from the 509 surveys because of incomplete data in the PRIME-MD, for a final sample of 502 and a final response rate of 51%.

Fifty percent of the respondents (*n* = 250) demonstrated positive screened results for either burnout or depressive symptoms, with 41% (*n* = 208) demonstrating positive screened results for depressive symptoms and 32% (*n* = 159) demonstrating positive screened results for burnout. Twenty-three percent of respondents (*n* = 117) demonstrated positive screened results for both burnout and depressive symptoms (Fig 1). A correlation of *r* = 0.44 was found between burnout and depressive symptoms.

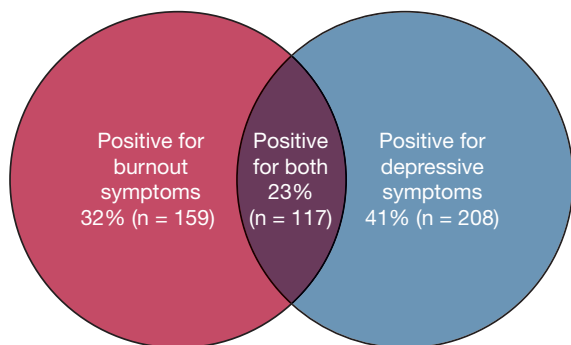


Figure 1 – Venn diagram showing the percentage of fellows with positive screening results for burnout, depressive symptoms, or both.

Fifty-nine percent of respondents identified as men and 57% identified as White or non-Hispanic (Table 1). Student loan debt ranged from none to more than \$400,000, and 39% of respondents (*n* = 194) reported at least \$200,000 of student loan debt. A plurality of respondents indicated working more than 70 hours per week in a typical inpatient clinical rotation (36% [*n* = 181]), working more than 12 weekends on average in an academic year (62% [*n* = 312]), having 3 months or more of clinical elective time (56% [*n* = 279]), having clinical rotations of 4 weeks or less (74% [*n* = 372]), and having more than 6 months of research time (63% [*n* = 318]). Most respondents reported having a structured program to provide coverage in case of a personal emergency or illness (60% [*n* = 299]), whereas 25% (*n* = 129) reported that they did not and 15% (*n* = 74) indicated that they were not sure or left the question blank. Of those who reported a coverage system, 29% (*n* = 88) were uncomfortable accessing the system or felt comfortable only if unable to find their own coverage. Most respondents reported that they had 24/7 access to mental health resources (57% [*n* = 287]), whereas 39% (*n* = 197) reported they were not sure or had missing data and 4% (*n* = 18) reported they did not. Of those who reported access to mental health resources, 15% (*n* = 42) reported they were uncomfortable accessing services if needed. More than 40% of respondents indicated the EHR impacts their joy in medicine in a negative way (42% [*n* = 212]). Most respondents reported spending minimal to satisfactory amount of time at home on the EHR (69% [*n* = 345]) and noted that their institution offers activities to promote physician well-being (70% [*n* = 349]).

TABLE 1] Respondent Characteristics

Characteristic	Data
No. of responses	502
Age, y	32 (31-34)
Sex	
Identifies as male	294 (59)
Identifies as female	191 (38)
Missing	17 (3)
Race/ethnicity	
White/non-Hispanic	284 (57)
Black/non-Hispanic	13 (2)
Asian or Pacific Islander	121 (24)
Hispanic	18 (4)
Other ^a /more than one option	40 (8)
Missing	26 (5)
Married	
Yes	373 (74)
No	110 (22)
Missing	19 (4)
Caregiving ^b	
Yes	200 (40)
No	263 (52)
Missing	39(8)
AAMC geographic region	
Central	113 (26)
Northeast	203 (40)
South	58 (12)
West	68 (14)
Missing	40 (8)
Fellow type	
Pulmonary and critical care medicine	441 (88)
Critical care	42 (8)
Pulmonary	7 (1)
Missing	12 (2)
Fellowship year	
First year	183 (36)
Second year	159 (32)
Third year or beyond	147 (30)
Missing	13 (2)
Student loan debt	
None	160 (32)
<\$50,000-\$199,999	108 (21)
\$200,000->\$400,000	194 (39)
Prefer not to answer/missing	40 (8)
Financial concern	5 (3-8)
Rotation at the time of the survey	

(Continued)

TABLE 1] (Continued)

Characteristic	Data
Research	140 (28)
Outpatient/elective	77 (15)
ICU/night float	148 (30)
Inpatient/interventional pulmonary	92 (18)
Leave	4 (1)
Missing	41 (8)

Data are presented as No. (%) or median (interquartile range) unless otherwise indicated. AAMC = Association of American Medical Colleges.

^aIncludes one Native American/Alaskan individual.

^bIncludes caring for children, disabled or ill family member, or elders.

Burnout

Working more than 70 hours in an average clinical week (adjusted OR [aOR], 2.80; 95% CI, 1.78-4.40) and reporting a somewhat negative or very negative impact of the EHR on joy in medicine (aOR, 1.91; 95% CI, 1.22-2.98) were associated significantly with higher odds of burnout. Report of a coverage system (aOR, 0.44; 95% CI, 0.26-0.73) and access to mental health services (aOR, 0.14; 95% CI, 0.04-0.47) were associated with significantly lower odds of burnout (e-Table 1) (Fig 2). Caregiving status, year of fellowship, sex, race, geographic location, rotation, financial concern, number of weekends, rotation length, amount of clinical elective time, presence of an ICU attending overnight, and report of wellness activities were not associated significantly with burnout (e-Table 1).

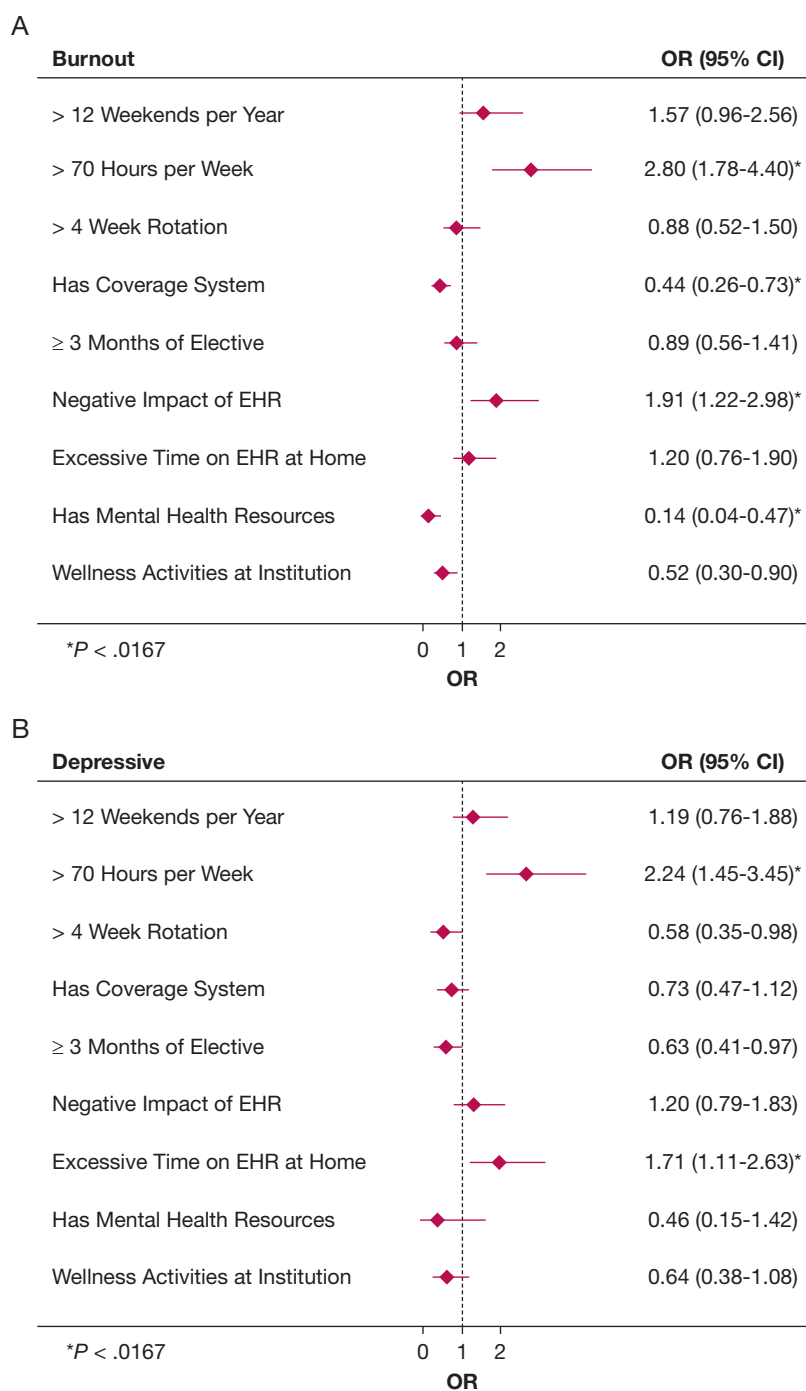
Depression

Financial concern (aOR, 1.13; 95% CI, 1.05-1.22), being located in the Association of American Medical Colleges West region (aOR, 3.96; 95% CI, 1.41-11.14), working more than 70 hours in an average clinical week (aOR, 2.24; 95% CI, 1.45-3.45), and spending a moderately high or excessive amount of time at home on EHRs (aOR, 1.71; 95% CI, 1.11-2.63) were associated significantly with higher odds of depressive symptoms (e-Table 1) (Fig 2). Caregiving status, year of fellowship, sex, race, rotation, number of weekends, presence of an ICU attending overnight, rotation length, and elective time were not associated significantly with depressive symptoms.

Financial Concern

In the multiple linear regression model testing the association between financial concern and student loan debt, geographic region, and caregiving status,

Figure 2 – A, B, Diagrams showing the programmatic and institutional factor odds of (A) burnout and (B) depressive symptoms. EHR = electronic health record.



report of higher student loan debt was associated with significantly higher financial concern rating: prefer not to answer, $b = 1.52$ (95% CI, 0.57-2.48); up to \$199,999, $b = 0.92$ (95% CI, 0.32-1.52); and \$200,000 or more, $b = 2.76$ (95% CI, 2.24-3.27) (Fig 3). Geographic region and caregiving status were not associated significantly with financial concern.

Discussion

To our knowledge, this is the first national survey of fellows training in PCCM that investigated the prevalence of burnout and depressive symptoms among respondents. Half of the respondents showed positive screening results for either burnout or depressive symptoms, which is similar to the results of previous studies among resident and fellow trainees.^{3,16,18,24,41} Of

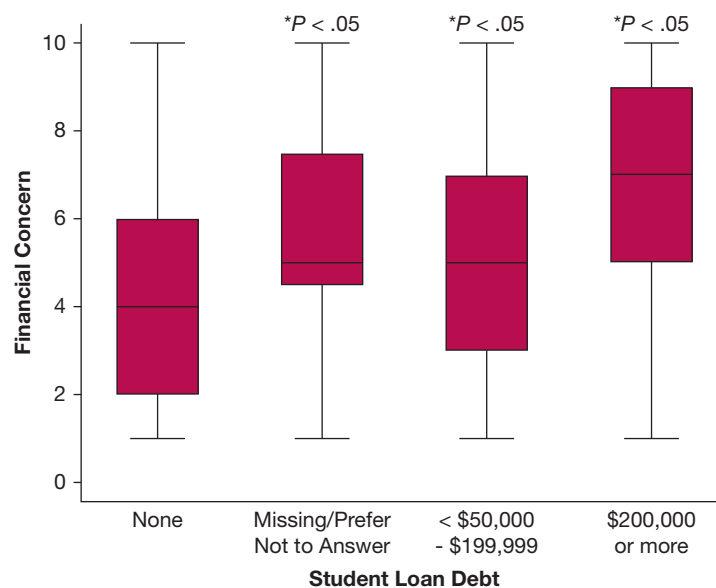


Figure 3 – Box and whisker plot showing the association between financial concern and student loan debt. *Significantly higher financial concern compared to those with no student loans in multiple linear regression.

the respondents, 41% showed positive screening results for depressive symptoms, 32% showed positive screening results for burnout, and only 23% showed positive screening results for both, confirming previous findings that burnout and depression may have overlap, but are distinct entities.^{6,44,45}

Burnout seems to be affected more by programmatic or institutional policies and resources than by depression. Fellows who reported a structured coverage program for illness or emergencies and access to mental health resources were associated with lower odds of burnout. We did not assess use of these programs. In fact, 29% of respondents were uncomfortable accessing the coverage scheme and 15% were reluctant to access mental health resources. Therefore, we hypothesize that the presence of these programs leads to decreased burnout for several reasons. It may be that fellows who are faced with personal illness or emergency without a back-up system experience tension between their sense of professional responsibility and their personal well-being, which could result in a higher odds of burnout. Furthermore, the presence of these programs may reflect a programmatic and institutional culture of wellness that has not been measured. Of concern, a nontrivial number of respondents were unsure if mental health resources existed at their institution (39%). The Accreditation Council for Graduate Medical Education has recognized the importance of coverage systems and access to mental health resources for fellows,¹⁹ and program directors should make every effort to inform their fellows regarding these resources and to create a

culture in which use of coverage schemes and mental health resources is encouraged.

Workload burden (including work hours and EHR burden) influenced both burnout and depressive symptoms. We found that working more than 70 hours in an average clinical week was associated with a nearly threefold increased odds of burnout and more than twofold increased odds of depressive symptoms. These high ORs suggest notable concerns with workload burden, and program directors should be aware that when fellows are on rotations with a high number of work hours in a week, the risk of burnout and depressive symptoms increases significantly. In a recent large randomized control trial, burnout was similar among residents with flexible duty hours compared with those with standard duty hours.⁴⁶ Of note, both groups had an 80-hour weekly maximum work hour limit and both had high levels of burnout,⁴⁶ suggesting that adding flexibility without reducing work hours is unlikely to improve burnout. Additionally, another study of trainees restricted to working 80 hours per week in both groups found that in the less restrictive duty hour programs (no restrictions on shift length or required time off between shifts), trainees reported significantly poorer personal health compared with those in the standard policy programs.⁴⁷ Our findings of EHR burden are not unique to trainees, and given that trainees spend more of their training in front of a computer than with patients,⁴⁸ prioritizing solutions

that ease the burdens of the EHR and work hours may mitigate burnout.

Financial concern was associated significantly with increased odds of depressive symptoms. Additionally, higher student loan debt was associated with greater financial concern when compared with no student loan debt. Of note, almost 40% of respondents reported \$200,000 or more in student loan debt. Future work investigating strategies to reduce financial concerns among fellows may help to improve their mental health.

Our findings suggest that several components of fellowship program structure and institutional resources and policies are associated with burnout and depressive symptoms. Although burnout and depressive symptoms may occur simultaneously, different factors were associated with the odds of symptoms of each in our study. Burnout and depression should be considered separately when discussing physician well-being, especially because depression is a clinical disorder that may require evidence-based management.⁶

Although we hypothesized in our study that factors specific to pulmonary, PCCM, and CCM training, including rotating in the ICU at the time of the survey and less elective time, would be associated with burnout, our findings did not support this and likely are not unique to this group of trainees. Additionally, we did not measure trainees after transitioning to faculty and hypothesize that there are likely to be differences in factors associated with burnout and depressive symptoms among junior faculty because they enjoy increased autonomy, but less regulation and often less built-in institutional support.

This study has several limitations. As a cross-sectional survey, the directionality of the associations cannot be determined. Despite our relatively high participation rate (52%), it may be that the individuals with burnout

and depression were more or less likely to respond, potentially skewing the true prevalence of burnout and depressive symptoms. However, the characteristics of the respondents are similar to those of the Accreditation Council for Graduate Medical Education databook⁴⁹ and represent 31 of 42 states with fellowship programs. We did not collect data about institution to assure fellows responding to the survey of anonymity. Additionally, we used screening tools to assess burnout and depressive symptoms rather than diagnostic tests, which may lead to misclassification bias. Another potential limitation is that the survey was designed to ask fellows about their awareness of program structure and institutional policies, rather than assessing the program and institutions themselves. Potential lack of awareness of resources and policies is a concern and suggests that more communication is needed. Future interventional studies should investigate the efficacy of policies aimed at addressing the association between weekly duty hours, EHR burdens, financial concerns, and the presence of mental health resources and structured coverage systems on fellow burnout and depression.

Conclusions

Given the high prevalence of burnout and depressive symptoms among fellows training in PCCM, it is crucial for fellowship training programs and academic hospitals to consider policies and programs that can improve this public health crisis. Our results suggest that further study of systemic solutions at the programmatic and institutional levels, rather than at the individual level, are needed. Strategies such as providing an easily accessible coverage system, providing access to mental health resources, addressing work hour burden, reducing the EHR burden, and addressing financial concerns among trainees may help to reduce burnout, depressive symptoms, or both and should be studied further.

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Author contributions: M. N. E. had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis, including and especially any adverse effects. M. S., M. N. E., K. M. B., M. H. A., R. W. A., L. D. B., G. T. B., S. T. D., T. E., M. M. K. S. K., P. H. L., J. W. M., J. O., C. S. R., K. A. R., M. I. S., G. R. W., and S. Z. contributed substantially to the study design, data analysis and interpretation, the writing of the manuscript, or a combination thereof.

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Additional information: The e-Appendix and e-Table can be found in the Supplemental Materials section of the online article.

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