CLINICAL STUDY

Burnout among Interventional Radiologists

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ABSTRACT

Purpose: To characterize burnout, as defined by high emotional exhaustion (EE) or depersonalization (DP), among interventional radiologists using a validated assessment tool.

Materials and Methods: An anonymous 34-question survey was distributed to interventional radiologists. The survey consisted of demographic and practice environment questions and the 22-item Maslach Burnout Inventory–Human Services Survey (MBI). Interventional radiologists with high scores on EE ($\geq$ 27) or DP ($\geq$ 10) MBI subscales were considered to have a manifestation of career burnout.

Results: Beginning on January 7, 2019, 339 surveys were completed over 31 days. Of respondents, 263 (77.6%) identified as male, 75 (22.1%) identified as female, and 1 (0.3%) identified as trans-male. The respondents were interventional radiology attending physicians (298; 87.9%), fellows (20; 5.9%), and residents (21; 6.2%) practicing at academic (136; 40.1%), private (145; 42.8%), and hybrid (58; 17.1%) centers. Respondents worked $<$ 40 hours (15; 4.4%), 40–60 hours (225; 66.4%), 60–80 hours (81; 23.9%), and $>$ 80 hours (18; 5.3%) per week. Mean MBI scores for EE, DP, and personal achievement were 30.0 $\pm$ 13.0, 10.6 $\pm$ 6.9, and 39.6 $\pm$ 6.6. Burnout was present in 244 (71.9%) participants. Identifying as female (odds ratio 2.4; $P = .009$) and working $>$ 80 hours per week (odds ratio 7.0; $P = .030$) were significantly associated with burnout.

Conclusions: Burnout is prevalent among interventional radiologists. Identifying as female and working $>$ 80 hours per week were strongly associated with burnout.

ABBREVIATIONS

DP = Depersonalization, EE = Emotional exhaustion, MBI = Maslach Burnout Inventory–Human Services Survey, PA = Personal achievement

Burnout is defined as a cluster of symptoms that occur in response to chronic emotional career-related stressors resulting in emotional exhaustion (EE), depersonalization (DP), and lack of personal accomplishment in relation to one's professional activity (1,2). Burnout among medical professionals has been studied extensively since it was discovered that the rate of burnout among physicians was significantly greater than among other non–health care

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workers (37.9% vs 27.8%) (3). Burnout related to physician turnover and reduced productivity has been estimated to cost the United States approximately $4.6 billion annually (4).

The Maslach Burnout Inventory–Human Services Survey (MBI) is a validated, self-administered assessment tool used to assess 3 aspects of burnout: EE, DP, and personal achievement (PA) (5). Using this survey, prior studies have found burnout among physicians to be associated with decreased satisfaction, impaired physician performance, early retirement, and suicide (6–11). However, likely owing to the complex personal and organizational factors that contribute to career-related stress, studies have found varying rates of burnout among physicians in different specialties (3). Whereas burnout has been studied among practicing diagnostic radiologists, burnout among interventional radiologists has not been characterized (12–14). Identifying demographic and practice patterns associated with burnout may be important when devising strategies to reduce burnout in interventional radiology (IR) (15). The aims of this study were to assess the prevalence of burnout and determine demographic and practice-related stressors among interventional radiologists using a validated assessment tool.

MATERIALS AND METHODS

Study Population and Data Collection

This Health Insurance Portability and Accountability Act–compliant study was exempt from institutional review board approval based on institutional assessment of criteria listed in 45 CFR 46.101(b). The study was assessed using STROBE (STrengthening the Reporting of OBservational studies in Epidemiology) guidelines (16). A survey of the membership of the Society of Interventional Radiology (SIR) Connect Open Forum website (http://connect.sirweb.org/home) was conducted from January 7, 2019, to February 6, 2019 (31 days). At the time of survey dissemination, during January 2019, the SIR Connect Open Forum had 7,402 members. Additionally, the survey was concurrently distributed on social media platforms, including Twitter (Twitter Inc; San Francisco, California), Facebook (Facebook; Menlo Park, California), and LinkedIn (LinkedIn Corp; Sunnyvale, California), and via e-mail. The survey was posted on various social media outlets with a description regarding the purpose of the survey, a link to the survey, and a guarantee of anonymity. Respondents were made aware of the survey on social media outlets by including relevant hashtags (#IRad and #Burnout) and tagging prominent and active members of the IR community.

Survey Design and Evaluation

A 34-question survey (**Appendix A** [available online on the article's Supplemental Material page at *www.jvir.org*]) assessing demographics, practice characteristics, and burnout using the 22-item MBI for Medical Personnel was created using Google Forums (Google; Mountain View, California). The survey included 10 demographic questions: age, gender, current level of practice, time since fellowship training, practice setting, number of interventional radiologists in the practice, daily percentage of time spent performing nonprocedural diagnostic radiology, mean weekly hours worked, presence of IR call duties, and mean number of call shifts taken per month. An optional, open-ended, free response question regarding the greatest contributor to burnout in the workplace was also included.

License to distribute the 22-item MBI (Mind Garden, Inc; Menlo Park, California) was purchased, and its entirety cannot be published herein. In accordance with previous convention, responses for each domain (EE, DP, and PA) were categorized into low, moderate, and high (1,17,18). Scoring categories were as follows: EE, low $\leq$ 18, moderate 19–26, and high $\geq$ 27; DP, low $\leq$ 5, moderate 6–9, and high $\geq$ 10; PA, low $\geq$ 40, moderate 34–39, and high $\leq$ 33. Following the standard scoring criteria for health care workers, interventional radiologists with high scores on the EE ($\geq$ 27) or DP ($\geq$ 10) subscale were considered to have at least 1 manifestation of burnout (17). By convention, PA scores were not considered in the determination of burnout.

Eligibility Criteria

There were 339 complete responses. Of respondents, 168 (49.6%) accessed the survey through SIR Connect, 66 (19.5%) accessed the survey via e-mail, 57 (16.8%) accessed the survey via engaging with a Twitter post, 25 (7.4%) accessed the survey on Facebook, 14 (4.1%) accessed the survey via LinkedIn, and 9 (2.7%) accessed the survey by other means. There were no incomplete survey responses, as completion of all questions, aside from the free response, was mandatory for submission of survey results.

Statistical Analyses

All statistical analyses were performed by a dedicated statistician (E.L.) using R Version 3.2.2 (R Foundation for Statistical Computing, Vienna, Austria). The association between 2 categorical variables was assessed by χ^2 test or Fisher exact test. A binary logistic regression model was fitted to detect correlations between demographic variables and burnout. Stepwise variable selection was performed to identify a simple and predictive regression model. $P < .05$ was considered statistically significant for all 2-sided tests.

RESULTS

Demographics

Demographic data are shown in **Table 1**. Of survey respondents, 263 (77.6%) identified as male, 75 (22.1%) identified as female, and 1 (0.3%) identified as trans-male. Six (1.8%) respondents were < 30 years of age, 150 (44.2%) were 30–39 years of age, 96 (28.3%) were 40–49 years of age, 67 (19.8%) were 50–59 years of age, and 20 (5.9%) were > 60 years of age. The respondents were IR attending physicians (298; 87.9%), fellows (20; 5.9%), and residents (21; 6.2%). Practice settings among all respondents

Table 1. Respondent Demographics

	No. (%)
Age, y	
< 30	6 (1.8%)
30–39	150 (44.2%)
40–49	96 (28.3%)
50–59	67 (19.8%)
≥ 60	20 (5.9%)
Gender	
Male	263 (77.6%)
Female	75 (22.1%)
Trans-male	1 (0.3%)
Hours worked per week	
< 40	15 (4.4%)
40–60	225 (66.4%)
61–80	81 (23.9%)
> 80	18 (5.3%)
Postgraduate years	
≤ 5	112 (33.0%)
6–10	68 (20.1%)
11–20	74 (21.8%)
≥ 21	55 (16.2%)
Still in training	30 (8.8%)
Practice level	
Attending	298 (87.9%)
Fellow	20 (5.9%)
Resident	21 (6.2%)

Table 2. Respondent Practice Environment Characteristics

	No. (%)
Practice setting	
Academic	136 (40.1%)
Private	145 (42.8%)
Hybrid	58 (17.1%)
Time reading diagnostic studies	
0%	152 (44.8%)
25%	113 (33.3%)
50%	44 (13.0%)
75%	24 (7.1%)
100%	6 (1.8%)
Number of interventional radiologists in practice	
0–5	145 (42.8%)
5–10	124 (36.6%)
10–15	39 (11.5%)
15–20	21 (6.2%)
≥ 21	10 (2.9%)
Number who take call	316 (93.2%)
Number of calls taken per month	
1–5	116 (34.2%)
6–10	158 (46.6%)
11–20	40 (11.8%)
≥ 21	2 (0.6%)

included academic (136; 40.1%), private (145; 42.8%), and hybrid (58; 17.1%) centers. In terms of experience, 112 (33.0%) were ≤ 5 years postgraduate, 68 (20.1%) were 6–10 years postgraduate, 74 (21.8%) were 11–20 years postgraduate, 55 (8.8%) were > 21 years postgraduate, and 30 (8.8%) were still in training.

Practice Environments

Practice environment data are shown in Table 2. Practice size was 0–5 interventional radiologists for 145 respondents (42.8%), 5–10 interventional radiologists for 124 respondents (36.6%), and > 10 interventional radiologists for 70 (20.6%) respondents. Respondents reported working a mean of < 40 hours (15; 4.4%), 40–60 hours (225; 66.4%), 60–80 hours (81; 23.9%), and > 80 hours (18; 5.3%) per week. Of respondents, 316 (93.2%) reported providing on-call services, with most respondents taking 1–5 (116; 34.2%) or 6–10 (158; 46.6%) estimated calls per month. Of respondents, 152 (44.8%) performed interventions only and did not provide diagnostic radiology services.

Burnout

MBI results are shown in Figures 1–3. The prevalence of burnout among respondents was 71.9% (n = 244). Mean ± SD MBI scores for EE, DP, and PA were 30.0 ± 13.0, 10.6 ± 6.9, and 39.9 ± 6.6. Based on the MBI subscales for EE, 22.7% were low risk, 15.3% were moderate risk, and 61.9% were high risk. Regarding DP scores, 28.6% were low risk, 17.2% were moderate risk, and 54.3% were high risk. PA subscale scores were high in only 14.7%, moderate in 26.0%, and low in 59.3%. There were 162 (47.8%) respondents who scored in the high-risk category in both EE and DP. Identifying as a female interventional radiologist was significantly associated with burnout (odds ratio 2.4; $P = .009$) (Fig 2). Compared with respondents who worked < 80 hours per week, working > 80 hours per week was significantly associated with burnout (odds ratio 7.0; $P = .030$) (Fig 3). Age ($P = .856$), practice level ($P = .553$), postgraduate years ($P = .373$), practice setting ($P = .557$), practice size ($P = .232$), diagnostic radiology duties ($P = .588$), and amount of calls taken ($P = .110$) were not significantly associated with burnout. Most of the respondents reporting symptoms of burnout were among 0–5 postgraduate years in practice with a stepwise decrease in burnout as postgraduate years increased (Fig 4).

Open-Ended Responses

Of respondents, 258 (76.1%) completed the optional, open-ended response to the question of greatest contributor to burnout in the workplace. On review of responses, several themes emerged, including administrative pressures on productivity and administrative tasks, relationships between interventional radiologists and ancillary staff, workload and work hours, electronic medical record and documentation

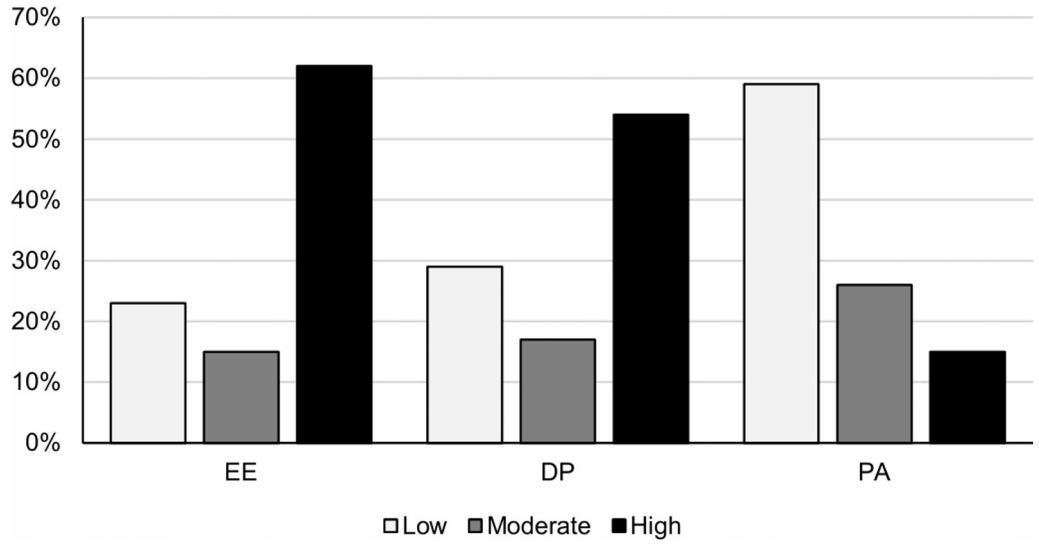

Figure 1. MBI survey results (as a percentage) showing EE, DP, and PA subscales of interventional radiologists categorized into low, moderate, and high.

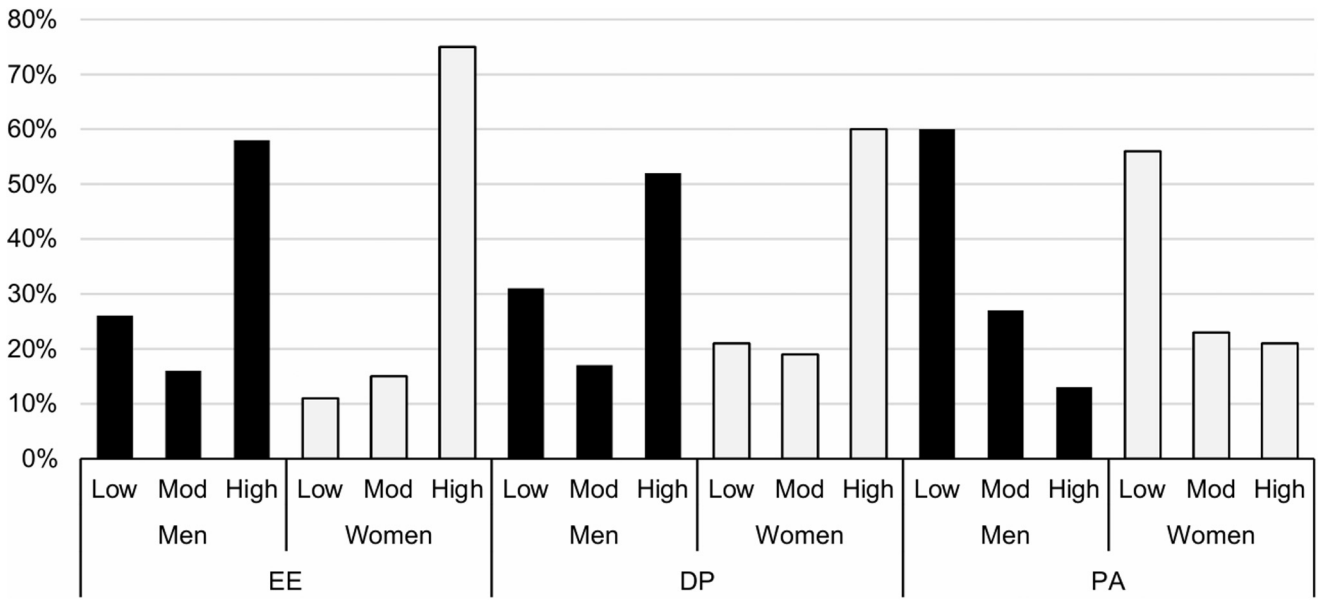

Figure 2. Comparison of MBI results (as a percentage) showing EE, DP, and PA subscales between male and female respondents.

systems, diagnostic radiology responsibilities, contentious relationships with diagnostic radiologists within the same practice, lack of recognition and respect from other medical and surgical subspecialties, and fielding inappropriate consultations from other medical professionals.

DISCUSSION

Burnout has been shown to affect physicians within every medical specialty; however, the prevalence of burnout among specialties varies from 30% to 75% (3). The present study indicates that interventional radiologists are in the upper range of burnout recorded among physicians with 71.9% presenting with at least 1 manifestation of burnout. Interventional radiologists report manifestations of burnout at a rate higher than not only the general public (28%), but also diagnostic radiologists (54%–61%) and surgeons (40%) (3,14,17). The technical challenges, physical demands, and unpredictable work hours of IR likely impart different stressors, and thus rates of burnout may be related to these factors. Regardless, this is an alarming finding given the negative impact burnout has on job satisfaction, career longevity, mental health, and patient care (19). Identifying factors associated with high rates of burnout may facilitate the implementation of strategies to combat burnout.

Gender was significantly associated with increased rates of burnout, with women having 2.4 higher odds of experiencing burnout than men. In a sample of 7,858

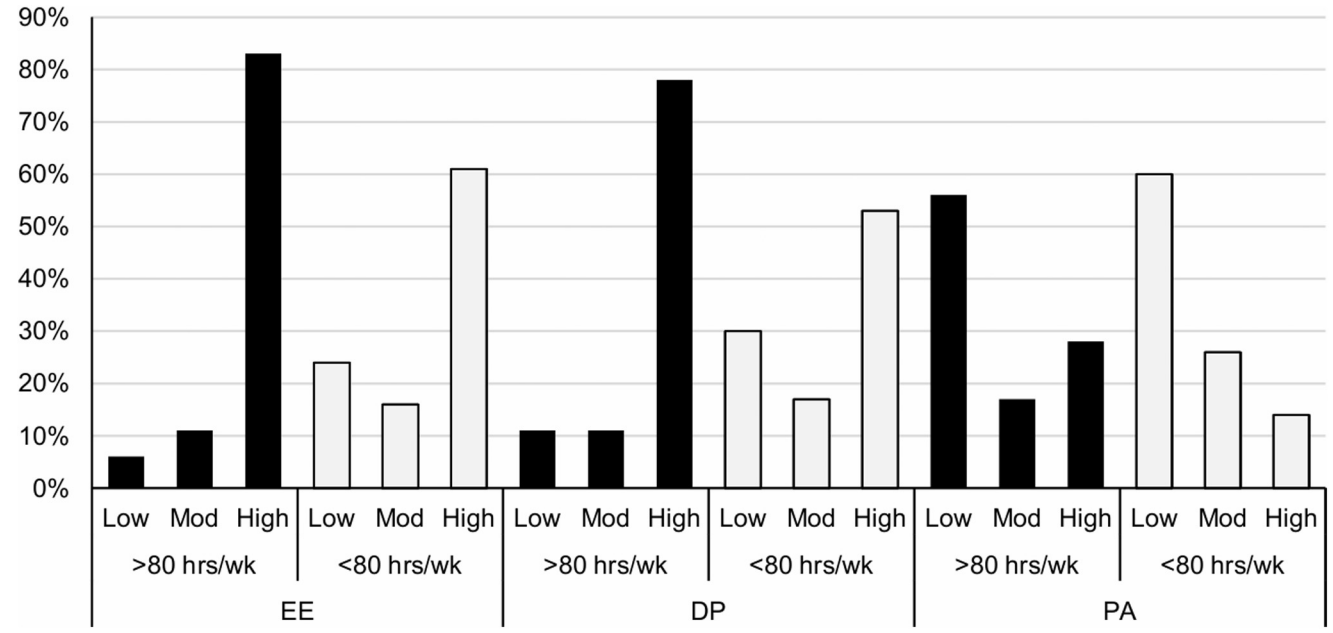

Figure 3. Comparison of MBI results (as a percentage) showing EE, DP, and PA subscales between respondents who work > 80 hours per week and < 80 hours per week.

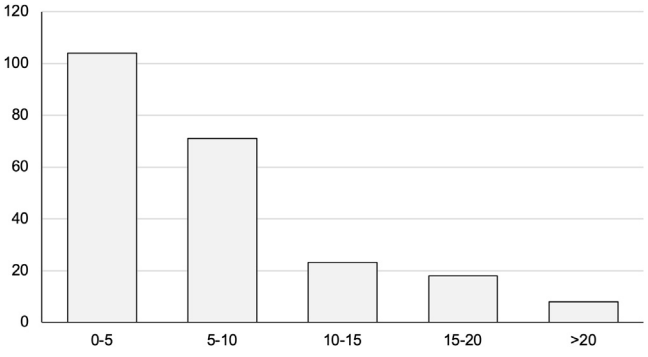

Figure 4. Comparison of MBI results (as raw number of responses) between respondents stratified by postgraduate years.

surgeons assessed using the MBI, Dyrbye et al (20,21) found a significant association between gender and burnout, with 5% more women experiencing burnout than men. Gender judgment and stereotypic perceptions of female physicians have been linked to increased rates of burnout and worsened psychological well-being (22). These findings suggest that increasing the number of women in a predominantly male-dominated field, such as IR, may mitigate the relationship between stereotypic perceptions and burnout among women (23). In a study of 413 musculoskeletal radiologists, women in private practice had higher scores for EE and DP than men, and women had a statistically lower sense of PA across all practice settings compared with men (14). Additional explanations for the increased rate of burnout and decreased PA among women include an increased propensity to work > 80 hours per week compared with men, the concept of the dual role (mother or partner and physician), and the lack of female mentors in leadership positions (24).

Interventional radiologists who worked > 80 hours per week were 7 times more likely to report traits indicative of burnout than interventional radiologists who worked < 80 hours per week. Working hours, as a studied variable, have been associated with an increased likelihood of burnout, and prolonged working hours have been identified as the third leading cause of burnout among physicians (19,25). Although only 5.3% of the respondents reported working > 80 hours per week, previous studies have found significant associations between burnout and working > 40 hours per week (25). A systematic review of 31 studies on physician burnout found workload to be the dominant cause of burnout (24). However, physicians experience workload in a variety of contexts, including weekly hours, consultations per week, overnight duty, administrative duties, and case complexity. Of note, the form of call taken in the present survey was not assessed; however, IR call shifts would likely contribute differently than diagnostic radiology call shifts toward the total hours worked. Whereas physician expectations for acceptable work hours vary by specialty, a dependent response is likely present between work hours and burnout. Although not an easily applicable intervention, decreasing work hours or other contributors to overall workload may have a substantial impact on lowering the incidence of burnout among interventional radiologists (26).

Previously studied strategies to reduce burnout of physicians have focused on helping improve resiliency and the physician's ability to handle stress through individual or organizational interventions (27). The most commonly studied interventions among practicing physicians involve mindfulness training, small group discussions, and exercise (27). A randomized control trial of 74 practicing physicians found biweekly facilitated physician discussion groups led

to a sustained 15.5% decrease in high DP (28). Furthermore, a study of 253 pediatric critical care physicians found that physicians who participated in routine exercise were 44% less likely to report burnout (29). Although further research is needed to delineate which interventions are most effective in reducing physician burnout, there are a variety of interventions that may be individually tailored to combat burnout.

Although the survey was designed to capture a representative cross section of interventional radiologists in training and practice, it disproportionately represented early career physicians. The imbalance in respondents may be attributable to the method of survey distribution and use of social media, as 62% of Twitter users are < 50 years of age (30). Though not statistically significant, the variation in rates of burnout as a factor of postgraduate years may be related to generational differences in career expectations and experiences, including work hours, acceptable social norms, and lifestyle balance. The Millennial generation (born 1982–2000) has documented personality traits including rule-consciousness, altruism, sensitivity, and perfectionism (31). Generations perceive stress differently, and interventions designed to decrease burnout should consider how their respective personality traits respond to external stresses. Additional analyses of burnout within age-specific subsets of IR physicians and trainees would be beneficial to further delineate the etiologies of burnout among these groups.

The results of the current study and the responses to the open-ended question indicate that additional harmful external factors exist and may require attention when combating burnout among interventional radiologists. Interventional radiologists who responded to this survey reported suffering from perceived gender stereotypes and being burdened by bureaucracy and administrative duties. These represent problems that may not be resolved through established physician wellness programs, but instead may require human system interventions driven by organizational restructuring and redirection toward patient-centered care rather than financial obligations. Additional factors cited to contribute to burnout included call burden, electronic health record inefficiencies, diagnostic radiology responsibilities, staff relationships, and lack of recognition.

Recently, there has been a paradigm shift regarding the characterization and etiology of burnout. Historically, moral injury was a term used to describe soldiers' responses to their actions in war, but more recently this term has been used to describe the emotional and psychological insults health care providers experience when their moral ideals are transgressed (32,33). When physicians are unable to provide high-quality care because of limitations imposed by the electronic medical record or health care system, for instance, they experience psychological trauma leading to feelings of detachment and hopelessness. Within this context, burnout may be the result of moral injury experienced owing to the misalignment of interests between the physician, the patient, and the health care system as opposed to individual weakness, lack of resilience, or other susceptibility. Further exploration into this entity may be beneficial.

This study has limitations. As with all voluntary surveys, the study was impacted by selection bias. Interventional radiologists who are not members of the SIR Open Forum or active on social media would not have had the opportunity to participate in the survey. Respondents with manifestations of burnout may have been more inclined to participate in the survey. Conversely, physicians experiencing burnout may have been less likely to participate owing to generalized disengagement. Additionally, this study consisted of 339 respondents, which, although substantial, represents only a small proportion of practicing interventional radiologists. However, the survey respondents reflect the heterogeneity of IR practice settings, and whereas the study proportions may not mirror the proportion of actual practice settings, the survey results provide insights for further areas of investigation.

In conclusion, the results of this survey indicate that the incidence of burnout among studied interventional radiologists is high, especially among female interventional radiologists and interventional radiologists with longer work hours. Given the significant personal and professional toll that physician burnout may take and its potential negative impact on patient care, strategies to identify and reduce burnout among interventional radiologists are essential.

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APPENDIX A. WELLNESS IN IR

Please complete all the questions in this anonymous survey. Submit only one complete survey. Thank you for your time.
*Required

1. **Which describes your current level of practice?*** *Mark only one oval.*
   - ◯ Resident
   - ◯ Fellow
   - ◯ Attending
   - ◯ Other: _____
2. **How would you describe your clinical practice?*** *Mark only one oval.*
   - ◯ Academic
   - ◯ Private
   - ◯ Hybrid
   - ◯ Other: _____
3. **What percentage of your daily work is reading diagnostic radiology studies (ie, nonprocedural radiology).*** *Mark only one oval.*
   - ◯ 0%
   - ◯ 25%
   - ◯ 50%
   - ◯ 75%
   - ◯ 100%
4. **How many interventional radiologists are in your practice?*** *Mark only one oval.*
   - ◯ 0–5
   - ◯ 5–10
   - ◯ 10–15
   - ◯ 15–20
   - ◯ > 20
5. **How long has it been since you completed your postgraduate residency and fellowship training?*** *Mark only one oval.*
   - ◯ 5 years or less
   - ◯ 6–10 years
   - ◯ 11–20 years
   - ◯ 21 years or more
   - ◯ I am still in training
6. **How many hours do you work per week on average?*** *Mark only one oval.*
   - ◯ < 40 hours
   - ◯ 40–60 hours
   - ◯ 61–80 hours
   - ◯ > 80 hours
7. **What is your gender?*** *Mark only one oval.*
   - ◯ Male
   - ◯ Female
   - ◯ Other: _____
8. **What is your age?*** *Mark only one oval.*
   - ◯ < 30
   - ◯ 30–39
   - ◯ 40–49
   - ◯ 50–59
   - ◯ > 60
9. **Do you take interventional radiology call?*** *Mark only one oval.*
   - ◯ Yes
   - ◯ No
10. **On average, how many days per month do you take call?*** *Mark only one oval.*
    - ◯ I do not take call
    - ◯ 1–5
    - ◯ 6–10
    - ◯ 11–20
    - ◯ > 20
11. **(Optional) In your own words, the greatest contributor to burnout in your workplace is …**

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