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Burnout Rate and Risk Factors Among Anesthesiologists in the United States

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Abstract

Background: Physician burnout, widespread across medicine, is linked to poorer physician quality of life and reduced quality of care. Data on prevalence of and risk factors for burnout among anesthesiologists are limited. Our objective was to improve understanding of burnout in anesthesiologists, identify workplace and personal factors associated with burnout among anesthesiologists, and quantify their strength of association.

Methods: During March 2020, we surveyed member anesthesiologists of the American Society of Anesthesiologists (ASA). Burnout was assessed using the Maslach Burnout Inventory Human Services Survey. Additional survey questions queried workplace and personal factors. The primary research question was to assess rates of high risk for burnout (scores of at least 27 on the emotional exhaustion subscale and/or at least 10 on the depersonalization subscale of the Maslach Burnout Inventory) and Burnout Syndrome (demonstrating all three burnout dimensions, consistent with the World Health Organization definition). The secondary research question was to identify associated risk factors.

Results: Of 28,677 anesthesiologists contacted, 13.6% (3,898) completed the survey; 59.2% (2,307/3,898) were at high risk of burnout and 13.8% (539/3,898) met criteria for Burnout Syndrome. On multivariable analysis, perceived lack of support at work (odds ratio, 6.7 [95% confidence interval (CI), 5.3-8.5]); working 40 h/week (odds ratio, 2.22 [95% CI, 1.80-2.75]); lesbian, gay, bisexual, transgender/transsexual, queer/questioning, intersex, and asexual status (odds ratio, 2.21 [95% CI, 1.35-3.63]); and perceived staffing shortages (odds ratio, 2.06 [95% CI, 1.76-2.42]) were independently associated with high risk for burnout. Perceived lack of support at work (odds ratio, 10.0 [95% CI, 5.4-18.3]) and home (odds ratio, 2.13 [95% CI, 1.69-2.69]) were most strongly associated with Burnout Syndrome.

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Conclusions: The prevalence of burnout among anesthesiologists is high, with workplace factors weighing heavily. We identified risk factors for burnout, especially perceived support in the workplace, where focused interventions may be effective in reducing burnout.

Summary Statement:

We conducted a large-scale study of burnout in practicing anesthesiologists. Our findings indicate there is a significant influence of workplace culture and support on physician burnout, far outweighing the influence of personal demographic factors.

Introduction

Burnout is more common in physicians than in the general population.¹⁻⁴ Burnout Syndrome is a condition characterized by the dimensions of emotional exhaustion, depersonalization, and low sense of personal accomplishment^{5,6} (Figure 1). Burnout is a clinically meaningful condition that is intricately linked with decreased quality of life, physician health, patient satisfaction, quality of care, unprofessional behavior, and increased medical errors.⁷⁻⁹

Studies suggest that anesthesiologists and critical care physicians have a high risk of burnout,^{10,11} with approximately half reporting at least one major dimension of burnout.¹ Anesthesiologists routinely lead teams that care for patients across a wide variety of medical settings. This responsibility is rewarding and impactful but also leaves those in the field more vulnerable to stress related to the job's intensity.¹¹ These challenges have been amplified during the COVID-19 pandemic, with anesthesiologists often performing on the front lines.

At present, data on the prevalence of burnout and predictors of burnout among anesthesiologists are limited. Several studies have shown high rates of burnout among anesthesia residents and/or attendings in the U.S.,^{7,12} Europe,^{10,13-15} Africa,¹⁶ and Asia.¹⁷ However, to our knowledge, no large-scale studies have focused specifically on burnout among practicing anesthesiologists in the U.S. Further, a recent report from the National Academy of Medicine outlines approaches to improving well-being on a more systemic level. This is in line with our desire to determine specific risk factors for burnout in the anesthesiologist community, thereby identifying where such interventions could initially be best targeted.¹⁸

Our objective was to improve our understanding of anesthesiologist-specific risk factors for burnout, with a hypothesis that certain workplace and personal demographic factors may be more associated with burnout symptoms than others. We hope to identify risk factors in practicing anesthesiologists for burnout and Burnout Syndrome to guide potential preventative strategies in the future.

We conducted a large, nationwide study of anesthesiologists in the U.S. The ASA Committee on Physician Well-Being endorsed the study and gave advice on its design, then the ASA executive committee approved this survey for distribution to the membership.

Neither group was directly involved in the analysis methodology, though one of the authors is the current Chair of the Committee on Physician Well-being.

Materials and Methods

This study was determined to be exempt by the institutional review boards of Memorial Sloan Kettering Cancer Center and Boston Children's Hospital in July 2019 and January 2020, respectively.

Participants

Invitations to participate with objectives of the study and a survey link were distributed by the ASA via email to all ASA member attending anesthesiologists in the U.S. Participation was not mandatory, there were no incentives to participate, and all responses were anonymous. The initial email was sent on March 6, 2020 and was followed by two weekly reminders (March 14 and 21). A third reminder was planned for March 28, but this was canceled out of concern for the escalating COVID-19 pandemic and following ASA member feedback to the investigators raising concern for the overall e-mail burden physicians were experiencing. The principal investigators did not believe it was ethical to continue to send reminder emails given the cognitive overload many individuals were beginning to experience during the initial phases of the pandemic.

Survey Questionnaire

Burnout was assessed using the validated Maslach Burnout Inventory Human Services Survey.⁵ Our additional survey questions focused on both personal and occupational risk factors for burnout. The study survey was designed on the basis of guidance from the American Association for Public Opinion Research.^{19–21} The demographic and practice information questions were developed primarily by the authors after performing a literature review and receiving input from the ASA Committee on Physician Well-Being and approval from the ASA Executive Committee for distribution to the membership. Survey development and pre-testing, which included online interface, usability and technical functionality of the electronic questionnaire, was tested on a targeted group of approximately 15 professional colleagues. Intended survey logic was retained throughout with all responses obtained during this testing phase erased prior to survey distribution to the ASA membership and were not included in statistical analysis. Participants were first asked via email to participate in the voluntary study, being provided explicit assurance of confidentiality; this e-mail contained a link to the 35-question survey tool (Appendix A). Explicit consent was not required by either institution's IRB for participation in this survey study. Questions were presented in a forced-response format, with optional demographic responses, without any incentives offered.

Participants were asked to provide information on demographic characteristics (including age, gender identity, inclusion in a vulnerable or underrepresented group, and English as a second language, primary practice environment, availability of a professional mentor at work, length of time since completion of training, recent staffing shortages at work, level of

support in their professional and personal lives, and magnitude of caregiving responsibility at home.

The survey also included the full version of the Maslach Burnout Inventory Human Services Survey, which is the predominant metric for assessment of burnout among physicians.^{1,22,23} The Maslach Burnout Inventory Human Services Survey uses 22 items to assess levels of three dimensions: emotional exhaustion (9 items), depersonalization (5 items), and feelings of personal accomplishment (8 items). Each item is scored using a 7 level scale ranging from 0 to 6 (from “never” to “every day”), allowing for subscale assessment in all three dimensions.⁵ In order to facilitate potential comparisons to large prior studies of burnout in US physicians, in a manner similar to these studies,^{3,4,24} we considered a high score on emotional exhaustion (≥ 7) and/or depersonalization (≥ 10) to indicate a high risk of burnout.¹ While the Maslach Burnout Inventory assesses burnout over a continuum, in order to identify those with more significant degrees of burnout, we also classified the combination of a high score on emotional exhaustion and depersonalization and a low score on personal accomplishment (≤ 3) (i.e. all 3 dimensions present, using the same scoring thresholds as previously described for “high risk for burnout”) as Burnout Syndrome, consistent with definitions by the World Health Organization and Maslach.^{5,25} Responses were automatically captured into SurveyMonkey® without any participant identifiers for further analyses.

Statistical Analysis

Descriptive statistics of responses are presented as frequencies and percentages (for categorical variables) and medians and interquartile ranges (for continuous variables). Missing data in the final analysis sample were negligible; denominators are presented to indicate instances of missing data. Burnout rates are presented as frequencies and percentages, and means and standard deviations are presented for each continuous subscale (emotional exhaustion, depersonalization, and personal accomplishment). Assessment of the generalizability of the study respondents was performed by comparing age, gender identity, and time since completion of training between the analysis sample and the overall ASA population. Age and time since training completion were modeled as outcome variables in two separate median regression models with group indicator (survey respondents versus ASA population) as a covariate, and the coefficient and 95% CI are reported to estimate the difference in medians with corresponding 95% CI.²⁰ Differences between proportions were calculated for gender identity using exact 95% CIs.

For statistical analysis, work support questions were considered in 3 categories (Not at all/A little, A moderate amount, A lot/A great deal), and other Likert scale questions were dichotomized as (Not at all/A little/ A moderate amount vs A lot/A great deal). Practice environment, gender identity, and caregiving responsibilities were coded as a categorical variable, age was dichotomized as age < 50 years, and all other variables were considered as dichotomous predictors.

Univariate comparisons were performed by comparing respondents with and without one manifestation of burnout (high score on the scales for emotional exhaustion and/or depersonalization) and by comparing respondents with and without Burnout Syndrome.

Demographic and practice characteristics and support perceptions were analyzed using the Wilcoxon rank-sum test for continuous variables and the χ^2 test for categorical variables. After univariate associations were determined for screening, all variables with $P < 0.05$ on univariate testing were included in the multivariable logistic regression modeling. A final multivariable model was fit following backwards elimination model building to obtain the adjusted associations between each potential risk factor and burnout, with the purpose of identifying independent risk factors associated with burnout. Results from multivariable modeling are presented as adjusted odds ratios with corresponding 95% CIs and P values. A post-hoc supplemental analysis was performed to determine the significant risk factors for emotional exhaustion, depersonalization, and personal accomplishment, using univariate and multivariable linear regression modeling, with results presented as adjusted coefficients with 95% CIs and P values.

No statistical power calculation was conducted prior to the study, because the sample size was based on the number of complete survey responses. For all statistical analyses, a two-tailed $P < 0.05$ was considered to be statistically significant. All statistical analyses were performed using Stata (version 16.0, StataCorp, College Station, TX).

Results

Physician Characteristics

Of 28,677 anesthesiologists contacted via email, 4,147 (14.5%) opened the provided link and were considered to have participated. Of the survey respondents, 3,898 (94.0%) completed the survey in its entirety and were included in the statistical analyses, yielding an effective 13.6% response rate. We received 2,357 complete responses (60.5%) before March 14, 887 (22.8%) between March 14 and 20, and 654 (16.8%) after March 20, 2020. Only 19 responses (0.5%) were received after March 24. The survey link was officially closed on March 30.

Participant characteristics and rates of burnout are presented in Table 1. The ASA provided the investigators with basic demographic data for the membership contemporaneous with the study period for the purpose of establishing how representative the study cohort was to the whole. The median age of respondents was 52 years (interquartile ranges, 42-60 years), compared with 48 years (interquartile ranges, 40-58 years) for the overall ASA population (difference, 4 years [95% CI, 3.2-4.8 years]). Of the respondents, 33.6% were women, compared with 29.2% of the ASA population (difference, 4.4% [95% CI, 2.8%-6%]). The most common practice environments among respondents were hospital-based private practice (34%), community hospital (28%), and university hospital or academic appointment (26.2%). The median time since completion of training was 18 years (interquartile ranges, 10-28 years), compared with 14.8 years (interquartile ranges, 7.8-25.8 years) for the ASA population (difference, 3.2 years [95% CI, 2.7-3.8 years]). Of the respondents, 86.4% worked at least 40 h/week, 35.1% experienced staffing shortages, 46.6% felt little support in work life, and 20.2% felt little support in home life. The majority of respondents had caregiving responsibilities of at least one person (85.4%). Respondents identified as underrepresented on the basis of race (10.2%); religion (4.9%); lesbian, gay, bisexual,

transgender/transsexual, queer/questioning, intersex, and asexual status (2.7%); and English as a second language (6.1%).

Prevalence of High Risk for Burnout and Burnout Syndrome

On the basis of the Maslach Burnout Inventory Human Services Survey, the rate of high risk of burnout among anesthesiologists was 59.2% (2,307/3,898). Emotional exhaustion, depersonalization, and reduced feelings of personal accomplishment were experienced by 53.3%, 37.2%, and 25.9% of respondents, respectively. The mean scores in the cohort were 27 (SD=13) for emotional exhaustion, 8 (SD=6) for depersonalization, and 38 (SD=8) for personal accomplishment. The rate of Burnout Syndrome was 13.8% (Figure 2). The rates of high risk for burnout were not significantly different across the 3 survey waves (59.8%, 59.9%, and 56%, respectively; $P=0.185$), and neither were the rates of Burnout Syndrome (14.7%, 12.4%, and 12.5%, respectively; $P=0.135$).

Factors Associated with Burnout

Results of the univariate analysis for high risk of burnout and Burnout Syndrome are presented in Table 2. Following univariate testing for screening of variables, multivariable logistic regression analyses were performed. After adjustment for all other variables in the model, the following were identified as independent risk factors for high risk of burnout: working more than 40 h/week (odds ratio, 2.22 [95% CI, 1.80-2.75]; $P<0.001$), experiencing staffing shortages (odds ratio, 2.06 [95% CI, 1.76-2.42]; $P<0.001$), perception of a low level of support in work life (ref. = a lot or a great deal; not at all or a little support: odds ratio, 6.7 [95% CI, 5.3-8.5]; $P<0.001$; a moderate amount of support: odds ratio, 2.29 [95% CI, 1.85-2.83]; $P<0.001$), perception of a low level of support at home (ref. = a lot or a great deal; not at all or a little support: odds ratio, 1.77 [95% CI, 1.44-2.18]; $P<0.001$; a moderate amount of support: odds ratio, 1.37 [95% CI, 1.15-1.64]; $P<0.001$), not having someone to talk to about concerns at work (odds ratio, 1.56 [95% CI, 1.31-1.84]; $P<0.001$), age <50 years (odds ratio, 1.48 [95% CI, 1.27-1.72]; $P<0.001$), and identifying as underrepresented on the basis of lesbian, gay, bisexual, transgender/transsexual, queer/questioning, intersex, and asexual status (odds ratio, 2.21 [95% CI, 1.35-3.63]; $P=0.002$) (Figure 3; Supplemental Tables A and B).

The following were identified as independent risk factors for Burnout Syndrome: hospital-based private practice environment (odds ratio, 1.88 [95% CI, 1.21-2.93]; $P=0.005$; ref. = private practice outpatient based), experiencing staffing shortages (odds ratio, 1.61 [95% CI, 1.32-1.96]; $P<0.001$), perception of a low level of support in work life (ref. = a lot or a great deal; not at all or a little support: odds ratio, 10.0 [95% CI, 5.4-18.3]; $P<0.001$; a moderate amount of support: odds ratio, 3.63 [95% CI, 1.96-6.7]; $P<0.001$), perception of a low level of support at home (ref. = a lot or a great deal; not at all or a little support: odds ratio, 2.13 [95% CI, 1.69-2.69]; $P<0.001$; a moderate amount of support: odds ratio, 1.55 [95% CI, 1.22-1.97]; $P<0.001$), not having someone to talk to about concerns at work (odds ratio, 1.66 [95% CI, 1.26-2.37]; $P<0.001$), and age <50 years (odds ratio, 1.94 [95% CI, 1.59-2.37]; $P<0.001$) (Figure 3, Supplemental Tables A and B).

Supplemental multivariable linear regression analyses for each subscale (emotional exhaustion, depersonalization, and personal accomplishment) are summarized in Supplemental Tables C, D and E.

Discussion

Our findings show that anesthesiologists are at high risk of burnout in the U.S. Burnout is linked to decreased quality of care,²⁶ professionalism,²⁷ patient safety,⁸ and physician quality of life.²⁸ Shanafelt et al. estimated that 45.8% of physicians are at risk of burnout,¹ a high percentage that persists even after accounting for higher rates of resilience among physicians.²⁴ That study also found that the prevalence of burnout among anesthesiologists (48%), a small fraction of their sample (n=309 [4.2%]), was higher than the mean. The higher rate of burnout in our study (59.2%) may be explained by differences in sample size, shifts in social climate, or increasing rates of burnout over time.

We also explored the rate of Burnout Syndrome, which we defined as the presence of all three dimensions of burnout, in accordance with the World Health Organization.²⁵ The presence of all three dimensions at once is less presented in the literature than “high risk for burnout”. However, given the reported rates of major morbidities in anesthesiology, such as substance use disorder and suicide, we felt it important to report.^{29,30} The rate of Burnout Syndrome was predictably lower than that of burnout (13.8% vs. 59.2%), but Burnout Syndrome still affected a meaningful proportion of anesthesiologists in our dataset. Similar to the case for high risk for burnout, risk factors for Burnout Syndrome were strongly associated with workplace factors, especially perceived support of work-life. Age was the only personal factor that was significantly associated with Burnout Syndrome.

Although studies have analyzed burnout among trainees or attendings in anesthesia internationally,^{13–16} they did not capture specific risk factors that are pervasive in the population of anesthesiologists. Sun et al. observed a rate of burnout of 52% among anesthesiology residents and first-year graduates that was unrelated to hours worked or student debt.¹² However, our study suggests that workplace factors, rather than personal factors, are the primary factors associated with being high risk for burnout among practicing anesthesiologists. In particular, lack of workplace support, working 40 h/week, staffing shortages, and lack of a workplace confidant were all associated with burnout, which is consistent with recent data.³¹ Higher-risk characteristics of burnout in other studies included long work hours, excessive alcohol consumption, female gender identity, not being married, non-Hispanic White race, US medical school graduate, younger age, poor learning environment, inadequate sleep quality, and lower income.^{7,17,18,32–34} Although our analysis sample, as compared to ASA members, was slightly older and had a higher percentage of females, we did not feel that this small difference affected our prevalence of burnout. Many other studies did not find sex as an independent predictor of burnout, yet the prevalence of depersonalization and emotional exhaustion is higher among men and women, respectively.^{31,34,35} In our study, contrary to prior investigations,³⁶ but in line with the National Academy of Medicine consensus study,¹⁸ personal factors seemed to be of lower importance than workplace factors. These results hold true in sensitivity analyses within

each of the individual subscales (emotional exhaustion, depersonalization, and personal accomplishment). (Supplemental Tables C, D, and E).

To date, groups that are underrepresented in medicine have not been as regularly measured in physician burnout studies. In their initial report on the Maslach Burnout Inventory, Maslach and Jackson noted that respondents who identified as being part of a racial minority did not have higher rates of burnout and our results confirm this.³⁷ Interestingly, we also found that anesthesiologists with English as a second language tended to have a lower risk of burnout, which echos previous findings that international medical students had lower rates of burnout than US medical graduates.³³ These findings highlight the importance of workplace factors, though it remains unclear why these populations have lower rates of burnout.

Among personal factors, lesbian, gay, bisexual, transgender/transsexual, queer/questioning, intersex, and asexual status had the strongest association with burnout in underrepresented participants. As lesbian, gay, bisexual, transgender/transsexual, queer/questioning, intersex, and asexual people represent an increasing proportion of medical students and future physicians,³⁸ this finding warrants further investigation. Identifying as a sexual minority has been associated with greater psychological distress in the workplace,³⁹ and higher burnout.⁴⁰ In fact, Przedworski and colleagues investigated 4,673 medical students with self-reported sexual orientation data in a national longitudinal cohort study.⁴¹ Compared with heterosexual students, first-year sexual minority medical students (who identified as non-heterosexual) experience significantly greater risk of depression, anxiety and low self-rated health. Another cohort study of 27,504 US medical students showed that lesbian, gay, or bisexual students reported mistreatment and discrimination based on sexual orientation.⁴² Members of this community may lack inherent familial support because they do not necessarily share their sexual or gender identity with their family of origin. Additionally, members of the lesbian, gay, bisexual, transgender/transsexual, queer/questioning, intersex, and asexual population may not be federally protected from workplace discrimination; this lack of protection may lead individuals to hide their lesbian, gay, bisexual, transgender/transsexual, queer/questioning, intersex, and asexual status, potentially amplifying the effect of workplace factors on burnout.

Actionable Interventions to Ameliorate Burnout

Our results suggest that feelings of support (in mentorship, at work, and at home) are the most critical factors in anesthesiologist well-being. Our results substantiate that lack of support in work-life contributed to anesthesiologist burnout and can provide baseline assessment of anesthesiologist well-being and burnout. After quantifying the magnitude of different risk factors that contribute to burnout, we can intervene most effectively from the perspective of how to make anesthesiologists feel more support at work. Indeed, not feeling supported in work-life was strongly associated with high risk for burnout, and even more strongly with Burnout Syndrome.

There are a number of effective strategies to reduce burnout, as demonstrated in a 2016 systematic review and meta-analysis of burnout reduction strategies, showing a burnout reduction from 54% to 44% in the intervention groups.⁴³ A recent publication describes interventions for well-being with descriptions of policy-level, institutional and

personal strategies to ameliorate burnout and improve physician well-being. With actionable recommendations that can be adopted by policy-makers (systematic destigmatizing of mental healthcare, educational debt reform, limiting discoverability of peer support), institutions (peer support programs, electronic health optimization, emphasis on mentorship) and physicians (mindfulness stress reduction training, optimum nutrition and physical activity) we can make practical steps towards decreasing burnout and improving overall well-being.⁴⁴

Workplace culture is directly linked to leadership,⁴⁵ in particular executive leadership.⁴⁶ However, all physicians assume leadership roles, whether in the operating room or at the department level, and therefore have an opportunity to foster a culture of support. We have shown that a culture of support is associated with a lower risk of burnout, and data suggests that burnout may have a negative effect on patient satisfaction and safety.^{8,47} Put simply, leadership drives culture, culture drives burnout, and burnout affects patient care. Solutions focused on leadership skills, self-care, balance between demands and resources, and alignment in the working environment are likely to have downstream effects, multiplying investments made.²⁹

Multiple models of supportive cultures exist,^{46,48} but, in essence, a culture of support must reach all aspects of life and practice, integrating principles of healthy well-being and care into each. The creation of such a culture should follow an iterative path, requiring repeated feedback from people at every organizational level. Care must be taken to ensure that giving feedback is safe, without fear of reprisal. Following any changes, assessments must be made to ensure the changes are effective—these assessments can be in the form of formal survey instruments, focus groups, or surrogate markers of engagement, such as employee retention or involvement in voluntary organizational activities. Mentorship meetings should incorporate both work and life factors into goal setting, taking care to strategize ways in which balance can be attained on an individual basis.

Finally, given the continued burden of depression, suicide, and substance use disorders in medicine and anesthesiology,^{29,30} a goal of any well-being initiative should be to create a culture in which anyone who needs help, gets help, with no barriers due to stigma, fear of career impact, time constraints, or ability to pay. Institutions and leadership should ensure access to mental health resources. Seeking help must be seen as a laudable act of professionalism and the expected course when in need.

Potential Limitations

Our survey was disseminated in March 2020, just before the escalation of the COVID-19 pandemic in the U.S. This pandemic has disproportionately affected anesthesiologists on the front line.⁴⁹ However, because of the timing of our responses, the pandemic likely had a minimal effect on the data. The pandemic began to escalate in the last week of March 2020 and did not initially peak in the U.S. until April 2020.⁵⁰ As noted, 83.3% and 99.5% of the responses to our surveys occurred before March 20 and 24, respectively. Therefore, the responses represent rates of burnout just before the pandemic and may not represent levels of burnout and stress currently. Our effective response rate was low at 13.6%, likely because of the increased e-mail burden and the truncated schedule of email

reminders. Given the volume of e-mail communication experienced throughout March 2020 regarding the emerging COVID pandemic, cognitive bandwidth to participate in extraneous tasks like voluntary survey studies was likely impacted. Even so, the response rate in this study is not much lower than those in recent large-scale studies of burnout, which were slightly over 17%.^{4,24} Other factors possibly contributed to the low response rate, such as survey fatigue or burnout itself. Furthermore, our sample being similar to the overall population of ASA member anesthesiologists suggests that our results are generalizable to the larger population. Finally, we used the complete Maslach Burnout Inventory Human Services Survey questionnaire, which contains 22 items; while use of a well validated survey instrument is certainly not a limitation, the length limited the number of additional questions feasible to ask. Therefore, only select personal and practice factors could be queried and additional risk factors, such as geographic location, were not collected.

Conclusions

Given the inherent stress of anesthesiology, burnout is not an unexpected occupational hazard. No clear trend of burnout rates over time have been established among anesthesiologists, although the landscape continues to evolve dynamically. In this large, national, survey-based study of anesthesiologists, the prevalence of high risk for burnout and Burnout Syndrome were high (59.2% and 13.8%, respectively). Burnout was primarily associated with workplace factors, particularly the lack of feeling supported in work life. The high rates of high risk for burnout and Burnout Syndrome identified here demand attention in the form of well-designed interventions that factor in the drivers of burnout in this population. These factors include lack of support at work and home, long work hours, staffing shortages, and issues related to sexual/gender identity. These risk factors can be used to identify anesthesiologists at risk for burnout and to design initiatives to reduce the risk of burnout and manage existing burnout among anesthesiologists.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments:

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Appendix A: Burnout surveysent to anesthesiologists

Individual Job Questions

The purpose of this survey is to assess the nature of burnout in practicing anesthesiologists, focusing on professional and individual risk factors in order to more effectively drive systemic changes to improve well-being.

Please answer each question truthfully and to the best of your availability. All answers are anonymous.

This complete survey should take no more than 3-5 minutes of your time.

* 1. What is your primary practice environment?

- University Hospital/Academic Appointment
- Community Hospital
- Private Practice - Hospital Based
- Private Practice - Outpatient Based
- Other (please specify)

* 2. Do you have someone you currently identify as a professional mentor?

- Yes
- No

* 3. In what year did you complete your last year of anesthesia training, including fellowships?

* 4. How many hours do you work in an average week?

- 20 or less
- 21-30
- 31-40
- 41-50
- 51-60
- More than 60

* 5. In the past month, has your primary practice experienced anesthetic staffing shortages?

- | Not at all | A little | A moderate amount | A lot | A great deal |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

* 6. How supported do you feel in your work-life?

Not at all	A little	A moderate amount	A lot	A great deal
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 7. How often is there someone available at your institution with whom you can safely talk to about your concerns regarding your work?

Never	Rarely	Sometimes	Often	Always
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 8. How supported do you feel in your out-of-work life?

Not at all	A little	A moderate amount	A lot	A great deal
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 9. Do you currently have any caregiving responsibility outside of work?

- Yes
 No

10. If you do have caregiving responsibility, for how many people? (children, older parents, etc.)

** MBI-HSS Questionnaire (#11-32) **

Demographic Questions

Please answer each question truthfully and to the best of your availability. All answers are anonymous.

This section is optional.

33. What is your gender?

- Female
- Male
- Other (specify)

34. What is your age?

35. Are you a member of an underrepresented or vulnerable group in anesthesia? If yes, please choose all that apply. If no, please skip.

- Underrepresented racial minority - please specify below (optional)
- Underrepresented religious minority - please specify below (optional)
- Member of the LGBTQIA+ community - please specify below (optional)
- English as a second language

Other (please specify)

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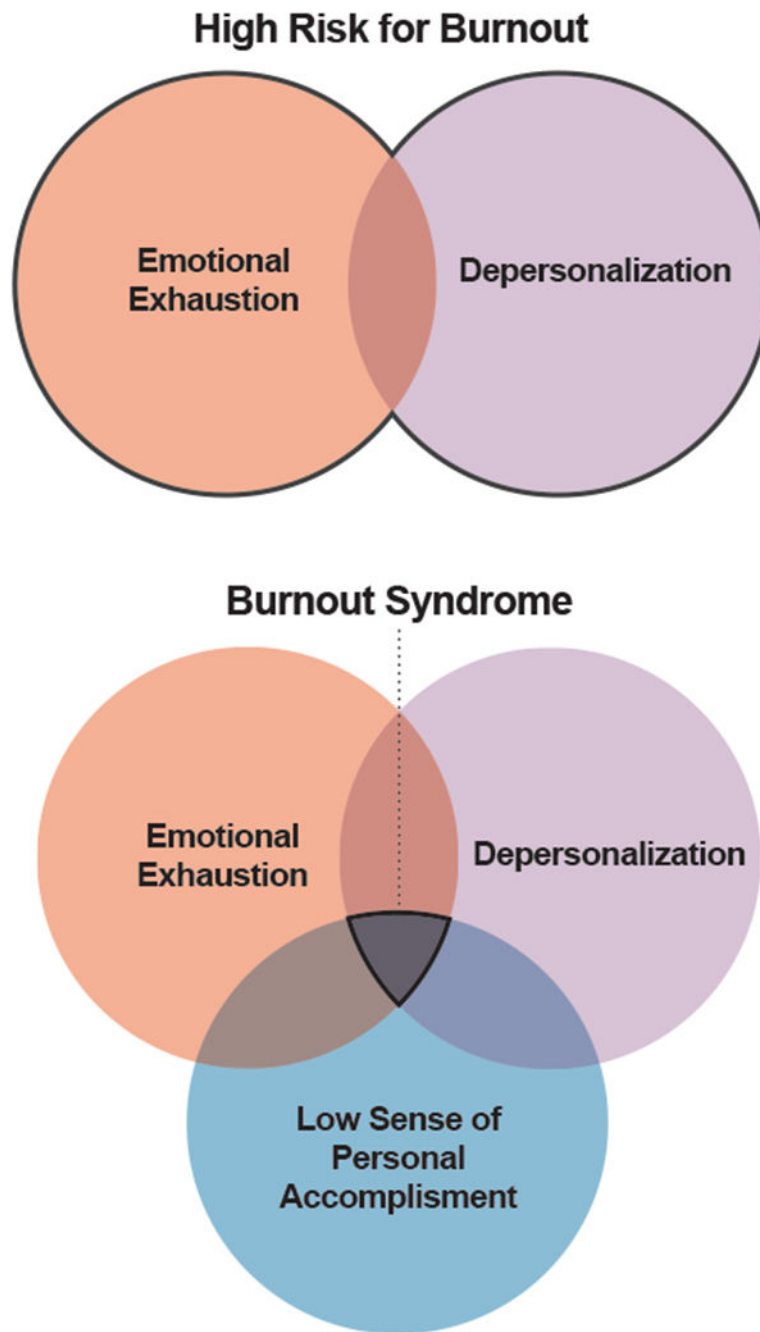


Figure 1. Burnout versus Burnout Syndrome. High risk for burnout is classified as reaching threshold levels of either emotional exhaustion and/or depersonalization as described in the methods. Burnout Syndrome is a condition characterized by the dimensions of emotional exhaustion, depersonalization, and low sense of personal accomplishment.

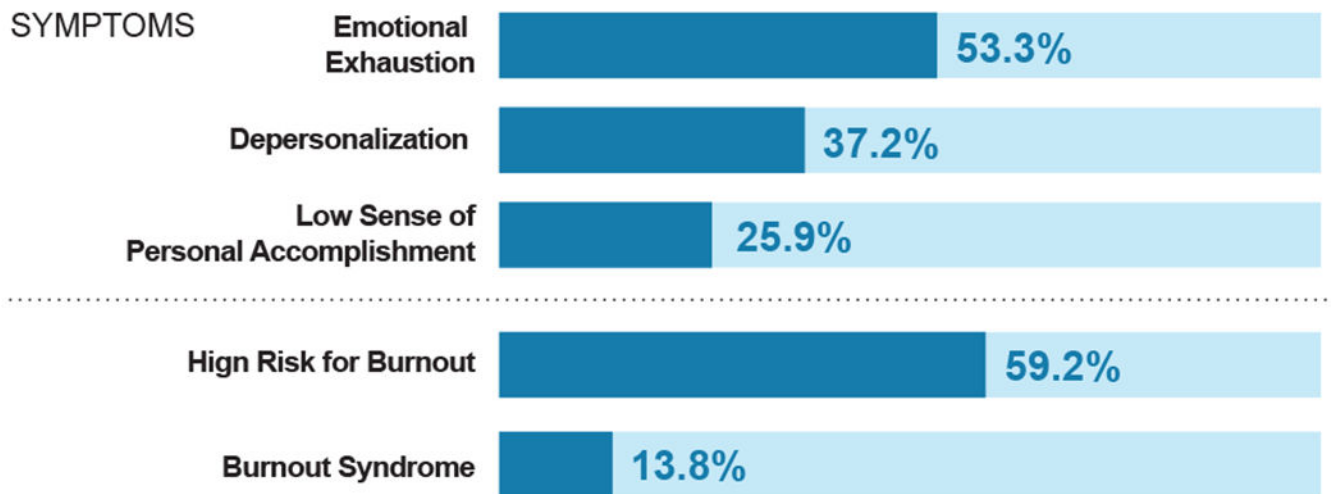


Figure 2.

Dimensions associated with burnout. Methodology: Risk factors were determined by multivariable logistic regression based on 3,898 anesthesiologists who completed the survey in March 2020. High risk for burnout is defined as reaching threshold levels of either emotional exhaustion and/or depersonalization. Burnout Syndrome is a condition characterized by the dimensions of emotional exhaustion, depersonalization, and low sense of personal accomplishment

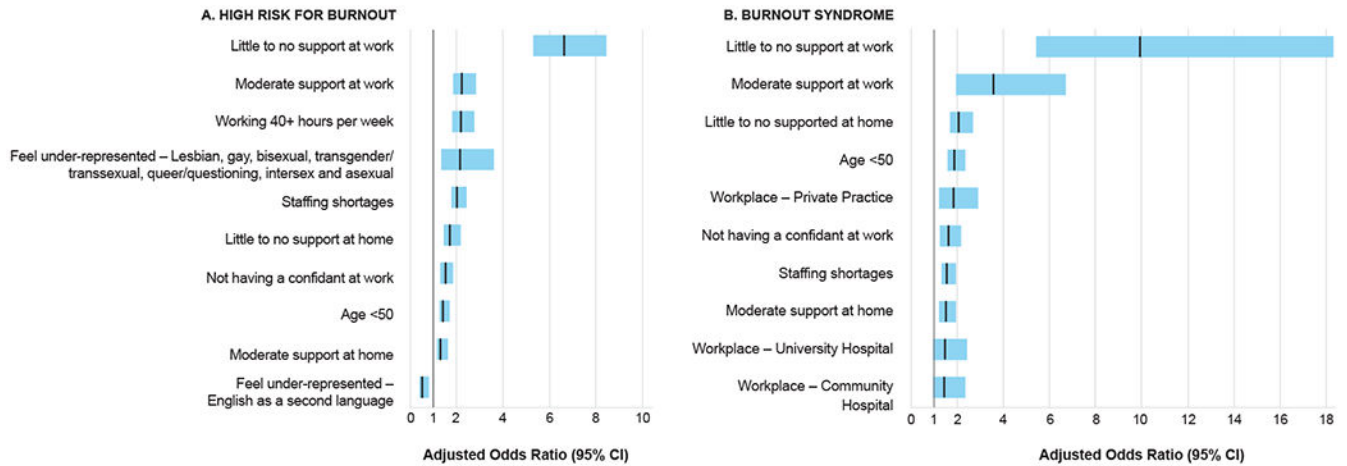


Figure 3. Independent risk factors associated with burnout and Burnout Syndrome. Methodology: Risk factors were determined by multivariable logistic regression based on 3,898 anesthesiologists who completed the survey in March 2020. High risk for burnout is either reaching threshold levels of emotional exhaustion and/or depersonalization. Burnout Syndrome is a condition characterized by the dimensions of emotional exhaustion, depersonalization, and low sense of personal accomplishment. Multivariable logistic regression analyses in A) High risk for burnout and B) Burnout Syndrome.

Demographics and Anesthesiologist characteristics

Table 1.

Variable	Analysis Sample (N=3,898)	ASA Population (N=28,621)	Difference (95% CI)
Practice environment			
Private practice – hospital based	1,325 (34%)		
Private practice – outpatient based	330 (8.5%)		
Community hospital	1,092 (28%)		
University hospital/academic appointment	1,022 (26.2%)		
Other	129 (3.3%)		
Have a professional mentor	932 (23.9%)		
Time since training complete, years ^a	18 (10-28)	14.8 (7.8-25.8)	3.2 (2.7-3.8)
>40 h working per week	3,367 (86.4%)		
Staffing shortages experienced	1,369 (35.1)		
Feeling supported in work-life			
Not at all/A little	1,818 (46.6%)		
A moderate amount	1,310 (33.6%)		
A lot/A great deal	770 (19.8%)		
Feeling supported at home			
Not at all/A little	787 (20.2%)		
A moderate amount	978 (25.1%)		
A lot/A great deal	2,133 (54.7%)		
Somebody available to safely talk about concerns at work	1,427 (36.6%)		
Caregiving responsibilities			
None	566/3,890 (14.6%)		
1-2 people	1,468/3,890 (37.7%)		
>2 people	1,856/3,890 (47.7%)		
Gender Identity			
Female	1,277/3,798 (33.6%)	8,330/28,537 (29.2%)	4.4% (2.8%-6%)

Variable	Analysis Sample (N=3,898)	ASA Population (N=28,621)	Difference (95% CI)
Male	2,521 (3,798 (66.4%))	20,207/28,537 (70.8%)	4 (3.2-4.8)
Age, years	52 (42-60)	48 (40-58)	
Identify as underrepresented on the basis of race	398 (10.2%)		
Identify as underrepresented on the basis of religion	192 (4.9%)		
Identify as underrepresented on the basis of lesbian, gay, bisexual, transgender/transsexual, queer/questioning, intersex, and asexual status	104 (2.7%)		
Identify as underrepresented on the basis of English as a Second Language	236 (6.1%)		
High risk for burnout (emotional exhaustion and/or depersonalization)	2,307 (59.2%)		
Emotional exhaustion	2,077 (53.3%)		
Depersonalization	1,451 (37.2%)		
Low personal accomplishment	1,008 (25.9%)		
Burnout Syndrome (emotional exhaustion, depersonalization, and low personal accomplishment)	539 (13.8%)		

Data are presented as no. (%) or median (interquartile range). Differences and 95% CIs were calculated to assess the comparability of the analysis sample and the ASA population for variables known in both. Quantile regression on the 50th percentile (median) was used to estimate the difference, with 95% CIs, for time since completion of training and age. Exact CIs were calculated for difference in percent female.

^aTime since becoming an attending for analysis sample and time since completion of residency/fellowship for the ASA population.

Table 2.

Univariate analysis of high risk for burnout and burnout syndrome

Variable	High Risk of Burnout			Burnout Syndrome		
	Yes (n=2,307)	No (n=1,591)	P	Yes (n=539)	No (n=3,359)	P
Practice environment			<0.001			0.005
Private practice – hospital based	825 (35.8%)	500 (31.4%)		212 (39.3%)	1,113 (33.1%)	
Private practice – outpatient based	161 (7%)	169 (10.6%)		27 (5%)	303 (9%)	
Community hospital	651 (28.2%)	441 (27.7%)		149 (27.6%)	943 (28.1%)	
University hospital/academic appointment	592 (25.7%)	430 (27%)		136 (25.2%)	886 (26.4%)	
Other	78 (3.4%)	51 (3.2%)		15 (2.8%)	114 (3.4%)	
Have a professional mentor	507 (22%)	425 (26.7%)	0.001	92 (17.1%)	840 (25%)	<0.001
Time since training complete, years ^a	17 (10-26)	21 (10-29)	<0.001	15 (9-24)	19 (10-28)	<0.001
>40 h working per week	2100 (91%)	1267 (79.6%)	<0.001	487 (90.4%)	2,880 (85.7%)	0.004
Staffing shortages experienced	1,012 (43.9%)	357 (22.4%)	<0.001	271 (50.3%)	1,098 (32.7%)	<0.001
Feeling supported in work-life			<0.001			<0.001
Not at all/A little	1,440 (62.4%)	378 (23.8%)		424 (78.7%)	1,394 (41.5%)	
A moderate amount	674 (29.2%)	636 (40%)		103 (19.1%)	1,207 (35.9%)	
A lot/A great deal	193 (8.4%)	577 (36.3%)		12 (2.2%)	758 (22.6%)	
Feeling supported at home			<0.001			<0.001
Not at all/A little	604 (26.2%)	183 (11.5%)		196 (36.4%)	591 (17.6%)	
A moderate amount	625 (27.1%)	353 (22.2%)		152 (28.2%)	826 (24.6%)	
A lot/A great deal	1,078 (46.7)	1,055 (66.3%)		191 (35.4%)	1,942 (57.8%)	
Somebody available to safely talk about concerns at work	582 (25.2%)	845 (53.1%)	<0.001	80 (14.8%)	1,347 (40.1%)	<0.001
Caregiving responsibilities			0.029			0.064
None	307/2,305 (13.3%)	259/1,585 (16.3%)		64/537 (11.9%)	502/3,353 (15%)	
1-2 people	888/2,305 (38.5%)	580/1,585 (36.6%)		223/537 (41.5%)	1,245/3,353 (37.1%)	
>2 people	1110 (2,305 (48.2%)	746/1,585 (47.1%)		250/537 (46.6%)	1,606/3,353 (47.9%)	

Variable	High Risk of Burnout			Burnout Syndrome			P
	Yes (n=2,307)	No (n=1,591)	P	Yes (n=539)	No (n=3,359)	P	
Gender Identity			0.334			0.629	
Female	767/2,240 (34.2%)	510/1,558 (32.7%)		171/523 (32.7%)	1,106/3,275 (33.8%)		
Male	1,473/2,240 (65.8%)	1,048/1,558 (67.3%)		353/523 (67.5%)	2,169/3,275 (66.2%)		
Age, years	50 (42-58)	54 (43-61)	<0.001	48 (41-56)	53 (43-60)	<0.001	
Identify as underrepresented on the basis of race	226 (9.8%)	172 (10.8%)	0.304	52 (9.9%)	346 (10.3%)	0.642	
Identify as underrepresented on the basis of religion	119 (5.2%)	73 (4.6%)	0.419	33 (6.1%)	159 (4.7%)	0.167	
Identify as underrepresented on the basis of lesbian, gay, bisexual, transgender/transsexual, queer/questioning, intersex, and asexual status	77 (3.3%)	27 (1.7%)	0.002	19 (3.5%)	85 (2.5%)	0.183	
Identify as underrepresented on the basis of English as a Second Language	124 (5.4%)	112 (7%)	0.032	32 (5.9%)	204 (6.1%)	0.902	

Continuous data are presented as median (interquartile range); categorical data are presented as no. (%). The Wilcoxon rank sum test and χ^2 test were used to compare the two groups in terms of continuous and categorical variables, respectively. Bold indicates a statistically significant value.