



ORIGINAL ARTICLE

Extinguishing burnout: National analysis of predictors and effects of burnout in abdominal transplant surgery fellows

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Burnout among surgeons has been attributed to increased workload and decreased autonomy. Although prior studies have examined burnout among transplant surgeons, no studies have evaluated burnout in abdominal transplant surgery fellows. The objective of our study was to identify predictors of burnout and understand its impact on personal and patient care during fellowship. A survey was sent to all abdominal transplant surgery fellows in an American Society of Transplant Surgeons-accredited fellowship. The response rate was 59.2% (n = 77) and 22.7% (n = 17) of fellows met criteria for burnout. Fellows with lower grit scores were more likely to exhibit burnout compared with fellows with higher scores (3.6 vs 4.0, $P = .026$). Those with burnout were more likely to work >100 hours per week (58.8% vs 27.6%, $P = .023$), have severe work-related stress (58.8% vs 22.4%, $P = .010$), consider quitting fellowship (94.1% vs 20.7%, $P < .001$), or make a medical error (35.3% vs 5.2%, $P = .003$). This national analysis of abdominal transplant fellows found that burnout rates are relatively low, but few fellows engage in self-care. Personal and program-related factors attribute to burnout and it has unacceptable effects on patient care. Transplant societies and fellowship programs should develop interventions to give fellows tools to prevent and combat burnout.

KEYWORDS

clinical research / practice, education, education, ethics, ethics and public policy, mental health, organ procurement, organ transplantation in general, physician education, social sciences

Abbreviations: ASTS, American Society of Transplant Surgeons; DP, depersonalization; EE, emotional exhaustion; PA, personal achievement; PD, program director; SHS, Subjective Happiness Scale; SVS, Second Victim Syndrome.

From the Fellowship Training Committee of the American Society of Transplant Surgeons

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1 | INTRODUCTION

Burnout, characterized by the constellation of emotional exhaustion (EE), depersonalization (DP), and reduced personal accomplishment (PA), has been extensively studied in recent years in the surgical literature.^{1,2} A common theme that emerges among surgeons is the association of burnout with increased workload accompanied by reduced autonomy.³⁻⁵ One study examining burnout among 582 surgeons found that 32% had high levels of emotional exhaustion, 13% were depersonalized, and 4% felt low levels of personal accomplishment.⁶ And while other studies have found even higher rates of burnout, many faculty and residents underestimate its prevalence and severity.⁷

Surgical training has changed drastically over the past decade as the culture of surgical education has evolved. Implicated factors include increased patient volume within the constraints of duty hour restrictions, decreased trainee autonomy, inclusion of diverse learning styles among surgical trainees, and an increasing focus on trainee well-being.^{8,9} Although prior studies have examined burnout and well-being among general surgery residents and attending surgeons, no studies have evaluated burnout in abdominal transplant surgery fellowships. In recent years, transplant surgery has been considered one of the least popular and least competitive fellowships amongst US-trained graduates.^{10,11} This fellowship is particularly demanding requiring long, irregular work hours with more on-call responsibilities than most other fellowships.³ Furthermore, while the result of solid organ transplant for patients is transformative and life-saving, the complexities of patient management and high incidence of patient mortality in the transplant and end-stage organ disease populations make transplant surgeons vulnerable to feelings of shame, guilt, and helplessness.¹²⁻¹⁵

In this study, we set out to assess the prevalence of burnout among abdominal transplant surgery fellows. We sought to identify predictors of burnout and to understand its impact on personal and patient care during fellowship. A better understanding of this process may help create initiatives to combat burnout and help cultivate more interest in pursuing a career in transplant surgery.

2 | METHODS

2.1 | Study population

This study was developed through the American Society of Transplant Surgeons (ASTS) Fellowship Training Committee. Study approval was granted from the ASTS Executive Council, and an electronic survey was distributed using Survey Monkey (www.surveymonkey.com). The survey was sent to all ASTS-accredited abdominal transplant surgery fellowship programs seeking the participation of all transplant surgery fellows. Participation was voluntary and all results were anonymous with no information linking a response to an individual fellow or training program. The survey tool was distributed from October to November 2019 to allow sufficient time to

elapse since the start of the academic year and to permit both the junior and senior fellows to adjust to their new roles.

2.2 | Survey instrument

The survey tool consisted of 34 study-specific questions developed to obtain individual sociodemographic characteristics, training program information, and an understanding of one's work-life balance. Questions were presented as a combination of multiple choice, 5-point Likert scale, or yes/no. Additionally, 3 previously validated survey tools to assess burnout, grit, and happiness were used.

Burnout was assessed using the Maslach Burnout Inventory Human Services Survey, which gauges the frequency one feels specific emotions to determine levels of EE, DP, and PA. A 7-point Likert scale is used, ranging from 0 (never) to 6 (every day), and the subscale scores are converted to ordinal categories of low, moderate, or high. For the purposes of our study, "burnout" criteria were determined by having 2 of the following 3 based on previously published work: high EE (≥ 27), high DP (≥ 13), or low PA (≤ 31).^{1,16,17}

The 8-item grit scale was used to measure an individual's grit, or their perseverance and passion for long-term goals.^{18,19} This score ranged between 1 (low) and 5 (high). The 4-item Subjective Happiness Scale (SHS) was used to measure global happiness compared with the general population on a scale of 1 (not very happy) to 7 (very happy) with the average happiness level for a working adult being 5.6.²⁰

2.3 | Objectives and statistical analysis

The primary objective was to determine predictors of burnout. The secondary objective was to evaluate the effects of burnout. Outcomes were assessed based on whether a fellow exhibited burnout. Continuous variables are represented as median and IQR. Categorical variables are represented as a percentage of the population (n%). Analyses were performed using the Fisher exact test for categorical variables and Kruskal-Wallis test for continuous variables. Statistical significance was set at $P < .05$. Approval from the University of Cincinnati Institutional Review Board was obtained prior to the study (IRB No. 2018-7527).

3 | RESULTS

3.1 | Demographics

During the 2019-2020 academic year, 71 junior fellows and 59 senior fellows were training in ASTS-accredited abdominal transplant fellowships. The voluntary survey was completed by 41 junior fellows (57.7%) and 43 senior fellows (72.9%). Three junior fellows and 4 senior fellows did not complete the entire survey and were therefore excluded from the analysis for an overall response rate of 59.2%. Demographics of the overall cohort can be found in Table 1.

Among respondents, 64.9% were male and the median age of the cohort was 34 years old (IQR 33-37 years). Fifty-two fellows completed residency in either the US or Canada, and 25 completed residencies in another country. The median grit score was 3.9 (IQR 3.5-4.1), and the median happiness score was 5.3 (IQR 4.5-6.3). Overall, 22.7% (n = 17) of fellows met criteria for burnout. The median EE score was 21 (moderate, IQR 12-31), median DP score was 5 (low, IQR 2-11), and median PA score was 40 (high, IQR 33-44).

3.2 | Predictors of burnout

Predictors of burnout were categorized into 3 domains: individual attributes, program-dependent, and personal-life/self-care. Regarding individual attributes, no differences were seen based on sex, age, fellowship year, country of surgical residency, or relationship status (Table 2). Fellows with lower grit scores (3.6, IQR 3.1-4.0) were more likely to exhibit burnout compared with fellows with higher scores (4.0, IQR 3.6-4.3; $P = .026$). While not significant, there was a trend toward higher burnout in fellows who had children compared with those who did not (64.7% vs 41.4% respectively, $P = .105$).

A number of program-dependent variables impacted burnout (Table 3). A higher portion of fellows with burnout experienced severe work-related stress compared with those without burnout

TABLE 1 Demographics of participating transplant surgery fellows

Transplant fellow information (n = 77)	n (%) / median (IQR)
Gender	
Male	50 (64.9%)
Female	27 (35.1%)
Age	34 (33-37)
Fellowship year	
1 (Junior)	38 (49.4%)
2 (Senior)	39 (50.6%)
Country of surgical residency	
US/Canada	52 (67.5%)
Foreign	25 (32.5%)
Region of residency program	
Northeast	18 (23.3%)
Southeast	15 (19.5%)
Midwest	20 (26.0%)
Southern Central	7 (9.1%)
West	12 (15.6%)
Canada	5 (6.5%)
Grit score	3.9 (3.5-4.1)
Subjective happiness score	5.3 (4.5-6.3)
Burnout	17 (22.7%)
Emotional exhaustion	21 (12-31)
Depersonalization	5 (2-11)

(58.8% vs 22.4%, $P = .01$). The fellows with burnout reported that their programs were less likely to follow the ASTS Fellowship Managed Time Policy (58.8% vs 82.8%, $P = .048$) and were more likely to work >100 hours per week (58.8% vs 27.6%, $P = .023$). Relationships between fellows and program leadership also differed. Fellows with burnout were less likely to perceive their well-being as a priority to attendings (35.3% vs 75.9%, $P = .003$) and were less

TABLE 2 Predictors of transplant fellow burnout: individual attributes

Individual factors	No burnout	Burnout	P-value
Male	37 (63.8%)	11 (64.7%)	.945
Age (y)	34.5 (33-37)	33.5 (32-35.8)	.162
Fellowship year			
Senior	29 (74.4%)	10 (25.6%)	.589
Junior	29 (80.6%)	7 (19.4%)	
Country of residency			
US/Canada	39 (67.2%)	11 (64.7%)	.846
Foreign	19 (32.8%)	6 (35.3%)	
Relationship status			.524
Married	39 (67.2%)	13 (76.5%)	
Divorced	1 (1.7%)	0 (0%)	
Nonmarried/committed	3 (5.2%)	0 (0%)	
Single	15 (25.9%)	4 (23.5%)	
Has children	24 (41.4%)	11 (64.7%)	.105
Grit score	4.0 (3.6-4.3)	3.6 (3.1-4.0)	.026

Bold indicates significance ($P < .05$).

TABLE 3 Predictors of transplant fellow burnout: programmatic

Programmatic factors	No burnout	Burnout	P-value
Work > 100 h/wk	16 (27.6%)	10 (58.8%)	.023
Follows ASTS managed time policy	48 (82.8%)	10 (58.8%)	.048
Work-related stress level			.010
Severe	13 (22.4%)	10 (58.8%)	
Moderate	35 (60.3%)	7 (41.2%)	
Mild	10 (17.2%)	0 (0%)	
Well-being perceived as important to attendings	44 (75.9%)	6 (35.3%)	.003
Worried about limited job opportunities	45 (77.6%)	16 (94.1%)	.169
Program provides wellness education	27 (46.6%)	4 (23.5%)	.082
Comfortable discussing needs with PD	45 (77.6%)	9 (52.9%)	.047

Abbreviations: ASTS, American Society of Transplant Surgeons; PD, program director.

Bold indicates significance ($P < .05$).

comfortable discussing their personal needs with their program director (52.9% vs 77.6%, $P = .047$). Finally, while there was no correlation with burnout, <50% of fellows reported that their transplant fellowship provided education on wellness and >75% of fellows were concerned about limited job opportunities following fellowship.

There were fewer differences between fellows with and without burnout with regard to personal life factors (Table 4). Among the fellows with children, 50% ($n = 5$) of fellows with burnout thought their commitment to raising children interfered with their job as opposed to 12.5% ($n = 3$) of fellows without burnout. Additionally, burnout was associated with the perception that one's work schedule did not allow time for personal and home life matters (27.6% vs 0%, $P = .016$). While there was no correlation with burnout, the life of a transplant fellow appeared to leave little time for exercise, stress reduction, or financial planning. Less than 30% of fellows exercise more than twice a week, <41% have a long-term financial plan, and < 40% partake in stress reducing activities outside of work. The 3 greatest stressors identified were work/life balance, job security, and finances.

3.3 | Burnout realized

The effect of burnout on transplant surgery fellows was categorized as either work related or personal life outcomes (Table 5). Fellows who met criteria for burnout were more likely to have made a major medical error in the past 3 months (35.3% vs 5.2%, $P = .003$) and were more likely to have considered dropping out of fellowship (94.1% vs 20.7%, $P < .001$). Conversely, fellows without burnout

enjoyed coming to work each day (88.5% vs 35.3%, $P = .002$) and were more likely to be friends with their co-workers (77.6% vs 52.9%, $P = .047$).

TABLE 5 The effects of burnout on transplant surgery fellows

Effects of burnout	No burnout	Burnout	P-value
Work-related outcomes			
Made a major medical error in past 3 mo	3 (5.2%)	6 (35.3%)	.003
Considered dropping out of fellowship	12 (20.7%)	16 (94.1%)	<.001
Enjoy coming to work each day	46 (88.5%)	6 (35.3%)	.002
Am friends with co-workers	45 (77.6%)	9 (52.9%)	.047
Personal life outcomes			
How i resolve work/personal conflicts			.048
In favor of work	31 (53.5%)	10 (58.8%)	
In favor of personal	2 (3.5%)	3 (17.7%)	
Resolve to meet both	25 (43.1%)	4 (23.5%)	
Whose career took priority with conflict			.026
Fellow's career	22 (52.4%)	11 (84.6%)	
Spouse's career	0 (0%)	1 (7.7%)	
Have not had conflict	14 (33.3%)	1 (7.7%)	
Spouse does not work	6 (14.3%)	0 (0%)	
Had an annual physical past 12 mo	22 (37.9%)	3 (17.7%)	.151
Saw dentist in past 12 mo	25 (43.1%)	5 (29.4%)	.403
Weight changes			.001
Gained weight	16 (27.6%)	7 (41.2%)	
Weight stayed same	33 (56.9%)	2 (11.8%)	
Lost weight	9 (15.5%)	8 (47.1%)	
Taken time off for illness	1 (1.7%)	4 (23.5%)	.008
Missed major life event	40 (69.0%)	15 (88.2%)	.134
Subjective happiness score	5.8 (4.9-6.5)	4 (2.9-5)	<.001
Below average happiness	27 (47.4%)	15 (88.2%)	.004

Bold indicates significance ($P < .05$).

TABLE 4 Predictors of transplant fellow burnout: personal life

Personal life factors	No burnout	Burnout	P-value
Commitment to raising children interferes with job	3 (12.5%)	5 (50%)	.031
Schedule leaves time for personal time	16 (27.6%)	0 (0%)	.016
Has a PCP	19 (32.8%)	6 (35.3%)	.846
Exercise > 2 d/wk	17 (29.3%)	2 (11.8%)	.121
Has a long-term financial plan	19 (32.8%)	7 (41.2%)	.569
Partakes in stress reduction activities	23 (39.7%)	5 (29.4%)	.572
Current highest stressor			.469
Job security	22 (37.9%)	4 (23.5%)	
Work/life balance	20 (34.5%)	8 (47.1%)	
Academic Obligations	5 (8.6%)	0 (0%)	
Finances	8 (13.8%)	4 (23.5%)	
Family obligations	3 (5.2%)	1 (5.9%)	

Abbreviation: PCP, primary care physician.

Bold indicates significance ($P < .05$).

In terms of the impact on a fellow's personal life, fellows with burnout resolved conflict at home with different outcomes compared with fellows without burnout. There was a significant difference in weight change between groups, with 56.9% of fellows without burnout maintaining weight compared with 11.8% with burnout ($P = .001$). Additionally, 47.1% of fellows with burnout lost weight while 41.2% gained weight compared with 15.5% and 27.6% in fellows without burnout, respectively. Of the fellows with burnout, 23.5% took time off for an illness during fellowship compared with 1.7% for those without burnout ($P = .008$). While not significant across groups, <50% of fellows in the entire cohort saw a primary care physician or underwent a dental exam in the previous year. Additionally, >65% of fellows in both groups had missed a major life event, such as a wedding or funeral of a close family member or friend, since starting fellowship. Fellows without burnout were happier than those with burnout (SHS median score 5.8, IQR 4.9-6.5 vs 4, IQR 2.9-5, respectively; $P < .001$).

4 | DISCUSSION

This is the first national study to evaluate the prevalence of burnout among abdominal transplant surgery fellows and describes factors that may be associated with and/or be the result of burnout. Nearly 25% of fellows surveyed met criteria for burnout. Fellows with burnout were more likely to have personal and programmatic challenges compared with those without burnout. While only a minority of fellows exhibited burnout, the consequences were quite alarming. Burnout was associated with thoughts of attrition, medical errors, and poor health. In general, transplant fellows reported low frequencies of regular exercise, annual health checkups, and long-term financial planning. The majority of transplant fellows had missed important life events among their friends and family. These findings, in conjunction with the high rates of burnout among transplant attendings,^{8,21} suggest that interventions during fellowship geared towards well-being and stricter adherence to the managed time policy by programs could play a significant role in mitigating burnout and improving quality of life, not only during training but also as fellows transition into practice.

The concept of burnout in the field of transplant surgery is not a new realization. While burnout and wellness among attending transplant surgeons has been examined, this is the first study to evaluate burnout among transplant surgery fellows. Transplant surgeons continue to have one of the highest overall satisfaction rates in their choice of career, however burnout among transplant surgeons remains high (39.8%).^{6,22} A recent study of 218 transplant surgeons found that 40.1% reported high levels of EE, 17.1% reported high levels of DP, and 46.5% reported low PA.³ In addition to the personal impact of burnout, these high levels were associated with poor quality of patient care, an increase in medical errors, thoughts of attrition from the field,²³ and increased healthcare costs.²⁴ A study examining burnout among German clinicians revealed that patients' perception of quality of care was lower for those surgeons with burnout compared with those without burnout.²⁵ Another study found that among surgeons who reported making a medical error in the previous 3 months,

70% attributed the error to individual factors. More importantly, the likelihood of reporting an error increased by 11% for every 1-point increase in depersonalization and by 5% for every 1-point increase in emotional exhaustion.²⁶ This is consistent with our study, which identified that 35% of fellows with burnout reported a major medical error in the previous 3 months. These rates are unacceptably high, and every effort should be made to reduce burnout among transplant surgery fellows to improve the quality of patient care.

As burnout is studied in a more rigorous manner, associated factors have become better understood. Protective factors include marital satisfaction and participation in family life, while the demand of caring for an ill family member places one at risk for burnout.²¹ Although prior studies found no difference in burnout based on having children, our study showed higher rates of burnout among fellows with children who thought their commitment to raising children interfered with their job. One proposed reason may be financial hardship associated with child care on a fellow salary. Jesse et al found that difficulties with flexible childcare lead to higher rates of EE among transplant attendings.²⁷ The demands of a transplant fellowship may magnify these difficulties, often leaving a spouse to function as a single parent. These findings are further complicated by the high proportion of international medical graduates among abdominal transplant surgery fellows, 60% in 2016, who may not have the family support in the US or social network to provide help when needed.²⁸ Program-level initiatives as well as resource development by the transplant surgical societies should focus on providing fellows with assistance to meet work demands while allowing them to provide adequate child and familial support. In addition to mitigating fellow and surgeon EE, innovative approaches to redefine schedule demands of the transplant surgeon and allow for family care are necessary to maintain a pipeline of diverse applicants into the profession.

A unique aspect of transplant surgery is the need for teams, often led by transplant surgery fellows travelling to recover organs. Procurement travel is time consuming and often occurs at times beyond a typical workday. Furthermore, travel requirements have led to transplant surgery being deemed one of the riskiest jobs in medicine. This unique stress of time and risk is a source of emotional distress that may contribute to the overall burnout of transplant fellows.²⁹ In a study surveying transplant surgeons, 15% reported at least 1 travel-related accident, with a reported 11 fatalities and 61 accidents in all.²⁹ Additionally, only 16% of respondents felt very safe while traveling. Multiple solutions have been proposed to help reduce this risk, which could potentially mitigate some of the burnout seen in the field. Noncommercial flights, when compared with commercial flights, have higher fatal accident rates and often need to meet less stringent criteria to fly. Ensuring that flights meet proper Federal Aviation Administration criteria and that pilots have adequate training and use a 2-pilot system may reduce the risk associated with flyout procurements.³⁰ Additionally, procurements performed locally, by the closest transplant center, have been shown to decrease the risk associated with travel.^{29,31} Yet, recent changes in liver allocation have actually broadened the sharing of organs and may have the opposite impact, increasing the hours spent procuring and the number of flyouts required by transplant surgery fellows.^{32,33}

Prolonged work hours are ubiquitous across multiple surgical subspecialties and have been associated with higher rates of burnout^{4,5,22} While few studies have examined burnout in other US surgical fellowships, a study evaluating burnout in vascular surgery found that fellows and residents who violated duty hours experienced higher rates of burnout.³⁴ Feelings of EE may be related to inadequate time to spend with family and friends or attend to health and personal needs. A survey of 7905 surgeons found that only 36% thought their work schedule allowed enough time for personal and family life.³⁵ Problematic work-life integration begins in surgical training, as demonstrated in a study assessing general surgery residents that found that 54% lacked maintenance healthcare visits, 44% had undesired weight gain, 75% worried about their finances, and 92% thought their work-related stress was moderate to severe.³⁶ We demonstrated that these concerns persist into transplant fellowship, as less than 40% of fellows had an annual physical or dentist appointment in the prior year and 30% reported weight gain during fellowship. Additionally, only 34% claimed to have a long-term financial plan, and 84% had moderate to severe work-related stress. Wellness programs and protected personal time to allow residents and fellows to manage their own health needs could mitigate burnout. Early implementation of financial education, perhaps in medical school and reinforced throughout residency and fellowship, could relieve stress associated with debt and delayed income.

Emerging areas in the study of physician burnout are moral injury and second victim syndrome (SVS). Moral injury was initially described in the combat veteran population but has been depicted in healthcare workers who attempt to put patients first and follow the oath of "do no harm" but may be hindered by systemic issues beyond their control.^{37,38} SVS describes the guilt, anxiety, depression, shame, or loss of confidence physicians can develop after an unexpected, negative patient outcome.^{12,14} Physicians in all fields experience these emotional and psychological experiences, but their frequency and severity may be exacerbated in the field of transplant surgery. Moral injury may come from the process of organ distribution. Fellows and surgeons develop relationships with patients in need of an organ, knowing that the only means to a cure is a transplant. Yet, this process falls out of the jurisdiction of the physician and instead is at the mercy of the next organ offer. The degree of moral injury may also be intensified if patients die while on the waitlist, making the physicians helpless.

The complexities and inherent risks of operating on patients with organ failure or in an immunocompromised state may lead to higher rates of SVS, with complications or deaths causing severe psychological repercussions for providers. Increasing awareness of this psychological impact may be a necessary step in reducing burnout, but further efforts should be entertained. Several groups have recently put forth novel solutions to address SVS. The Resident Wellness Consensus Summit, held in 2017, recommended 3 steps to combat SVS: (1) modules to expose residents and fellows to the concept and introduce preventative and coping mechanisms, (2) training to help recognize SVS in coworkers and address mistakes or poor outcomes immediately after they occur, and (3) creation of department-wide

prevention with culture changes and routine group debriefings after difficult situations.³⁹ The group additionally recommended implementing mindfulness and meditation into residency programs and introducing a paradigm shift from traditional feedback to positive psychology. Focusing on individuals' strengths rather than weaknesses not only decreases depressive symptoms and improves well-being, but it can also improve team communication, resident and fellow comradery, and program morale.⁴⁰⁻⁴² Finally, the ASTS Wellness Task Force is establishing a peer support network for ASTS members, whereby volunteer members will be trained and available to provide support and counseling for their colleagues on a 24-hour/7-day basis.

There are several potential limitations of our study. First, this survey was voluntary, so the study may have an element of selection bias because those suffering from the highest degree of burnout may not participate in the study. Second, the timing of the administration of the survey may affect burnout, as there may be a relationship between burnout rates and time throughout the academic year. Additionally, burnout rates may vary based on a fellow's rotation assignment or the nature of the institution's transplant service. However, the large nation-wide sample helps to minimize the confounding impact of some of these factors. Finally, the overall number of fellows is small, but our study had high response rates with fellows from every region represented.

In summary, this national analysis of abdominal transplant fellows revealed that 1 in 5 fellows reported burnout, and all fellows seem to sacrifice their own self-care for patient-care duties. We identified personal and program-related factors that may attribute to burnout and described the unacceptable effects of burnout on patient care. Given the high rates of burnout among practicing transplant surgeons, transplant societies and fellowship programs should develop interventions to give fellows the tools to prevent and combat burnout, moral injury, and SVS.

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DISCLOSURE

The authors of this manuscript have no conflicts of interest to disclose as described by the *American Journal of Transplantation*.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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REFERENCES

1. Cortez AR, Winer LK, Kassam A-F, et al. Exploring the relationship between burnout and grit during general surgery

- residency: a longitudinal, single-institution analysis. *Am J Surg*. 2020;219(2):322-327.
2. Elmore LC, Jeffe DB, Jin L, Awad MM, Turnbull IR. National survey of burnout among US general surgery residents. *J Am Coll Surg*. 2016;223(3):440-451.
 3. Jesse MT, Abouljoud M, Eshelman A. Determinants of burnout among transplant surgeons: a national survey in the United States. *Am J Transplant*. 2015;15(3):772-778.
 4. Balch CM, Shanafelt TD, Dyrbye L, et al. Surgeon distress as calibrated by hours worked and nights on call. *J Am Coll Surg*. 2010;211(5):609-619.
 5. Balch CM, Shanafelt TD, Sloan JA, Satele DV, Freischlag JA. Distress and career satisfaction among 14 surgical specialties, comparing academic and private practice settings. *Ann Surg*. 2011;254(4):558-568.
 6. Bertges Yost W, Eshelman A, Raoufi M, Abouljoud MS. A national study of burnout among American transplant surgeons. *Transplant Proc*. 2005;37(2):1399-1401.
 7. Williford ML, Scarlet S, Meyers MO, et al. Multiple-institution comparison of resident and faculty perceptions of burnout and depression during surgical training. *JAMA Surg*. 2018;153(8):705-711.
 8. Jesse MT, Shkokani L, Eshelman A, De Reyck C, Abouljoud M, Lerut J. Transplant surgeon burnout and marital distress in the sandwich generation: the call for organizational support in family life. *Transplant Proc*. 2018;50(10):2899-2904.
 9. Quillin RC 3rd, Pritts TA, Hanseman DJ, Edwards MJ, Davis BR. How residents learn predicts success in surgical residency. *J Surg Educ*. 2013;70(6):725-730.
 10. Borman KR, Vick LR, Dattilo JB, Tarpley JL, Mitchell ME. Factors in fellowship selection: effect of services and fellows. *J Surg Res*. 2009;154(2):274-278.
 11. Quillin RC III CA, Bongu A, Halazun K, et al. The transplant surgery pipeline. *Am J Transplant*. 2018;18 Suppl 2(18th Annual State of the Art Winter Symposium):13-14.
 12. Heiss K, Clifton M. The unmeasured quality metric: burn out and the second victim syndrome in healthcare. *Semin Pediatr Surg*. 2019;28(3):189-194.
 13. Mitzman J, Jones C, McNamara S, Stobart-Gallagher M, King A. Curated collection for educators: five key papers about second victim syndrome. *Cureus*. 2019;11(3):e4186.
 14. Marmon LM, Heiss K. Improving surgeon wellness: the second victim syndrome and quality of care. *Semin Pediatr Surg*. 2015;24(6):315-318.
 15. Rozario D. Burnout, resilience and moral injury: how the wicked problems of health care defy solutions, yet require innovative strategies in the modern era. *Can J Surg*. 2019;62(4):E6-E8.
 16. Kassam AF, Cortez AR, Winer LK, Kuethe JW, Athota KP, Quillin RC 3rd. The impact of medical student interest in surgery on clerkship performance and career choice. *Am J Surg*. 2020;219(2):359-365.
 17. Cortez AR, Winer LK, Kassam AF, Kuethe JW, Athota KP, Quillin RC 3rd. The impact of medical student burnout on surgery clerkship performance. *J Surg Educ*. 2019;76(5):1241-1247.
 18. Duckworth AL, Peterson C, Matthews MD, Kelly DR. Grit: perseverance and passion for long-term goals. *J Pers Soc Psychol*. 2007;92(6):1087-1101.
 19. Duckworth AL, Quinn PD. Development and validation of the short grit scale (grit-s). *J Pers Assess*. 2009;91(2):166-174.
 20. Subjective CM, Scale H. *Encyclopedia of quality of life and well-being research*. Michalos AC, ed. Dordrecht: Springer, Netherlands; 2014:6420-6423.
 21. Jesse MT, Abouljoud M, Eshelman A, De Reyck C, Lerut J. Professional interpersonal dynamics and burnout in European transplant surgeons. *Clin Transplant*. 2017;31(4):e12928.
 22. Balch CM, Shanafelt TD. Burnout among surgeons: whether specialty makes a difference. *Arch Surg*. 2011;146(4):385-386.
 23. Balch CM, Shanafelt T. Combating stress and burnout in surgical practice: a review. *Adv Surg*. 2010;44:29-47.
 24. Han S, Shanafelt TD, Sinsky CA, et al. Estimating the attributable cost of physician burnout in the United States. *Ann Intern Med*. 2019;170(11):784-790.
 25. Klein J, Grosse Frie K, Blum K, von dem Knesebeck O. Burnout and perceived quality of care among German clinicians in surgery. *Int J Qual Health Care*. 2010;22(6):525-530.
 26. Shanafelt TD, Balch CM, Bechamps G, et al. Burnout and medical errors among American surgeons. *Ann Surg*. 2010;251(6):995-1000.
 27. Lindemann J, Dageforde LA, Brockmeier D, et al. Organ procurement center allows for daytime liver transplantation with less resource utilization: may address burnout, pipeline, and safety for field of transplantation. *Am J Transplant*. 2019;19(5):1296-1304.
 28. Schlottmann F, Gerber DA, Patti MG. International medical graduates and unfilled positions in abdominal transplant surgery fellowships in the United States. *Transpl Int*. 2018;31(5):566-567.
 29. Englesbe MJ, Merion RM. The riskiest job in medicine: transplant surgeons and organ procurement travel. *Am J Transplant*. 2009;9(10):2406-2415.
 30. Renz JF. How can we improve procurement air travel safety? *Liver Transpl*. 2010;16(12):1345-1351.
 31. Englesbe MJ, Shah S, Cutler JA, et al. Improving organ procurement travel practices in the United States: proceedings from the Michigan Donor Travel Forum. *Am J Transplant*. 2010;10(3):458-463.
 32. Goldberg D. An opposing view to United States liver allocation problems with broader sharing. *Curr Opin Organ Transplant*. 2020;25(2):110-114.
 33. Leventhal TM, Florek E, Chinnakotla S. Changes in liver allocation in United States. *Curr Opin Organ Transplant*. 2020;25(1):52-58.
 34. Janko MR, Smeds MR. Burnout, depression, perceived stress, and self-efficacy in vascular surgery trainees. *J Vasc Surg*. 2019;69(4):1233-1242.
 35. Shanafelt TD, Balch CM, Bechamps GJ, et al. Burnout and career satisfaction among American surgeons. *Ann Surg*. 2009;250(3):463-471.
 36. Yoo PS, Tackett JJ, Maxfield MW, Fisher R, Huot SJ, Longo WE. Personal and professional well-being of surgical residents in New England. *J Am Coll Surg*. 2017;224(6):1015-1019.
 37. Meador KG, Nieuwsma JA. Moral injury: contextualized care. *J Med Humanit*. 2018;39(1):93-99.
 38. Dean W, Talbot S, Dean A. Reframing clinician distress: moral injury not burnout. *Fed Pract*. 2019;36(9):400-402.
 39. Chung A, Smart J, Zdradzinski M, et al. Educator toolkits on second victim syndrome, mindfulness and meditation, and positive psychology: the 2017 resident wellness consensus summit. *West J Emerg Med*. 2018;19(2):327-331.
 40. Sin NL, Lyubomirsky S. Enhancing well-being and alleviating depressive symptoms with positive psychology interventions: a practice-friendly meta-analysis. *J Clin Psychol*. 2009;65(5):467-487.
 41. Lauria MJ, Rush S, Weingart SD, Brooks J, Gallo IA. Potential role for psychological skills training in emergency medicine: part 1 - Introduction and background. *Emerg Med Australas*. 2016;28(5):607-610.
 42. Bolier L, Haverman M, Westerhof GJ, Riper H, Smit F, Bohlmeijer E. Positive psychology interventions: a meta-analysis of randomized controlled studies. *BMC Public Health*. 2013;13:119.

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