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Meta-Analysis of Surgeon Burnout Syndrome and Specialty Differences

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Abstract

OBJECTIVE—Surgeon burnout compromises the quality of life of physicians and the delivery of care to patients. Burnout rates and interpretation of the Maslach Burnout Inventory (MBI) complicates the interpretation of surgeon burnout. The purpose of this study is to apply a standardized interpretation of severe surgeon burnout termed, “burnout syndrome” to analyze inherent variation within surgical specialties.

DESIGN—A systematic literature search was performed using MEDLINE, PsycINFO, and EMBASE to identify studies reporting MBI data by surgical specialty. Data extraction was performed to isolate surgeon specific data.

SETTING—A meta-analysis was performed.

RESULTS—A total of 16 cross-sectional studies were included in this meta-analysis, totaling 3581 subjects. A random effects model approximated burnout syndrome at 3.0% (95% CI: 2.0%–5.0%; $I^2 = 78.1\%$). Subscale analysis of emotional exhaustion, depersonalization, and personal accomplishment indicated subscale burnout in 30.0% (CI: 25.0%–36.0%; $I^2 = 93.2\%$), 34.0% (CI: 25.0%–43.0%; $I^2 = 96.9\%$), and 25.0% (CI: 18.0%–32.0%; $I^2 = 96.5\%$) of surgeons, respectively. Significant differences ($p < 0.001$) in MBI subscale scoring existed among surgical specialties.

CONCLUSIONS—Approximately 3% of surgeons suffer from extreme forms of burnout termed “burnout syndrome,” although surgeon burnout may occur in up to 34% of surgeons, characterized by high burnout in 1 of 3 subscales. Surgical specialties have significantly different rates of burnout subscales. Future burnout studies should target the specialty-specific level to understand inherent differences in an effort to better understand methods of improving surgeon burnout.

Keywords

burnout; quality of life; surgeons

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SUPPORTING INFORMATION

Supplementary data associated with this article can be found in the online version at <http://dx.doi.org/10.1016/j.jsurg.2018.02.003>. departmental leaders. *J Bone Joint Surg.* 2007;89: 896-903.

ACGME COMPETENCIES

Systems based practice; Medical knowledge

INTRODUCTION

A career in surgery is associated with demanding hours in a high-stress environment, but recent criticisms of pursuing a career in surgery include unprecedented scrutiny of outcomes, decreasing autonomy with increasing regulations for surgical residents, and a struggle to maintain work-life balance.¹⁻³ These factors contribute to a high levels of surgeon burnout, a phenomenon characterized by emotional exhaustion, cynicism, and reduced feelings of PA.⁴ Surgeon burnout not only compromises quality of life and relationships in the physician's personal life, but also influences the delivery of compromised medical care resulting in increased errors and patient dissatisfaction.^{5,6}

The Maslach Burnout Inventory (MBI) is the gold standard for assessing surgeon burnout across 3 subscales: emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA).⁴ Despite having a validated assessment tool, significant variation in interpreting subscale scoring, appropriate cutoffs, and dichotomous classification of burnout hinders large-scale characterization in the surgical community.⁷ Depending on use and interpretation of the MBI, rates range markedly from as low as 2% with strict criteria to 56% with more lenient criteria for burnout classification.^{8,9}

Even with widespread attention in the last decade, both attrition and burnout remain serious issues threatening the future of the field. To better characterize burnout among surgeons and surgical specialties, we provide a comprehensive and quantitative meta-analysis of available data. The purpose of this study is to better understand the gap in knowledge regarding the current variability in literature-defined burnout, to integrate current data through a standardized interpretation of burnout syndrome, and to analyze inherent variation within surgical specialties in order to aid in future investigation and development of targeted interventions to improve the quality of life of surgeons.

MATERIALS AND METHODS

Study Selection

An OVID electronic search of studies listed in MEDLINE, PsycINFO, and EMBASE databases (Supplemental Fig. 1) was conducted. Search terms included: "quality of life," "burnout," "surgeon," "surgical specialty," and "United States" using medical subject headings (Supplemental Table 1). Inclusion criteria were English manuscripts published between January 1980 and July 2015 that used the MBI as the primary assessment tool to evaluate burnout in the United States; only studies that provided specialty-specific data were included. Excluded studies included those with medical students and other health professionals. Studies with both surgeon and nonsurgeon data underwent surgeon specific data extraction. The references to each article meeting inclusion criteria were reviewed to ensure relevant articles not captured within the aforementioned search were identified. The

term “surgeon” was defined as residents in-training and attending physicians trained in a “surgical specialty” including: obstetrics and gynecology (Ob/Gyn), otolaryngology (ENT), orthopedic, general, plastic, surgical oncology, pediatric, neurosurgery, transplant, trauma, breast, endocrine, cardiothoracic, vascular, urology, and colorectal surgery. Individual title, abstract, and full manuscript review, and data extraction was completed independently by 2 reviewers (M.P. and M.S.), discrepancy for inclusion was reconciled by both parties. Establishing data homogeneity and data validation was completed by a third party (A.J.B. and A.K.H.).

Maslach Burnout Inventory

The MBI is the most commonly used and validated method for measuring burnout among healthcare professionals.⁴ Three independent subscales, or dimensions, within the MBI include EE, DP, and PA. EE reflects the perception of being emotionally overextended by one’s work, DP measures cynicism toward recipients of one’s services, and PA assesses feelings of personal satisfaction and sense of achievement in relation to one’s work. Scores are generated for each individual subscale and can be categorized into “low,” “moderate,” and “high.” Dimensions of burnout can be described by a high degree of EE (> 30), high degree of DP (> 12), or low sense of PA (< 33).⁴

Statistical Analysis

Statistical analysis was completed using R 3.2.0.¹⁰ The proportion of surgeons experiencing burnout within one or more subscales and the corresponding 95% CI were gathered from each study. Meta-analyses employed the use of random effects models with all studies meeting explicitly defined criteria. Results are reported as weighted mean proportions with statistical significance defined at a level of $p < 0.05$ and heterogeneity among pooled studies evaluated with I^2 . Pearson correlation coefficients (r) are provided to assess the linear association between subscales. Subgroup analyses for surgical specialty was compiled using generalized linear models.

Outcomes

Primary endpoints were derived from the MBI assessment tool and used to characterize burnout syndrome, analyze individual subscales, and perform comparative analysis by specialty. Burnout syndrome was defined as being high-risk for burnout in each of the 3 subscales concurrently. The concept of “burnout syndrome”, a dichotomous classification based on meeting criteria in each of the 3 individual MBI subscales concurrently, is a concept adapted by the authors, which was not the original intended use of the MBI tool.¹¹

RESULTS

Included Study Characteristics

A total of 16 cross-sectional studies met inclusion criteria, generating a sample size of 3851 subjects (Table 1). Eight studies included residents/fellows ($n = 1819$).^{9,12–18} Eleven studies included attendings ($n = 2032$).^{8,9,17–25} Seven different surgical specialties were represented among the studies, including ENT, Ob/Gyn, orthopedic, general, neurosurgery, surgical oncology, and transplant. Eleven studies reported sex ($n = 3278$), with an average breakdown

of 78.2% males and 21.8% females.^{9,12–16,18,19,22,23} Eight studies reported age ($n = 1698$), yielding a mean age of 40.7 years.^{8,9,13,15,16,19,21,25} Due to single studies representing surgical specialties, four specialties were grouped into a single “other” category for subsequent analysis that included data from general surgery, surgical oncology, transplant surgery, and neurosurgery.

Overall Burnout

Thirteen studies assessed overall burnout among surgeons, including a total of 3385 subjects.^{8,9,13–19,21–23,25} Meta-analyses using a random effects model demonstrated burnout syndrome at a rate of 0.03 (95% CI: [0.02, 0.05]); statistical heterogeneity was significant ($I^2 = 78.1\%$; Fig. 1).

The 3 dimensions of burnout were individually evaluated with separately performed meta-analyses. EE analysis included 16 studies with a total of 3851 subjects (Fig. 2).^{8,9,12–25} The rate of high EE was 0.30 (95% CI: [0.25, 0.36]; $I^2 = 93.2\%$) and the mean subscale score was 22.5 (standard deviation, SD = 5.9). For both DP (Fig. 3) and PA (Fig. 4) dimensions, 13 studies were included with a total of 3385 subjects.^{8,9,13–19,21–23,25} The rate of high DP was 0.34 (95% CI: [0.25, 0.43]; $I^2 = 96.9\%$) with a mean subscale score of 8.5 (SD = 3.5) and the rate of low PA was 0.25 (95% CI: [0.18, 0.32]; $I^2 = 96.5\%$) with a mean subscale score of 38.3 (SD = 4.0). Significant statistical heterogeneity ($I^2 > 90.0\%$) existed in each of the 3 individual subscale meta-analyses.

Correlations Between Subscales

Correlations were evaluated between each of the 3 MBI subscales. EE was strongly correlated with DP ($r = 0.85$) and moderately correlated with PA ($r = -0.43$). DP and PA also demonstrated a modest correlation ($r = -0.38$).

Specialty Specific Burnout

Five studies assessed burnout rate among ENT surgeons ($n = 1294$),^{8,15,17,20,25} 4 studies assessed Ob/Gyn's ($n = 669$),^{13,14,16,21} and 3 studies evaluated orthopedists ($n = 700$).^{9,18,24} Single studies evaluated general surgeons ($n = 156$),¹² neurosurgeons ($n = 85$),²² transplant surgeons ($n = 209$),¹⁹ and surgical oncologists ($n = 549$).²³

The mean score for EE was 17.7 (SD = 11.4) for ENT, 29.2 (SD = 11.5) for Ob/Gyn, 20.8 (SD = 10.9) for orthopedists, and 33.4 (SD = 5.7) for other. The mean score for DP was 5.6 (SD = 5.3) for ENT, 9.5 (SD = 5.0) for Ob/Gyn, 9.3 (SD = 6.0) for orthopedists, and 13.5 (SD = 3.5) for other. The mean score for PA was 37.6 (SD = 7.4) for ENT, 40.1 (SD = 8.0) for Ob/Gyn, 40.4 (SD = 5.7) for orthopedists, and 27.8 (SD = 5.9) for other (Table 2). Group comparative analysis (Table 3) demonstrated significant differences among burnout subscales across specialties ($p < 0.001$). Rates of burnout in ENTs were significantly lower than all other specialties across all 3 subscales of burnout ($p < 0.001$). Of note, the combined group of “other” had significantly higher rates of burnout on all 3 subscales ($p < 0.001$).

CONCLUSIONS

Surgeon burnout and declining quality of life threaten the wellbeing of present and future surgeons. Despite widespread attention, the current understanding of burnout syndrome and burnout based on distinct subscales of the MBI remains variable. Addressing burnout requires a thorough understanding of the associated risk and protective factors, as well as the inherent differences among surgical specialties. This meta-analysis attempted to quantify the presence of burnout syndrome among surgeons and to compare scores on burnout subscales among different specialties. In conducting this study with specialty specific MBI data, we find a high level of statistical heterogeneity, indicating significant variation across specialties. This inconsistency was observed in our strict, dichotomous definition of burnout syndrome, and it was also observed when individually analyzing each of the 3 MBI subscales of EE, DP, and PA.

The MBI assessment tool⁴ is considered the gold standard in evaluating burnout, but differences in the definition of burnout preclude most studies from being compared or combined. We sought to highlight the prevalence of the most severe form of burnout defined as burnout syndrome (high burnout in each of the 3 MBI subscales concurrently) among surgeons. This is a concept that is an adaptation of the original MBI tool and has not been explicitly validated in terms of combining the individual scales.¹¹ However, it provides a valuable estimation of individuals experiencing the most severe levels of burnout across all three dimensions concurrently. We found that approximately 3% of surgeons suffer from burnout syndrome, indicating combined feelings of low energy, cynicism, and questioning of personal competence.²⁶ Although the heterogeneity observed in this study renders a guarded interpretation of overall burnout syndrome, our rates are similar to limited, reported studies that met similar inclusion criteria.^{13,14,17,20,21} The severity of burnout syndrome may initially seem low, but extrapolating the 3% to the US surgeon workforce indicates an alarming 4000 practicing surgeons are simultaneously at the highest end of each burnout subscale concurrently.²⁷

Evaluation of each subscale independently identified that nearly 1 in 3 surgeons report high EE or DP, whereas 1 in 4 report a low sense of PA. Burnout rates cited in the literature are reported as high as 50% based on classification from a single burnout subscale dimension.²⁸ High scores in either EE or DP subscales, regardless of PA, have also been used in reporting burnout in surgeons, further complicating the interpretation. In addition, cutoffs for these scales vary and have been implemented in a way that may instead pathologize normal adaptive states, as proposed by Drolet et al.²⁹ It is imperative to standardize burnout reporting in literature to allow for consistency across surgical fields and to establish comparative analyses that can begin to identify surgical fields that foster more favorable burnout outcomes among surgeons. Documenting burnout based on a single subscale, or liberal criteria, may have unintentionally led to an overestimation of the true predictive power of the MBI.

The comparative analysis of surgical specialties identified significant differences in each of the dimensions of burnout. ENT surgeons demonstrated significantly decreased rates in all 3 MBI subscales compared to other surgical specialties. In comparison, general surgery,

neurosurgery, transplant surgery, and surgical oncology demonstrated significantly higher rates of burnout across all 3 dimensions. Ob/Gyn and orthopedic surgeons demonstrated relatively moderate levels of EE and DP compared to other specialties. The reported MBI subscale mean values can serve as a valuable aid in comparison of specialty-specific burnout in future studies.

Undoubtedly, surgical specialties vary in their demands, culture, and duration of training. Identifying factors associated with each field and how they are managed will allow for carefully tailored interventions to each unique specialty. Often implicated in burnout analysis is the impetus to limit work hours. However, simply placing a cap on the number of hours worked takes a global approach to a complex and heterogeneous problem among surgical specialties.³⁰ Alternative, well-established protective factors from burnout include camaraderie with peers, sense of clinical competency, autonomous clinical responsibility, and helpful social support systems.⁹ Other factors associated with increased burnout over time include nights on call, hours worked, and younger age.³¹ Understanding specialty-specific factors will allow for interdepartmental collaboration to harness the positive aspects of one specialty and incorporate them into those with higher rates of burnout. This study does not specifically focus on a specialty-specific solution to burnout but establishes a layout of the current status of various specialties.

Our study is the first to provide an overall quantitative assessment of burnout syndrome across multiple surgical specialties. However, this study is also subject to a number of limitations in both methodology and factors inherent to investigation of burnout. Studying burnout is largely cross-sectional and lacks the benefit of causality. In addition, many larger studies on surgeon burnout do not report specialty-specific data, and thus, were unable to be incorporated into our meta-analysis.^{5,28} The lack of specialty-specific data abstraction was the major limiting factor in sample size and resulted in underrepresentation of some surgical specialties, as well as an overrepresentation of specialties such as otolaryngology in our final analysis. Thus, this work may provide a more optimal design for comparing included specialties than for providing an overall estimate of burnout syndrome among every type of surgeon. Other limitations included pooling studies that are over a decade old, despite inevitable changes in the health care system and surgical training, and both resident and attending burnout data was combined.

Although prior large-scale studies are appealing, they miss the nuanced differences among varying surgical specialties. With large-scale studies representing the majority of burnout research, it is imperative to recognize the potential bias associated with single institution studies as groups may avoid publishing exceptionally high burnout rates of their surgeons and residents. We believe that this stigma is a major contributor to the limits of studying burnout, which is why future multi-institutional studies may potentially obviate this confounding factor as opposed to a comparison of specialties at a single institution. Our meta-analysis demonstrates a high level of variability across studies and specialties, supporting the call for specialty-specific studies with standardized interpretation of the MBI tool.

Even though burnout is the greatest predictor of career satisfaction,⁵ relatively few programs have been implemented to prepare surgeons to work to their maximum potential while maintaining a satisfying quality of life. As more research pertaining to surgeon burnout is performed, establishing a set definition and validation of burnout syndrome, along with consistent reporting of MBI sub-scales, will aid in guiding effective interventions and a more accurate assessment of burnout in the field. This work makes it clear that significant heterogeneity exists in burnout across surgical specialties that cannot be ignored. Rather than continuing with broad studies on burnout, the onus is on the leadership of hospitals, surgical societies, and residencies to better characterize burnout and associated factors, to learn from one another, and to ultimately improve surgeon quality of life in an effort to optimize delivery, quality, and longevity of care to patients.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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FIGURE 1.
Forest plot demonstrating burnout syndrome among surgeons.

FIGURE 2.
 Forest plot demonstrating high emotional exhaustion (EE) among surgeons.

FIGURE 3.
 Forest plot demonstrating high depersonalization (DP) among surgeons.

FIGURE 4.
 Forest plot demonstrating low personal accomplishment (PA) among surgeons.

TABLE 1

Studies Included in the Meta-Analysis

Author	Year	Number of Participants	Professional Level	Surgical Specialty	Mean Age (y)	Percentage Male
Antiel et al. ¹¹	2013	156	Residents	General surgery	Unknown	68
Becker et al. ¹²	2006	125	Residents	Ob/Gyn	29	20.8
Yost et al. ¹⁸	2005	209	Practicing MDs	Transplant	49	94
Fletcher et al. ¹⁹	2012	115	Practicing MDs	ENT	Unknown	Unknown
Gabbe et al. ²⁰	2002	119	Practicing MDs	Ob/Gyn	55	Unknown
Garza et al. ¹³	2004	368	Residents	Ob/Gyn	Unknown	29
Golub et al. ¹⁴	2007	684	Residents	ENT	31	79
Golub et al. ²⁴	2008	351	Practicing MDs	ENT	52	87
Govardhan et al. ¹⁵	2012	57	Residents	Ob/Gyn	30	8.8
Hill et al. ¹⁶	2009	24	Residents	ENT	Unknown	Unknown
		13	Faculty			
Johns et al. ⁸	2005	107	Practicing MDs	ENT	56	Unknown
Klimo et al. ²¹	2012	85	Practicing MDs	Neurosurgery	Unknown	96.5
Kuerer et al. ²²	2007	549	Practicing MDs	Surgical oncology	Unknown	80.3
Saleh et al. ²³	2009	195	Practicing MDs	Orthopedics	Unknown	Unknown
Sargent et al. ⁹	2004	21	Residents	Orthopedics	30	86
		25	Faculty		45	96
Sargent et al. ¹⁷	2009	384	Residents	Orthopedics	Unknown	88
		264	Faculty			92

ENT, otolaryngology; Ob/Gyn, obstetrics/gynecology; MDs, surgeons.

TABLE 2

Pooled Mean MBI Scores and Standard Deviations for Burnout Subscales Among Surgical Specialties

	ENT	Ob/Gyn	Orthopedic	Other
Emotional exhaustion	17.7 (11.4)	29.2 (11.5)	20.8 (10.9)	33.4 (5.7)
Depersonalization	5.6 (5.3)	9.5 (5.0)	9.3 (6.0)	13.5 (3.5)
Personal accomplishment	37.6 (7.4)	40.1 (8.0)	40.4 (5.7)	27.8 (5.9)

TABLE 3**Surgical Specialty Comparison by MBI Subscale**

	Specialty 1	Specialty 2	p Value
Emotional exhaustion	ENT	Ob/Gyn	<0.0001
	ENT	Orthopedic	0.0002
	ENT	Other	<0.0001
	Ob/Gyn	Orthopedic	<0.0001
	Ob/Gyn	Other	<0.0001
	Orthopedic	Other	<0.0001
Depersonalization	ENT	Ob/Gyn	<0.0001
	ENT	Orthopedic	<0.0001
	ENT	Other	<0.0001
	Ob/Gyn	Orthopedic	0.6724
	Ob/Gyn	Other	<0.0001
	Orthopedic	Other	<0.0001
Personal accomplishment	ENT	Ob/Gyn	0.0003
	ENT	Orthopedic	<0.0001
	ENT	Other	<0.0001
	Ob/Gyn	Orthopedic	0.7148
	Ob/Gyn	Other	<0.0001
	Orthopedic	Other	<0.0001