

# The Prevalence of Burnout in Limb Lengthening and Reconstruction Surgeons

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## ABSTRACT

**Aim:** To evaluate the level of burnout among international limb reconstruction surgeons.

**Background:** Burnout describes chronic workplace stress that has not been successfully managed. Limb reconstruction surgeons may be particularly at risk for burnout. The development of necessary skills and expertise has a steep learning curve and the patients are among the most complex in orthopaedics, with multiple failed surgeries and high complication rates.

**Methods:** An internet-based REDCap survey consisted of demographic questions, four open-ended questions, and two valid, reliable measures: (1) Patient Health Questionnaire 4 (PHQ-4)—a screening tool for anxiety and depression, and (2) The Maslach Burnout Inventory–Human Services Survey for Medical Personnel (MBI-HSS-MP) which measures levels of depersonalization, emotional exhaustion, and low personal achievement. The surveys were distributed to international limb reconstruction surgeons. Statistical analysis consisted of descriptive and non-parametric analysis: Chi-square and Kruskal–Wallis tests.

**Results:** There were 103 surgeon responses from at least one country of each of the six populated continents. Eighty-three percent of the respondents were male. The career level distribution was early (1–10 years' experience) = 51%, mid (11–20 years' experience) = 30%, and late (>20 years' experience) = 20%. Twenty-four percent stated they were currently being treated or had been treated in the past for mood or anxiety or both with medication or counselling. Based on the MBI-HSS-MP scores, 38% of limb reconstruction surgeons displayed burnout symptoms, and 16% exhibited severe burnout. The mid-career had the highest levels of overall burnout; there was no statistical significance between the groups. The PHQ-4 scores were within normal limits.

**Discussion:** In this study sample, 38% displayed burnout symptoms and 16% exhibited severe burnout. The mid-career group had the highest level of burnout.

**Clinical significance:** Unmanaged burnout can lead to major depression or suicidal ideation, or both. Support systems for limb reconstruction surgeons need to be developed and maintained.

**Keywords:** Burnout, Depression, Limb lengthening, Workplace stress.

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## INTRODUCTION

The introduction of the clinical term burnout is credited to psychoanalyst Herbert Freudenberger in the 1970s.<sup>1</sup> At the time, “burnout” was a slang term used to describe extreme drug use. While working long hours at a substance abuse clinic in New York city, he used the term to characterise his own state of work exhaustion. Since then, the term has become ubiquitous in healthcare. The unintended effect of its widespread use, however, is that the concept is losing impact to the point where some healthcare workers are burned out on burnout discussions. Additional terms have been proposed, such as moral injury or workplace ambivalence, to characterise stress in the workplace.<sup>2,3</sup> At any given time, an individual's level of burnout represents his or her location along the spectrum of stress. Recognizing burnout within yourself or your colleagues is critically important because, if left unchecked, progression along the spectrum towards major depression and eventually suicidal ideation will occur.

At its core, burnout is meant to describe chronic workplace stress that has not been successfully managed. It represents a mismatch between the demands on the individual and the individual's capacity to meet those demands. For physicians, this mismatch has been shown to influence the quality of care, patient safety, physician turnover, and patient satisfaction. One study

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demonstrated that physician burnout has been associated with 2.5 times increased odds of making medical mistakes.<sup>4</sup> In addition, physicians with burnout exhibit poorer professionalism with less empathy and more frequent displays of temper.<sup>5</sup>

Orthopaedic surgeons may be particularly vulnerable to developing burnout due to heavy workloads, long work hours, and challenging training programs. The Medscape 2023 orthopaedist lifestyle, happiness, and burnout report revealed that 30% of orthopaedic surgeons felt burnout, and 39% of those surgeons declared that burnout had a strong or severe impact on his or her life.<sup>6</sup> Perhaps more distressing were the findings in the 2022 study by Elkbuli et al., revealing that orthopaedic surgeons have the highest prevalence of death by suicide among all surgical subspecialties.<sup>7</sup>

Within orthopaedic surgery resides the subspecialty of limb lengthening and limb reconstruction (referred to herein as limb reconstruction). Surgeons who practice this subspecialty primarily may be at risk particularly for burnout. The skills required to develop expertise in the field take years of training and have a steep learning curve. Patients encountered are among the most complex in orthopaedics, often having undergone multiple failed surgeries before they reach the limb reconstruction surgeon. Limb reconstruction frequently encompasses long surgeries that may need multiple stages. In addition, due to the multifactorial nature of patient presentations and the current management options, there is often a high complication rate. This combination of stressors is the perfect recipe for developing burnout. To date, there has not been an examination of the burnout rate among limb reconstruction surgeons to assess the relative risk within this subspecialty. The purpose of this study was to evaluate the level of burnout among international limb reconstruction surgeons.

**METHODS**

After obtaining institutional review board approval, an anonymous, secure, internet-based REDCap survey was created. The survey consisted of several basic demographic questions (i.e., gender, career level, average weekly work hours, average monthly call nights, average monthly limb reconstruction cases, etc.), four open-ended questions (Table 1), and two valid and reliable measures: (1) the Patient Health Questionnaire 4 (PHQ-4)—a screening tool for anxiety and depression with a standardised aggregated scoring system indicating normal (0–2), mild (3–5), moderate (6–8), and severe (9–12);<sup>8</sup> and (2) the Maslach Burnout Inventory–Human Services Survey for Medical Personnel (MBI-HSS-MP) which measures levels of depersonalization, emotional exhaustion and low personal achievement.<sup>9</sup> Based on the standardised scoring system, a high score on any one scale of the MBI-HSS-MP is considered to be a symptom of burnout. High scores on 2 or more scales indicate severe burnout.

The surveys were distributed to international limb reconstruction surgeons by contacting multiple limb lengthening and reconstruction societies (i.e., Limb Lengthening and Reconstruction Society of North America, Nordic Limb Lengthening and Reconstruction Society, South African Limb Lengthening and Reconstruction Society, etc.) and asking permission to distribute the survey to their membership. Consent was obtained or assumed by opening the email and responding to questionnaires. Participants were instructed to participate once only. Statistical analysis of the responses consisted of descriptive as well as non-parametric analysis, including Chi-square and Kruskal–Wallis tests with alpha set to 0.05.

**RESULTS**

There were 103 responses to the survey. A surgeon from at least one country of each of the six populated continents (all except

**Table 1:** In addition to the MBI-HSS-MP and PHQ-4, the survey also included demographic and open-ended questions

Sex/Gender	
Male (cis or trans)	84 (82%)
Female (cis or trans)	17 (17%)
Did not or wish not to answer	2 (2%)
What is your age (in years)?	
Under 30	
31–40	20 (19%)
41–50	48 (47%)
51+	34 (33%)
Number of years in practice?	
<1–10	51 (50%)
11–20	30 (23%)
21+	20 (19%)
Did not or wish not to answer	2 (2%)
Average number of hours worked weekly	53 ± 12 hours
Average number of call nights per month	5 ± 5 nights
Average number of LLR surgeries performed, monthly	12 ± 21 surgeries
Is wellness and/or counselling available where you work?	
Yes	52 (50%)
No	29 (28%)
I don't know	22 (21%)
If yes, do you use these services?	7 (7%)
Have you ever (now and/or in the past) been treated with counselling and/or medication to help with mood and/or anxiety?	
Yes	25 (24%)
No	78 (76%)
Wish not to answer	–
Free text questions	
Country where you practice	
Are you comfortable with conflict situations?	
How do you deliver bad news?	
How do you handle belligerent and/or difficult patients/families?	
How do you deal with complications or disappointing results that occur in your patients?	

Antarctica) responded. Eighty-three percent of the respondents were male. The career level distribution was early (1–10 years' experience) = 51%, mid (11–20 years' experience) = 30%, and late (>20 years' experience) = 20%. The average number of work hours per week was 53 hours, with an average of 5 call nights per month. The average number of limb reconstruction cases per month was 12.

Fifty percent reported having wellness counselling available at their hospital, but only 7% admitted to using these services. Twenty-four percent stated they were currently being treated or had been treated in the past with counselling or medication or both for mood or anxiety or both.

Based on the MBI-HSS-MP scores, 38% of limb reconstruction surgeons displayed burnout symptoms, and 16% exhibited severe



Fig. 1: Geographic distribution of n = 103 responding surgeons

Table 2: MBI-HSS-MP pathological scores (total and by career level)

Variable	Total group N = 103	Early N = 51	Mid N = 30	Senior N = 20	Chi-square
Emotional exhaustion					
High (pathological)	20 (19%)	9 (17%)	8 (27%)	3 (15%)	0.715
Moderate	33 (32%)	16 (32%)	9 (30%)	7 (35%)	
Low	50 (49%)	26 (51%)	13 (43%)	10 (50%)	
Depersonalization					
High (pathological)	15 (15%)	9 (17%)	3 (10%)	3 (15%)	0.162
Moderate	28 (27%)	15 (29%)	9 (30%)	4 (20%)	
Low	60 (58%)	27 (53%)	18 (60%)	13 (65%)	
Personal accomplishment					
Low (pathological)	26 (24%)	16 (32%)	7 (23%)	2 (10%)	0.407
Moderate	22 (21%)	10 (20%)	7 (23%)	4 (20%)	
High	56 (54%)	25 (49%)	16 (53%)	14 (70%)	
≥1 Pathological scores	39 (38%)	21 (41%)	13 (43%)	5 (25%)	
1 scale	23 (22%)	11 (22%)	9 (30%)	3 (15%)	0.770
2 scales	11 (11%)	7 (14%)	3 (10%)	1 (5%)	
3 scales	5 (5%)	3 (6%)	1 (3%)	1 (5%)	

2 people did not provide years in practice

Table 3: PHQ-4 results (total and by career level)

Variable	Total group N = 103	Early N = 51	Mid N = 30	Senior N = 20	p-value
PHQ4	2.0 ± 2.0	2.0 ± 1.9	2.0 ± 1.9	2.0 ± 2.3	0.897
PHQ-anxiety	1.2 ± 1.1	1.2 ± 1.1	1.1 ± 1.0	1.2 ± 1.3	0.985
PHQ-depression	0.8 ± 1.1	0.8 ± 1.0	0.9 ± 1.2	0.8 ± 1.2	0.935

2 people did not provide years in practice

burnout (Fig. 1, Table 2). The mid-career had the highest levels of overall burnout, but there was no statistical significance between the groups. The PHQ-4 scores were within normal limits (Table 3).

Regarding the survey questions, 56% reported that they were comfortable with conflict situations. Some of the noteworthy responses to this question are compiled in Table 4. For the question asking how to handle belligerent or difficult patients or families, there was a sense among the respondents that there was a learning curve to these exchanges and that age or experience or both

helped. There was also concern that the stress involved in these interactions isn't linear but volumetric according to how belligerent they are. Finally, there was an observation that since the COVID-19 epidemic in 2020, the number of these patients or encounters has increased exponentially.

The aggregate responses from the survey indicated that the best way to deliver bad news was in an honest, open, clear, and empathetic face-to-face manner. Proposing solutions to the problem or problems as part of the discussion was also important.

**Table 4:** Predominant themes from the open-ended questions

Question	Predominant themes
Are you comfortable with conflict situations? (56% Yes)	<ul style="list-style-type: none"> <li>- More exhausting than any surgery</li> <li>- Don't like MD-to-MD conflict</li> <li>- Workplace not responsive to concerns or need for resources</li> <li>- Actively avoid conflict situations</li> <li>- Feel anxious/stressed and think about it a long time</li> </ul>
How do you deliver bad news?	<ul style="list-style-type: none"> <li>- Honest/open/clear</li> <li>- Empathy</li> <li>- Face-to-face</li> <li>- Propose solutions to problems</li> <li>- Have a colleague present in a private setting</li> <li>- Allow plenty of time for discussion</li> <li>- Training in this area can be helpful</li> </ul>
How do you handle belligerent and/or difficult patients/families?	<ul style="list-style-type: none"> <li>- Learning curve to handling families</li> <li>- Experience and surgeon age helps</li> <li>- Stress involved is volumetric vs linear</li> <li>- Number of difficult family encounters has risen since the COVID-19 pandemic</li> </ul>
How do you deal with complications or disappointing results that occur in your patients?	<ul style="list-style-type: none"> <li>- Hardest part of job</li> <li>- Feels isolating</li> <li>- Don't always feel supported to deal with mental exhaustion</li> <li>- Affects all parts of life, including sleep/mental health/personal life</li> <li>- Struggled with (this issue) my entire career</li> <li>- Stress is cumulative</li> <li>- Dwell on the negative potential outcomes</li> <li>- Ruminates about what should have been done differently</li> </ul>

Suggestions were to have a colleague present while discussing the case in a private setting with plenty of time for talking and answering questions. Four different respondents mentioned using the training they had received for this scenario.

The final open-ended question asked about dealing with complications or disappointing results that occur with patients. Analysing the pragmatic responses to this query, the following recommendations were formulated: discuss the situation with colleagues, learn from the situation, and move on from the issue or issues. However, 31% of the respondents admitted to having unhealthy reactions to this situation. Representative unhealthy responses to this question are listed in [Table 4](#).

## DISCUSSION

Burnout describes the time point when the amount of cumulative stress placed on an individual in the workplace outweighs that individual's capacity to accommodate that stress. Depending on how an author interprets the term burnout, anywhere from 15 to 85% of orthopaedic surgeons can be classified as burnt out.<sup>5,10-12</sup> This wide heterogeneity results from a lack of consensus on how burnout should be measured and defined. The most common method to study burnout in healthcare utilises the Maslach Burnout Inventory–Human Services Survey for Medical Personnel (MBI-HSS-MP).<sup>9</sup> This validated measure analyses three characteristics of an individual: depersonalization, emotional exhaustion, and low personal achievement. Depersonalization describes feeling mentally distant or cynical about one's job. Emotional exhaustion is feeling overextended and progressively worn out, both mentally and physically. Finally, low personal achievement represents feeling less competent in one's job. Clinically, significant burnout is

generally defined as high depersonalization and/or high emotional exhaustion.

In our study of international limb reconstruction surgeons, we found 38% displayed burnout symptoms and 16% exhibited severe burnout (2 or more pathological scores on MBI-HSS-MP). When broken down by career level, the mid-career group (11–20 years' experience) had the highest level of burnout, but this was not statistically significant. This result is slightly higher than the results of the Medscape 2023 orthopaedist lifestyle, happiness and burnout report, which revealed a 30% burnout rate among orthopaedic surgeons.<sup>6</sup> Since the Medscape study didn't select out a particular orthopaedic sub-specialty, the results may not provide an acceptable comparison with our study. Morrell et al., however, performed a study that did focus on evaluating burnout solely within an orthopaedic sub-specialty.<sup>13</sup> They surveyed the American Society for Surgery of the Hand and found that 49% of hand surgeons were experiencing burnout. This study design allows a more direct comparison to our results and suggests that burnout is considerably higher among hand surgeons than limb reconstruction surgeons.

We also utilised the PHQ-4 to screen for anxiety and depression among limb reconstruction surgeons.<sup>8</sup> Fortunately, the results indicated that limb reconstructions overall scored in the normal range for these characteristics. When reviewing the results from this study, it is difficult to know whether surgeons were answering transparently. It is possible that these scores under-represent the true prevalence rate in this sample.

Although limb reconstruction surgeons did not demonstrate signs of anxiety or depression and scored better on the MBI-HSS-MP than the hand surgeons, it does not mean that they are doing well. Almost a third of the respondents described unhealthy, prolonged



responses to dealing with complications and 44% admitted that they are not comfortable with conflict situations. In addition, approximately one quarter of the group stated that they were previously or currently treated with counselling or medication or both to help with mood, anxiety or both. This indicates there is a common struggle among international limb reconstruction surgeons with these issues. There is a critical need to recognise and acknowledge these vulnerabilities and develop strategies to provide education, counselling, and support to our members.

When asked about potential available resources, 50% reported having wellness counselling available at their institutions and yet only 7% chose to use it. Why is there such a disparity? One possibility is that limb reconstruction surgeons, like most orthopaedic surgeons, work in an atmosphere where professional invincibility is promoted. From early training, orthopaedic surgeons are immersed in a culture of “quiet suffering” where the surgeon is supposed to solve problems by themselves and not be a burden to anyone. There is a reluctance to ask for help because it would demonstrate a lack of perceived invincibility or that “no one would understand my problems”. In addition, physicians traditionally tend to deny their own self-care in the service of others. These attitudes and behaviour are not only unhealthy but potentially dangerous. One of the strongest predictors of suicidal ideation and attempts is the feeling of professional or social isolation or both.<sup>14</sup> Communicating with a colleague can not only be therapeutic but can help to develop options, strategies and solutions to the stressful issues that might be overlooked by the involved surgeon.

More troubling is that some orthopaedic surgeons may be apprehensive to ask for help because they fear their request will lead to punitive consequences. Goldman et al. identified concerns around loss of confidentiality, negative effects on licensure, and risk of losing staffing privileging as potential barriers for physicians seeking treatment of mental health issues.<sup>15</sup> In the United States, a third of states have medical licensure application questions specifically concerning mental health disorders.<sup>16</sup> Dyrbye et al. found that nearly 40% of physicians were reluctant to seek formal medical care for treatment of mental health conditions because they were concerned for medical licensure repercussions.<sup>17</sup> This paradox of encouraging surgeons to seek help while simultaneously attaching negative consequences to this action is a hazardous mixed message that needs to be recognised and resolved. Based on our results, it seems more important than ever that limb reconstruction surgeons are allowed to seek help without fear of repercussions. Respondents commented on the increasing number of belligerent confrontations occurring after the COVID epidemic. In the post-COVID world, the general population is confronted with more stress in their lives and the result has been a tendency for rapid escalations of conflict even in the healthcare setting. Having an outlet to acknowledge, discuss, and evaluate these types of workplace challenges in a healthy atmosphere is critically important to preventing burnout in limb reconstruction surgeons.

There are several limitations to this study. Although we had over one hundred responses, there were many who chose not to participate in the survey. The exact denominator is not known, since we don't know exactly how many members of the international limb reconstruction societies received the request to answer our survey. There is the possibility that surgeons with increased feelings of burnout were more inclined to respond, which could potentially distort our results. Another limitation is a shortcoming that affects all healthcare burnout research studies. Currently, there is not a

unified definition for burnout. The lack of consensus on how burnout is measured and defined produces a vast heterogeneity in rates and makes it difficult to compare results across studies. Agreeing on a validated, standardised measure to evaluate burnout will be necessary to allow for cross-study comparisons in the future. Finally, as mentioned, the results are only as accurate as the honesty of the respondents to answer truthfully and transparently. It is possible that the findings could be skewed in one direction or the other depending on how comfortable the participants were to answer the questions. By making the survey anonymous, we tried to minimise any concern about providing genuine and candid answers to the questions.

In conclusion, the results of this study demonstrate that 38% of limb reconstruction surgeons are experiencing burnout and 16% exhibit characteristics of severe burnout. Understanding that unchecked burnout can lead to major depression or suicidal ideation, support systems for limb reconstruction surgeons need to be developed and maintained. In addition, the stigma surrounding surgeons asking for help needs to be exposed and removed. Limb reconstruction surgeons should learn to feel comfortable acknowledging and admitting signs of burn out without fear of repercussions. Finally, there needs to be a unified definition of burnout to allow standardised study of this topic across healthcare. This will allow future large-scale, prospective studies to be performed that examine not only burnout rates and associations but also investigate interventional studies to prevent and manage burnout.

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