

Imposter Phenomenon, Burnout, and Suicidal Ideation Among Orthopaedic Surgery Residents

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ABSTRACT

Background: The prevalence of imposter phenomenon (IP) and its risk factors among orthopaedic surgery residents remains poorly understood. The purpose of this study was to determine the prevalence of IP, burnout, and suicidal ideation among orthopaedic surgery residents. Secondly, we aimed to identify risk factors associated with higher levels of IP.

Methods: An anonymous survey including the Clance Imposter Phenomenon Survey (CIPS) was distributed to orthopaedic surgery residents. CIPS scores were compared using *t*-tests and one-way analyses of variance, and multivariable logistic regression was used to identify risk factors.

Results: Forty-two orthopaedic surgery residents were surveyed. Significant or intense IP was reported by 23 respondents (54.8%), with women ($P < 0.001$), those who experienced burnout within the past 5 years ($P = 0.002$), those who experienced suicidal ideation ($P = 0.003$), and those with a research year during medical school ($P = 0.018$) reporting higher levels of IP. Residents with a gap year before medical school were 4.85 times more likely to experience significant or intense IP (95% confidence interval, 1.063 to 22.107, $P = 0.041$). Among respondents, 15 (35.7%) were experiencing burnout, 26 (61.9%) experienced burnout over the past 5 years, 3 (7.1%) experienced suicidal ideation during their lifetime, and one (2.4%) experienced suicidal ideation during residency.

Conclusion: Significant or intense IP was reported by 54.8% of orthopaedic surgery residents, with higher levels reported by women, those with a research year during medical school, those who experienced burnout within the past 5 years, and those with a history of suicidal ideation.

Imposter phenomenon (IP) occurs when high-achieving individuals have a pervasive sense of self-doubt combined with a fear of being exposed as a fraud, despite objective measures of success.¹ IP is prevalent in the

medical community and often begins as early as medical school. Among medical students, the reported rate of IP ranges from 22% to 60%, with factors such as sex, low self-esteem, and institutional culture being associated with higher prevalence.²⁻⁴ Among all residents, reported rates of IP range from 33% to 44% and have been associated with burnout, depression, higher levels of stress, and poorer performance.^{2,3,5-7} In addition, compromised wellness and burnout among medical professionals have been associated with poor patient safety outcomes and an increased risk of medical errors.^{8,9} Therefore, it is vital to recognize IP and understand its prevalence and associated factors.

While IP is present across all medical specialties, residents in highly demanding surgical specialties may be at increased risk. Bhama et al¹ demonstrated that 76% of general surgery residents report significant or intense IP. Despite reporting a high prevalence, the authors were unable to identify specific risk factors, leaving them to question whether something inherent to the rigor of surgical training contributed to the heightened IP. In another study, Zaed et al demonstrated that 46% of neurosurgery residents experienced significant or intense IP, with level of medical experience (ie, junior resident, senior resident, fellow, or attending), female sex, and academic achievements identified as predictive factors.¹⁰ The varying results of these studies suggest that IP may affect residents in different subspecialties in a unique way.

Orthopaedic surgery is a demanding surgical subspecialty known for its intense residency training. Wong et al¹¹ demonstrated that 37.2% of orthopaedic surgery residents suffer from a high degree of emotional exhaustion, 48% from a high degree of depersonalization, and 33.1% from low personal accomplishment. Currently, data on the prevalence of IP among orthopaedic surgery residents are limited. Given their high-risk status, it is essential to understand the prevalence and risk factors associated with IP in this group.

The purpose of this study was to determine the prevalence of IP, burnout, and suicidal ideation among orthopaedic surgery residents. We hypothesized that most orthopaedic surgery residents would exhibit significant or intense IP. Furthermore, we hypothesized that residents who were women, those in earlier postgraduate years (PGYs), and those who have experienced burnout or suicidal ideation would report higher levels of IP than their counterparts. Secondarily, we aimed to identify risk factors associated with higher levels of IP. We hypothesized that sex, PGY, burnout, and suicidal ideation would serve as predictors of elevated IP.

Methods

Study Design

This study was endorsed by the Collaborative Orthopaedic Educational Research Group (COERG).¹² COERG is an American Orthopaedic Association–affiliated, multi-institutional forum representing more than half of orthopaedic residency programs aimed to improve the quality of education research. To do so, COERG sponsors quarterly research studies, with endorsement decisions based on five key domains: clarity of objectives, methodology, innovation, potential for impact, and potential for future studies. After receiving approval from our institutional review board, a survey designed to assess the prevalence of IP, burnout, and suicidal ideation was distributed to 7 ACGME-accredited orthopaedic surgery residency programs whose directors volunteered to participate after COERG endorsement and outreach. The program directors were responsible for survey distribution to their residents. Data were collected through Microsoft Forms (Microsoft Corporation) from October 2024 to November 2024. Survey participation was voluntary, and responses were anonymous.

Survey Content

The survey consisted of two parts, the Clance Imposter Phenomenon Survey (CIPS) and demographics (sex, race, age, and PGY), requiring approximately 5 minutes to complete.¹³ The CIPS is a validated survey designed to assess IP characteristics using a list of 20 questions answered on a five-point scale. Scores range from 20 to 100, with ≤ 40 representing none to mild IP, 41 to 60 representing moderate IP, 61 to 80 representing significant IP, and 81 to 100 representing intense IP (Table 1). The demographics section included additional questions regarding a gap year between college and medical school, a research year during medical school, United States Medical Licensing Examination (USMLE) Step 2 Clinical Knowledge (USMLE Step 2 CK) score, a rotation change within the past 2 to 4 weeks, active burnout, burnout within the past 5 years, a history of suicidal ideation at any point throughout the lifetime, and suicidal ideation during residency (Appendix 1, <http://links.lww.com/JG9/A408>).

Data Analysis

Demographics and the variables gap year, recent rotation change, burnout, and suicidal ideation were analyzed using frequencies and percentages for categorical variables and means and standard deviations for continuous

Table 1. Imposter Phenomenon Severity Based on the Clance Imposter Phenomenon Survey

CIPS Score	Level of Imposter Phenomenon
≤40	None to mild
41-60	Moderate
61-80	Significant
81-100	Intense

CIPS, Clance Imposter Phenomenon Survey

variables. Raw CIPS scores were compared between groups using *t*-tests for two groups and one-way analysis of variance for three or more groups. Multivariable logistic regression was used to identify risk factors associated with significant or intense IP.

Results

Resident Demographics

All demographic data are summarized in Supplemental Table 1 (<http://links.lww.com/JG9/A409>). A total of 42 orthopaedic surgery residents completed the survey. Of the residents, 30 (71.4%) were men and 12 (28.6%) were women. The breakdown by PGYs was as follows: 16 (38.1%) PGY-1, 6 (14.3%) PGY-2, 5 (11.9%) PGY-3, 7 (16.7%) PGY-4, and 8 (19.1%) PGY-5. Thirty-one residents (73.8%) took a gap year between college and medical school, and 5 (11.9%) took a research year during medical school. Thirty residents (71.4%) changed rotations within 2 to 4 weeks of completing the survey. Fifteen residents (35.7%) were actively experiencing burnout, 26 (61.9%) had experienced burnout within the past 5 years, 3 (7.1%) had experienced suicidal ideation at some point in their lives, and one (2.4%) experienced suicidal ideation during orthopaedic surgery residency.

Prevalence of the Imposter Phenomenon

The mean CIPS score for all residents was 63 (range 37 to 99, SD 15.3), representing significant IP characteristics. Two residents (4.8%) reported none to mild IP characteristics, 17 (40.5%) reported moderate IP characteristics, 18 (42.9%) reported significant IP characteristics, and 5 (11.9%) reported intense IP characteristics (Supplemental Table 1, <http://links.lww.com/JG9/A409>). By sex, the mean CIPS score for men was 56.1 (range 37 to 80, SD 11.2) and for women was 80.4 (range 69 to 99, SD 8.9), which demonstrated a significant difference ($P < 0.001$; Supplemental Table 2, <http://links.lww.com/JG9/A410>). By race, age, PGY, and USMLE Step 2

CK score, there were no significant differences in CIPS scores ($P = 0.310, 0.728, 0.314$, and 0.830 , respectively). Residents who took a gap year between college and medical school did not have different CIPS scores compared with their counterparts ($P = 0.060$), whereas those who took a research year during medical school demonstrated higher CIPS scores than their counterparts ($P = 0.018$). Residents who changed rotations within 2 to 4 weeks of completing the survey did not have higher CIPS scores than those without a recent rotation change ($P = 0.498$). Residents actively experiencing burnout did not have different CIPS scores than those not experiencing burnout ($P = 0.325$) while those who reported experiencing burnout within the past 5 years ($P = 0.002$) and those who had experienced suicidal ideation at any point in their lifetime ($P = 0.003$) demonstrated higher CIPS scores than their counterparts.

Risk Factors

Multivariable regression analysis was used to test for risk factors associated with significant or intense IP (Supplemental Table 3, <http://links.lww.com/JG9/A411>). Residents who took a gap year between college and medical school were 4.85 times more likely to demonstrate significant or intense IP than those without a gap year (95% confidence interval, 1.063 to 22.107, $P = 0.041$). Odds ratios could not be calculated for sex, research year during medical school, or suicidal ideation because of perfect separation (ie, all residents who were women, all residents who took a research year during medical school, and all residents who had ever experienced suicidal ideation recorded significant or intense IP characteristics).

Discussion

The purpose of this study was to determine the prevalence of IP, burnout, and suicidal ideation among orthopaedic surgery residents. We found that most (54.8%) of the residents reported significant or intense IP, supporting our hypothesis. In addition, we found that residents who were women, those who experienced burnout within the past 5 years, and those who had ever experienced suicidal ideation reported higher levels of IP than their counterparts, supporting our hypothesis. However, IP did not vary by PGY level, and residents who took a research year during medical school reported higher levels of IP. In this study, 35.7% of surveyed residents were actively experiencing burnout, 61.9%

experienced burnout within the past 5 years, and 7.1% had previously experienced suicidal ideation.

The secondary aim of this study was to identify risk factors associated with significant or intense levels of IP. We found that taking a gap year between college and medical school was a predictor of significant or intense IP. Importantly, odds ratios for the variables sex, research year during medical school, and suicidal ideation could not be calculated because of perfect separation whereby all residents in a category exhibited significant or intense IP. This suggests that these variables are highly likely to predict significant or intense IP, and additional investigation with a larger sample size may confirm these associations.

Previous studies have demonstrated similar findings. For example, Halgas et al¹⁴ examined a population of general surgeons and found that women were more likely to experience IP than men. The authors concluded that this trend may have been due to lower representation in the field, which can influence feelings of belonging. Furthermore, Ling et al¹⁵ demonstrated that bullying was more prevalent among general surgery residents and consultant surgeons who were women compared with men. Nuelle et al¹⁶ suggested that the higher prevalence of bullying among female surgeons may extend across surgical specialties, particularly in hand surgery, potentially contributing to higher levels of IP. The results of our study that demonstrated higher levels of IP in orthopaedic surgery residents who are women align with the current literature.

Burnout has also been associated with IP. Liu et al⁶ investigated the relationship of anxiety and IP with burnout among postgraduate learners in family medicine, pediatrics, anesthesiology, and general surgery. The authors found that IP contributes to learner anxiety and burnout. While the relationship between burnout and higher levels of IP approached but did not meet a level of statistical significance in our study, a high proportion (61.9%) of those surveyed reported burnout within the past 5 years, which may influence levels of IP. Suicidal ideation has also been associated with IP. Shanafelt et al¹⁷ conducted a broad survey of US physicians and found that higher levels of IP resulted in higher odds of experiencing suicidal ideation. While perfect separation of the data in this study prevented the calculation of an odds ratio for the variable suicidal ideation, a larger sample size may confirm this association among orthopaedic surgery residents. Interestingly, orthopaedic surgery residents who took a gap between college and medical school were at increased odds of experiencing significant or intense IP. To our

knowledge, this is the first study to document this relationship in the literature. Although not directly comparable, Kim et al¹⁸ found a high prevalence (75%) of IP among students entering military medical school with 3+ gap years before matriculation.

The significant levels of IP reported by orthopaedic surgery residents reflect the demanding and high-pressure nature of their training. IP often manifests as self-doubt, anxiety, and burnout, which can affect both personal well-being and professional performance.^{5,17,19-21} These challenges may hinder residents' ability to learn, make critical decisions, and perform effectively in high-pressure environments, while also affecting their personal lives outside of medicine.²² Furthermore, residents experiencing IP may be reluctant to seek help or ask questions, potentially leading to errors or inefficiencies in patient care. Therefore, it is essential to recognize the prevalence of IP among orthopaedic surgery residents to develop strategies to combat its harmful effects. According to the American Orthopaedic Association Critical Issues Symposium, developing resilience, grit, emotional intelligence, courage, and vulnerability during residency is critical to addressing IP.²³ Strong leaders and mentors who are aware of these phenomena and implement strategies to build confidence and normalize insecurity are essential to the success and well-being of the residents. Future work should aim to evaluate strategies to mitigate the harmful effects of IP used by orthopaedic leaders.

There are several limitations to this study. First, although the CIPS survey is a validated and widely used tool, it has certain constraints. Originally developed in 1978, it may not fully capture the contemporary nuances of IP across diverse populations. In addition, some critiques have highlighted its limitations in distinguishing the specific contributors to IP beyond overall severity.^{24,25} However, the CIPS remains a valuable tool outperforming other IP scales because of its sensitivity in differentiating between high and low IP scores, its reduced incidence of false positives and negatives, and its brevity compared with alternative surveys.²⁵ Second, as a survey-based study, the results are subject to response and recall biases, which may affect the accuracy and reliability of the data. Third, the sample size was limited by the number of survey responses received, potentially affecting the generalizability of these findings. Furthermore, a response rate was unable to be calculated because the survey was distributed directly to residency program directors who were responsible for subsequent distribution to their residents. Fourth, we did not collect data on the proportion of women in each residency program, preventing us from assessing its association with levels of IP among women. Fifth, given

the limited data on prevalence of IP among orthopaedic surgery residents, an a priori power analysis was not conducted. Despite these limitations, this study offers valuable insights into the prevalence and risk factors of IP among orthopaedic surgery residents.

Conclusion

Significant or intense IP was reported by 54.8% of orthopaedic surgery residents, with higher levels reported by women, those with a research year during medical school, those who experienced burnout within the past 5 years, and those with a history of suicidal ideation.

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