

Identifying Sources of Stress Across Years of General Surgery Residency

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Abstract

Stressors during surgical residency training are common and can contribute to impaired technical performance, medical errors, health problems, physician burnout, and career turnover. This survey of general surgery recent graduates and chief residents examined threats to resident health and well-being. An electronic survey composed of multiple-choice, checkbox, dropdown, and open-ended questions was developed to determine the most stressful general surgery residency year, sources of the stress, and potential interventions to manage resident well-being. The survey was sent to five program directors across the United States to be forwarded to chief residents and recent graduates less than five years from graduation. Twenty-three residents and recent graduates responded to the survey. Seventy percent reported they “never” got enough sleep, and 39% reported they did not have a healthy lifestyle. Financial concerns were the most frequently cited source of stress. During post-graduate-years (PGY) 1 and 2, residents were most likely to fear hurting a patient or being “in over their head.” In PGY-3, residents were most likely to consider leaving the residency program. The current findings suggest that each year of general surgery residency is linked with certain stressors, and no year is particularly stressful relative to the other years. There can be more research and efforts to focus on additional PGY-specific training and supervision, as well as added general measures to promote resident health and financial stability throughout all years. Regarding stress mitigation, residents may benefit from faculty, peer, and community interaction rather than from formal professional counseling.

Keywords

stress, general surgery, residency, survey, Hawaii

Abbreviations

ACS = American College of Surgeons
PGY = post-graduate-year

Introduction

General surgery is ranked in the top 5 in specialty shortages in O‘ahu. Colorectal surgery represents 1 of the largest subspecialty shortages statewide.¹ An area that could be addressed to improve the shortage of general surgery physicians in the state is addressing burnout. Burnout is prevalent in the surgical specialty and characterized by the combination of emotional exhaustion, depersonalization, and low personal achievement.² The perceived overwhelming stress during general surgery residency that causes burnout can manifest as decreased job performance and attrition.³ The attrition rate for

general surgery residents ranges from 14% to 32%, which is higher than other surgical or non-surgical fields of medicine.⁴ Identifying sources of stress during general surgery residency can help guide interventions and retention of general surgery residents. Stressors during surgical training are common and can contribute to impaired technical performance, medical errors, physical and mental health problems, physician burnout and career turnover.⁵ These stressors can arise from several sources: personal finances, work hours, quality or length of education, and personal relationships.⁶ Persistent stress is associated with a 20% resignation risk as well as depression and suicidal ideation.^{4,5} While residents with certain personality types may be more inherently resilient, there are also mechanisms and interventions from the program’s perspective which may be applied to prevent distress and subsequent burnout. Dispositional mindfulness has been useful in building resilience in surgical residents.⁵ Unfortunately, training and anticipation do not completely immunize trainees against the deleterious effects of stress associated with residency.

Recently, there has been interest regarding resident preparation for transitions in training, notably from medical school to residency and residency to practice. Due to the varying experiences during medical school training, first-year surgical residents may be unprepared for technical challenges occurring during the course of surgical operations. Implementing a “boot camp” training curriculum — which involves a combination of didactic sessions, actor-based clinical skills assessment, technical skill and clinical scenario-based simulations, as well as self-directed web-based learning modules. These activities may help increase proficiency at the beginning of residency.⁷ Studies have shown a lack of preparedness of residents graduating from their programs.⁸ To correct this, the American College of Surgeons (ACS) implemented a Transition to Practice program that paired recently graduated residents with a senior general surgeon mentor to increase their confidence, autonomy, decision-making, and operative skills.⁸ However, there may be transitions within residency training years that may be stressful, as residents assume increased responsibilities and autonomy in patient care. In the current report, the prevalence and timing of perceived stressors and stress responses during general surgery residency were explored. It was hypothesized that the most stressful period during residency is at the midlevel — Postgraduate Year (PGY) 3.

Methods

To address this hypothesis, the authors created a survey using a sample from a pool of current chief residents and recent graduates of general surgery. Survey questions were designed to address sources of stress, prevalence and incidence of stress during residency, coping mechanisms, and query about potential interventions. Five expert surgical educators (program and clerkship directors) participated in creating this survey. The survey was constructed by incorporating identified concerns by surgical fellows and surgeons (eg, finances). Demographic questions were adapted from published literature of PubMed.^{4,6} Creation of a survey was preferred due to copyright considerations, and a desire to incorporate findings from informal surveys of Hawai'i residents. Select coping mechanisms were identified after consultation with practicing general surgeons. The survey included 6 demographic questions (eg, gender, residency program location and type, marital status, family planning, and non-clinical years), 20 multiple-choice prompts (see table 2) for respondents to identify a specific year (PGY) of residency when they most frequently experienced situations or feelings, or if they "always" or "never" had the described experience throughout residency (eg, "I got enough sleep"), 1 dropdown question identified the most stressful aspect of surgical training with an option to specify other, 1 check box question identified coping mechanisms ("sleeping"), and 2 short-answer questions described the most stressful work experience and thoughts on potential stress-relieving faculty/program interventions. Content analysis of narrative responses were based upon categories derived from literature review and the personal experience of the senior authors. Stressors were coded and grouped into broad categories as follows: (a) work environment, including, patient workload, supervision and support, relationships with supervisors, colleagues and others, (b) ancillary to work environment, including finances, relationships with friends and family, personal well-being. Stress relieving mechanisms were coded as (a) personal (b) professional and (c) programmatic. Respondents were required to answer all questions and subsequent branching questions if they provided a particular answer except for the short-answer, dropdown, and checkbox questions.

Five program directors were contacted by the senior investigators (KM and SS). They represented a convenience sample of those who met the following qualifications: (1) Active membership in the Association of Program Directors in Surgery (APDS) (2) Prior participation in multi-institutional educational research projects (3) established academic surgeons with prior participation in multi-institutional research projects and (4) geographic diversity. All 5 program directors agreed to enter their residents in the study, but the decision to participate rested with the residents. Risks and benefits were outlined in the introduction to the survey, with implied consent indicated by the resident's decision to participate in the study. Participation of the entire

APDS membership (ie, all residency programs) was precluded by the research policy of the APDS, which regulates the number of surveys that can be conducted, favoring large, grant-supported research projects. Program directors forwarded the web-based survey (SurveyMonkey) to recent graduates (less than 5 years post-graduation) and current chief residents. No additional contacts was made to respondents. Anonymous responses were collected over a 5-month period (9/24/17 – 2/23/18); \$5 Amazon gift cards were provided as incentives. University of Hawai'i Investigational Review Board approval was obtained, protocol number 2017-00674.

Results

The survey was completed by 23 respondents out of 107 survey recipients (response rate 21%) from residency programs located in the West (30%), Midwest (26%), South (35%), and Northeast (9%); 79% were male. Fifty-seven percent trained at a university medical center, the rest at a university-affiliated medical center. Twenty-two percent of respondents had non-clinical years during residency, all occurred during PGY-2 and PGY-3. Activities during the non-clinical years included research (60%), research plus part-time clinical opportunities (20%), or other activities (medical director of facility, research, military, and other jobs) (20%) (Table 1).

Residents were able to grade different aspects of their personal and professional lives during residency (Table 2). Seventy percent of respondents indicated that they "never" felt they had adequate sleep, 30% never had enough time and energy to maintain relationships, and 39% never felt that they were eating and exercising. Residents were least likely to have adequate time, sleep, and a healthy lifestyle during PGY-3 to PGY-4.

Forty-three percent considered leaving their residency program; 60% of those considered it most strongly during PGY3. Thirty percent considered leaving the specialty of general surgery, 43% of those in PGY3. Seventy percent did not feel that their responsibilities matched their skills and training during PGY-5. Approximately one-third of residents directed anger towards friends, family, and staff.

Twenty-seven percent of respondents cited PGY-1 as the year when they frequently felt "in over their head during a case or procedure" and "unprepared during a non-procedural patient encounter." This perception decreased in later years, with zero reporting this during PGY-4 or PGY-5. In PGY-2, 24% said they were the most "fearful of hurting a patient," with PGY-1 following thereafter (19%). Thirty percent of respondents cited PGY-4 as the year of "tremendous growth in knowledge and skills." Although 59% said they "never" felt that they wanted more help/supervision, PGY-1 was cited by 23% of participants as the year they wanted the most help/supervision.

There were diverse sources of stress, many extrinsic to the training environment (Figure 1). The 2 most common stressors were finances (19%) and interpersonal relationships (14%). Work-related responsibilities and the training environment were identified as stressors for half of the respondents: possibility of hurting a patient (14%), learning technical skills (5%), standardized tests (5%), managerial or administrative tasks (10%), dealing with difficult people (5%), and ethical concerns (5%). Ten percent were concerned about their future or job prospects. Surgeons described a variety of stress-coping mechanisms (Table 3). The majority would be considered “healthy” responses including “talking with family/friends,” “talking with faculty, other residents, and work staff,” and exercising. Seventeen percent reported using alcohol to combat stress.

In the narrative responses, stressful work experiences were described as “[perceived] lack of consistency among colleagues and curriculum, getting yelled at by an attending, being repeatedly told that [resident] lack sufficient surgical skill, [perceived hypercriticism from attendings], caring for

more than 50 patients at one time with 4 residents, residency administration not listening/caring about concerns, and during the surgical intensive care unit rotation” (data not shown). Some suggested interventions were “stop targeting certain residents and aim to uplift as opposed to tearing down, reduce hours and increase length of residency, minimize the amount of non-clinical/educational responsibilities of the residents, take time to teach [residents], more time for preparation and study, encourage social interaction, mentorship/advisory models solely for the purpose of discussing stressful situations and emotional issues (in contrast to professional development and research), educate and remind residents on purposefulness, motivation, and mindfulness as it applies to everything they do, have enough coverage and listen to resident concerns, standardize teaching methods and expectations [amongst attendings] within an institution, and demonstrate appreciation for residents and display sensitivity to the demands placed on current general surgery residents and stop comparing to the ways things were in [attending’s] generation.”

Table 1. Demographics of Study Sample. “n” is the Total Number of Responses per Demographic Question. Percentage is Calculated from Taking the Reported Response Divided from the Total Responses Per Question.	
Gender n = 23	
Male	18 (78.6%)
Female	5 (21.74%)
Location of Residency Program n = 23	
West	7 (30.43%)
Midwest	6 (26.09%)
South	8 (34.78%)
Northeast	2 (8.7%)
Type of Residency Program n = 23	
University medical center	13 (56.52%)
University-affiliated medical center	10 (43.48%)
Non-university affiliated medical center	0
Change in Marital/Partner Status During Residency n = 23	
Yes	7 (30.43%)
No change	16 (69.57%)
When Did Marital/Partner Status Changes Occur? n = 16	
PGY-1	1 (14.29%)
PGY-2	2 (28.57%)
PGY-3	2 (28.57%)
PGY-4	1 (14.29%)
PGY-5	1 (14.29%)
What was the Marital/Partner Change? n = 7	
Married	5 (71.43%)
Engaged	1 (14.29%)
Started relationship	1 (14.29%)

Did You Have Children During Residency? n = 23	
Yes	8 (34.78%)
No	15 (65.22%)
Which PGY Did You Have children? n = 8	
PGY-1	0
PGY-2	2 (25%)
PGY-3	0
PGY-4	1 (12.5%)
PGY-5	2 (25%)
More than one year	3 (37.5%)
Non-Clinical Years Between PGY1-5 n = 23	
Yes	5 (21.74%)
No	18 (78.26%)
Which PGY Did You Have Non-Clinical Years? n = 5	
PGY1 – PGY2	0
PGY2 – PGY3	5 (100%)
PGY3 – PGY4	0
PGY4 – PGY5	0
More than one year	0
What Did You Do During the Non-Clinical Years? n = 5	
Research	3 (60%)
Research and part-time clinical	1 (20%)
Personal/medical leave	0
Other	1 (20%)

Table 2. Summary of Resident Responses Most Strongly Felt Per Each Survey Prompt During Residency. Percentages were Calculated from Taking the Number of Responses Divided from the Total Responses. Parentheses are the Number of Responses Per Respective PGY.

	PGY-1	PGY-2	PGY-3	PGY-4	PGY-5	Always Felt this Way	Never Felt this Way	Total Responses
I had enough time and energy to develop and maintain relationships outside of residency	13% (3)	26% (6)	9% (2)	0%	13% (3)	9% (2)	30% (7)	23
I maintained a healthy lifestyle (eating well and exercising).	17% (4)	13% (3)	4% (1)	4% (1)	13% (3)	9% (2)	39% (9)	23
My responsibilities matched my skills and training.	9% (2)	9% (2)	4% (1)	9% (2)	30% (7)	30% (7)	9% (2)	23
I got enough sleep.	13% (3)	4% (1)	4% (1)	4% (1)	4% (1)	0%	70% (16)	23
I had the skills and time to teach others.	9% (2)	13% (3)	13% (3)	17% (4)	35% (8)	4% (1)	9% (2)	23
I experienced tremendous growth in my surgical knowledge and skills.	17% (4)	9% (2)	13% (3)	30% (7)	13% (3)	9% (2)	9% (2)	23
I thought about leaving my residency program.	0%	4% (1)	26% (6)	13% (3)	0%	0%	57% (13)	23
I thought about leaving surgery for another specialty.	4% (1)	4% (1)	13% (3)	9% (2)	0%	0%	70% (16)	23
I was inappropriately angry with my friends or family.	9% (2)	5% (1)	0%	9% (2)	5% (1)	5% (1)	68% (15)	22
I was inappropriately angry with co-workers or staff.	0%	9% (2)	5% (1)	18% (4)	5% (1)	0%	64% (14)	22
I wanted more help/supervision.	23% (5)	9% (2)	5% (1)	0%	0%	5% (1)	59% (13)	22
I wanted more autonomy.	0%	5% (1)	14% (3)	18% (4)	14% (3)	28% (6)	23% (5)	22
I had feelings of being "in over my head" during a case or procedure.	27% (6)	14% (3)	9% (2)	9% (2)	0%	0%	41% (9)	22
I felt unprepared during a non-procedural patient encounter.	27% (6)	14% (3)	9% (2)	0%	0%	0%	50% (11)	22
I used alcohol and/or drugs in order to reduce my stress.	0%	0%	5% (1)	5% (1)	0%	0%	91% (20)	22
I lacked empathy for patients.	9% (2)	5% (1)	0%	14% (3)	0%	0%	73%	22
I felt that my peers were more prepared and/or capable than me.	10% (2)	0%	14% (3)	5% (1)	0%	10% (2)	62% (13)	21
I was fearful of hurting a patient.	19% (4)	24% (5)	0%	5% (1)	0%	19% (4)	33% (7)	21
I dreaded going into work.	14% (3)	10% (2)	5% (1)	0%	10% (2)	10% (2)	52% (11)	21
I had significant, unintentional weight changes.	14% (3)	14% (3)	10% (2)	0%	0%	0%	62% (13)	21

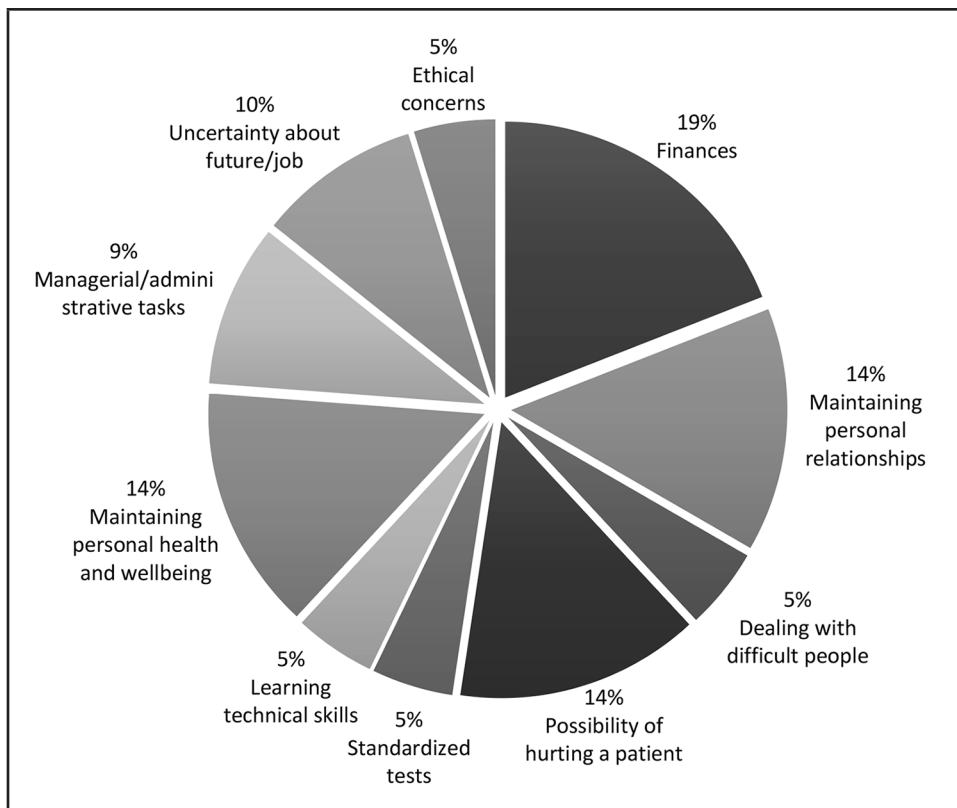


Figure 1. Sources of Stress During General Surgery Residency. Percentages were Calculated from Reported Stress by the Total Number of Respondents, 21.

Activity	Number of Responses Out of 21
Talking with friends and family	19
Talking with faculty, other	12
Talking with a professional	2
Using social media	0
Shopping	0
Watching TV or movies	13
Playing video games	4
Exercising and playing sports	11
Engaging in personal hobbies	10
Drinking alcohol	4
Going out to parties or clubs	3
Sleeping	10
Risk sexual behavior	0
Sexual intimacy	4

Discussion

This study is a semi-qualitative evaluation, where the authors analyzed response percentages and narrative responses of the sources of stress of general surgery residency, and presented suggestions for improving wellness in such programs. The results suggest that each year, residents experience unique stressful challenges. The first year is when residents felt the most unprepared and in over their heads. However, it was PGY-2 in which residents most frequently felt fearful about hurting a patient. PGY-3 and 4 were reported as years in which residents felt they had the least amount of time, sleep, and ability to have a healthy lifestyle. PGY-3 was also the most frequently cited time when the residents thought about leaving their program or specialty. A large percentage of respondents did not feel that their skills and training matched their PGY-5 responsibilities.

There might be a discrepancy in expectations of the general surgery field by medical students before they become interns and thus contribute to feeling overwhelmed.⁴ The findings suggest the first 2 years should focus on standardized training and building residents' confidence in their skills. Effective mentoring by faculty can help prepare residents to become successful, independent practitioners.⁹ Establishing deeper mentorships during these first two years can help alleviate some of the stresses mentioned, as well as lay a strong foundation for later years of residency, when some other stresses may become more prominent. A previous study reports that research years can lead to isolation or allow "escape" from the harsh environment of clinical duties, thus causing residents to reconsider their career.^{4,10} Program directors should ensure resident well-being and satisfaction in PGY-3 to 4. The sense of inadequacy in PGY-5 can be extrapolated into fellowship training and is supported by current literature where at least 30% of supervising program directors indicate that there are traits of clinical and operative unpreparedness.¹¹ The ACS transition to practice program or active mentorship during residency might be fitting solutions in resolving this potential dilemma.⁸

Finances, interpersonal relationship issues, fear of hurting a patient, and personal health and wellbeing were all top causes of stress (Figure 1). Financial stress may be particularly severe for general surgery residents in Hawai'i, due to the high cost of living, layered upon the substantial debt incurred from medical school – median debt of \$134,000 for JABSOM students in 2014.^{12,13} For comparison, the national median debt for graduating medical students in 2018 was \$192,000 according to the AAMC.¹⁴ This informs the need for geographically appropriate salary calibration for residents and early financial advising.

In regards to coping mechanisms, residents reported talking with family, friends, and colleagues as the preferred ways of managing stress (Table 3). Perhaps, program directors may consider selecting general surgery applicants with stronger ties to the location of the program, eg, family since it may improve

resilience. Interestingly, talking with a professional was not cited as frequently. Physicians, particularly surgeons, have been described as competitive individuals and may have a false belief that seeking help is a sign of weakness.⁹ This suggests that if program directors are looking to improve resident well-being and relieve stress, having informal one-on-one meetings to check in with a mentor or having social events would be preferable to more formal and professional interventions. However, this study did not evaluate the strength of supportive resources at the training locations. Current residency programs often emphasize that professional help is often available if the residents need it, but if the most effective way to help relieve these stresses is through more informal relationships and events, then these resources could be allocated better. Additionally, having more cohesive relationships with mentors can build comfort and trust in residents in seeking help.³ Despite needing more investigations, recent literature also supports the practice of mindfulness training to improve resident stress resilience and improve well-being and clinical performance.¹⁵ According to this study, mindfulness training can obviously benefit residency programs drastically since well-being was reported to be one of the most common causes of stress.

From the narrative responses, the most frequently cited suggestions to improve residency programs were to (1) standardize training, (2) have direct advisory or mentorship roles, and (3) improve coverage to ensure adequate relief. Having direct and personalized mentorship roles could improve stress relief through talking with colleagues and give budding surgeons a sense of encouragement.^{2,9} Excessive work hours from duty obligation or inadequate coverage and multiple night calls per week would hinder the occurrence of mentorships.² Lastly, identification of early signs of burnout can assist programs mediate therapy in an appropriate time. Investment into improving resident well-being is potentially cost-effective compared to the financial loss from decreased work commitment or replacing a burned out surgeon. The benefit of burnout prevention and intervention can be as significant as "less turn-over, less illness, fewer days off, improved patient care and better patient satisfaction."²²

Limitations of the study include the possibility of several biases. Recall bias may arise in that respondents who were nearing completion of their program may have recalled their experiences in a better light than those who were still going through the stresses of the early years. Sampling bias can occur because there were only a few representatives from different parts of the nation. However, these programs were a mix of academic and community programs. Although anonymous, social desirability bias can occur because respondents may have been reluctant to report unprofessional behavior such as alcohol or drug use and anger toward patients or colleagues. Non-response bias is possible if "burned out" residents did not want to participate in the survey and we did not address it, thus potentially losing responses from a significant population. The response rate was below the desired target of 60% and was thus not significant to

perform a statistical analysis and obtain meaningful quantitative results. Additionally, three of the programs that were contacted to distribute the survey did not reliably report the number of recipients of the survey and further prevent accurate measuring of response rate. Theoretically, residents who had a stressful experience might have a higher tendency to respond to the survey. However, the data on the prevalence of stressful events is similar to other national surveys of burnout among residents. Lastly, the participants were not blinded and responses may be affected from having insight in taking a stress survey.

The current findings suggest a need for continued emphasis on resident well-being throughout residency. Specifically, new strategies and schedules are needed to promote healthy lifestyles. Adequate sleep would be ideal. These findings demonstrate that each PGY is correlated with its own unique work-related stressors, with mid-level residents at highest risk for leaving their residency program. Effective program interventions may need to be tailored for each PGY-level.

Conflict of Interest

None of the authors identify any conflict of interest.

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