



Surgery on the edge: shaping the future between motivation, burnout, and gender inequities—a narrative review

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Abstract

A growing crisis of surgical vocation has emerged worldwide, characterized by declining interest in general surgery, increasing attrition during training, and persistent workforce shortages. Burnout has been identified as a central driver of this phenomenon, interacting with generational changes, training intensity, and gender disparities. This narrative review synthesizes current evidence on burnout in surgery and its relationship with workforce dynamics, generational expectations, and structural determinants, including surgical training pathways and gender-related barriers. Burnout affects approximately 40–70% of surgeons and trainees, with higher prevalence among younger physicians and women. Emotional exhaustion and depersonalization are the most prominent dimensions, driven by excessive workload, administrative burden, poor work–life integration, high training intensity and workplace culture. These factors negatively influence patient safety, team performance, and career sustainability. Generational shifts have redefined professional expectations, with greater emphasis on work–life balance and long-term sustainability. Persistent gender disparities further impact access to mentorship, career progression, and leadership opportunities, contributing to workforce instability. Italian data reflect similar trends, with underrepresentation in senior roles and ongoing challenges in training pathways. In the 2025 Italian national residency selection cycle, 247 of 662 General Surgery contracts remained unassigned, corresponding to an unassigned rate of 37.3%, highlighting the relevance of workforce instability in a publicly funded healthcare system. The crisis of surgical vocation is a multifactorial and systemic issue. Addressing burnout requires coordinated multilevel strategies, integrating individual, institutional, and policy-level interventions. Improving the quality and sustainability of surgical training, while promoting inclusive and supportive professional environments, is essential to ensure the future of the surgical workforce.

Keywords Burnout · Surgical workforce · Vocational crisis · General surgery · Gender disparities · Work–life balance

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Introduction

The concept of a “vocational crisis” in surgery describes a progressive shift whereby residents in general surgery increasingly pursue subspecialization or alternative career paths rather than committing to a long-term career as general surgeons. This trend reflects not only evolving professional aspirations but also deeper transformations in the cultural and organizational foundations of surgical practice.

The well-known Confucian maxim, “*Choose a job you love, and you will never have to work a day in your life*,” has long resonated within the surgical profession. Traditionally, surgery embodied a synthesis of vocation, discipline, and technical excellence, forming a cohesive professional identity grounded in ethical commitment. Surgeons were not merely practitioners but custodians of a tradition, inheriting values such as craftsmanship, resilience, altruism, and humility through mentorship and experiential learning.

Historically, surgical training followed a quasi-apprenticeship model in which identity formation was inseparable from technical progression. The operating theatre represented both a physical and symbolic space where competence, responsibility, and moral accountability converged.

In contemporary practice, however, this paradigm appears increasingly strained. The alignment between vocation, professional identity, and sustainable practice has weakened under the pressure of systemic constraints. Today’s surgical trainees navigate a complex environment characterized by administrative overload, medico-legal exposure, reduced autonomy, and shifting societal expectations. The traditional notion of vocation, once associated with dedication and sacrifice, is increasingly reinterpreted through the lens of personal well-being, work–life integration, and long-term sustainability. These evolving dynamics have contributed to what is now widely described as a crisis of surgical vocation, with important implications for workforce planning, professional satisfaction, and the future viability of general surgery as a discipline [1].

Beyond describing these trends, this review aims to provide an integrated conceptual framework linking burnout, generational changes, and structural determinants to the emerging crisis of surgical vocation. By bridging individual, organizational, and systemic perspectives, the manuscript seeks to move beyond descriptive analysis and contribute to a more comprehensive understanding of the factors shaping the future of general surgery. In addition, by incorporating recent Italian residency enrollment data, this review provides a country-specific perspective on how these forces may translate into measurable workforce instability within a publicly funded healthcare system.

Methods

This narrative review was conducted to provide an updated synthesis of the literature on burnout, surgical vocation, workforce sustainability, generational change, and gender inequities in general surgery. A structured literature search was performed in PubMed/MEDLINE and Google Scholar for studies published between January 2000 and April 2026. Search terms included combinations of: “burnout”, “general surgery”, “surgical training”, “surgical residency”, “workforce”, “career choice”, “attrition”, “gender disparities”, “mentorship”, “work-life balance”, and “surgical vocation”.

Articles were eligible for inclusion if they addressed burnout prevalence, determinants or consequences in surgeons or surgical trainees; factors influencing recruitment, retention, attrition, or career choice in surgery; gender-related barriers in surgical training or practice; or national/institutional data relevant to surgical workforce planning. Priority was given to systematic reviews, meta-analyses, multicenter studies, large-scale surveys, and official institutional reports. Exclusion criteria included articles not focused on surgical populations, commentaries without relevant empirical or conceptual contribution, studies with insufficient methodological detail, and non-English articles unless directly relevant to the Italian context. Records identified through PubMed/MEDLINE were screened by title and abstract, followed by full-text assessment when potentially relevant. For Google Scholar, the first 100 results were screened using the same relevance criteria. Additional references were identified through manual screening of bibliographies of key articles. Any uncertainty regarding study inclusion was resolved by discussion among the authors. Given the narrative design of the review, no formal risk-of-bias assessment was performed; however, the strength and limitations of the included evidence were considered qualitatively, with particular attention to study design, sample size, population, and generalizability (Table 1).

The evolving landscape of burnout in modern healthcare

Over the past two decades, general surgery has experienced a progressive decline in attractiveness among medical graduates (Fig. 1). This phenomenon encompasses two interconnected processes: a reduction in initial specialty preference and increasing attrition during training or early career stages. The former appears largely driven by generational shifts in expectations, particularly regarding work–life balance, flexibility, and professional sustainability. The latter is more closely linked to adverse working conditions, chronic stress, and burnout.

Table 1 Available and unassigned residency contracts by specialty in the 2025 Italian national medical residency selection cycle (Percentages are rounded to the nearest whole number). *Data source:* Anaa Assomed and ALS analysis of the 2025 Italian national medical residency selection cycle

Specialty School	Available contracts	Unassigned contracts	Unassigned contracts (%)
Microbiology and Virology	110	88	80
Clinical Pharmacology and Toxicology	117	92	79
Clinical Pathology and Clinical Biochemistry	283	216	76
Radiation Oncology	141	92	65
Community Medicine and Primary Care	136	87	64
Emergency Medicine	976	439	45
Pathological Anatomy	183	49	27
General Surgery	662	247	37
Anaesthesia and Intensive Care	1458	282	19
Internal Medicine	847	122	14
Medical Oncology	321	19	6
Vascular Surgery	124	5	4
Child and Adolescent Neuropsychiatry	242	13	5
Ophthalmology	244	0	0
Paediatrics	860	0	0
Total	15,283	2569	17

Burnout is classically defined by three dimensions: emotional exhaustion, depersonalization, and reduced personal accomplishment. Emotional exhaustion reflects a state of

profound physical and psychological depletion; depersonalization manifests as detachment or cynicism toward patients and colleagues; and reduced personal accomplishment is characterized by diminished professional efficacy and self-worth.

These dimensions significantly impair both individual well-being and professional performance. With increasing prevalence, further exacerbated by the COVID-19 pandemic, burnout is now recognized as a major public health concern within healthcare systems [1].

Emerging evidence also highlights its impact on fundamental health behaviors. Park and McElveen demonstrated that burnout correlates with deterioration in sleep quality, nutritional habits, and physical activity, emphasizing the importance of addressing basic physiological needs as conceptualized in Maslow's hierarchy [2]. Failure to meet these foundational needs compromises higher-order domains such as psychological resilience, professional fulfillment, and self-actualization.

Burnout in general surgery: a global perspective

Burnout represents a pervasive issue across all levels of surgical practice, affecting both trainees and experienced surgeons. Although widely acknowledged, temporal trends remain debated. Some evidence suggests relative stability, whereas other analyses indicate a worsening trajectory.

Elmore et al. reported that 69% of U.S. general surgery residents met criteria for burnout in at least one domain (emotional exhaustion, depersonalization, or reduced



Fig. 1 Integrated conceptual framework linking burnout, generational change, gender inequities, and surgical workforce instability. The figure illustrates the interaction between individual, institutional, and systemic determinants of the crisis of surgical vocation. Excessive workload, administrative burden, training intensity, reduced operative autonomy, gender inequities, and changing generational expecta-

tions contribute to burnout and reduced career attractiveness. These factors may affect recruitment, retention, leadership development, and workforce sustainability. Potential interventions include individual resilience strategies, structured mentorship, equitable operative exposure, institutional wellness policies, transparent career pathways, and national workforce planning

personal accomplishment), with higher prevalence among women, individuals working longer hours, and those anticipating non-academic careers [3].

Burnout extends beyond training. Data from the American College of Surgeons revealed a high prevalence among practicing surgeons, associated with younger age, family responsibilities, including childcare responsibilities and maternity-related demands, workload intensity, and dissatisfaction with work–life integration and compensation [4, 5]. These factors may disproportionately affect women surgeons. Additional stressors included regulatory pressures, electronic health records, and medico-legal concerns. Of particular concern, 6% of 7905 surgeons reported recent suicidal ideation, with a striking underutilization of mental health services due to stigma and concerns about professional repercussions, with only 26% seeking psychiatric help [5].

More recently, a 2018 survey conducted across six general surgery programs in North Carolina reported that 75% of residents and faculty experienced burnout, with 39% meeting criteria for depression and 12% reporting recent suicidal ideation. Barriers to adequate self-care included lack of time, denial, and stigma, ultimately leading many surgeons to discourage their children from pursuing a surgical career [5, 6].

Meta-analytic evidence reinforces these observations. Gili-Miner et al., analyzing 21 cross-sectional studies including 3,325 general surgeons, reported prevalence rates of 43% for emotional exhaustion (EE) and 41% for depersonalization (DP), with significant unexplained heterogeneity suggesting a multifactorial etiology supporting the concept of burnout as the result of a complex interplay of personal, professional, and systemic factors [7].

A systematic review and meta-analysis including 19 studies and 4,634 trauma surgeons reported a pooled burnout prevalence of 60%, exceeding that observed in most other surgical specialties. Emotional exhaustion and depersonalization were highly prevalent, whereas personal accomplishment was relatively preserved, suggesting the presence of intrinsic resilience factors. Younger age, prolonged working hours, and administrative burden were identified as key contributors, while mentorship and protected non-clinical time emerged as protective factors. These findings indicate that trauma surgeons may be particularly vulnerable [8].

A large systematic review by Etheridge et al., including 63,587 surgeons and trainees, found an overall burnout prevalence of 41%, with higher rates among trainees compared to attending surgeons (46% vs. 36%). Notably, trends over time (1996–2021) did not demonstrate a significant increase, suggesting a persistently high but stable burden showing a slight, non-significant decrease (− 4.8% per decade) [9].

Conversely, other authors describe an ongoing escalation, particularly among younger and female surgeons, with distress levels significantly exceeding those observed in the general population. Key contributing factors include poor work–life balance, prolonged working hours, and workplace mistreatment. Notwithstanding the implementation of structured interventions aimed at reducing dissatisfaction and emotional exhaustion, burnout rates continue to rise. Multiple surveys cited by the authors report prevalence rates ranging from 35% to 50% among attending surgeons and up to 70% among surgical trainees, with stress and psychological distress levels estimated to be 2–5 times higher than in the general population. Trauma surgeons appear particularly affected, with only 43% reporting satisfaction with work–life balance and 61% experiencing burnout symptoms. Overall, these findings support the view of burnout as a widespread and systemic issue requiring targeted strategies [10].

Importantly, burnout also has intergenerational implications. The well-being of senior surgeons directly influences trainees' psychological health and career perceptions. A French survey assessing quality of life among senior visceral surgeons and medical students ($n = 106$) found that, although students reported slightly lower levels of traumatic stress, their overall mental health and burnout were positively influenced by the well-being of their supervisors, underscoring the critical role of mentorship and professional modeling [11].

Interest in surgical careers among U.S. medical students has declined, with international graduates increasingly filling residency positions. Generational shifts likely contribute: while Baby Boomers (1946–1959) tended to prioritize professional achievement, individuals from Generation X (1960–1980) and Generation Y (1981–2000) place greater emphasis on work–life balance. Such expectations may be difficult to reconcile with the demands of surgical training and practice, characterized by long working hours, physical strain, prolonged training pathways, limited autonomy, and productivity pressures.

As highlighted by Sanfey et al., lifestyle considerations and family commitments, particularly among women, now play a central role in career decisions, contributing to the declining interest in surgery [12, 13].

Taken together, these findings support the interpretation of burnout not merely as an individual condition, but as a systemic phenomenon emerging from the interaction between personal vulnerability, organizational constraints, and evolving professional expectations.

Gender disparities in surgery: structural and cultural determinants

Gender-related disparities represent a crucial and increasingly recognized dimension of the surgical workforce crisis. Although women now constitute a substantial, and in many settings predominant, proportion of medical students, their representation within surgical specialties, particularly in senior and leadership positions, remains disproportionately low. This gap reflects not a lack of interest or capability, but rather the persistence of structural, cultural, and organizational barriers.

Limited access to mentorship and sponsorship remains a major challenge, with female trainees often reporting fewer opportunities for career guidance, operative autonomy, and integration into professional networks, key elements for academic advancement and leadership attainment [14].

These findings are consistent with national survey data from Italian surgical trainees and surgeons, which further highlight persistent structural barriers and gender-related career disruptions across the surgical pathway [15]. In parallel, evidence suggests that disparities in operative exposure emerge early during training, with female residents receiving fewer procedural opportunities and reduced operative autonomy compared with their male counterparts [16], indicating that inequities are established at a formative stage of professional development.

Work–family integration represents another significant obstacle. The demanding nature of surgical careers, characterized by prolonged training and inflexible schedules, frequently conflicts with reproductive choices and caregiving responsibilities. Consequently, women may encounter implicit or explicit pressures when planning pregnancy, maternity leave, or childcare, sometimes leading to delayed parenthood or career modification.

Cultural factors further compound these challenges: persistent stereotypes, implicit bias, and workplace discrimination may contribute to a less inclusive environment, with reports of microaggressions, reduced operative exposure, and unequal evaluation standards. This phenomenon has also been framed within broader analyses of diversity-related bias in surgical practice at a global level [17].

Importantly, disparities extend beyond training and workplace experience to issues of recognition and visibility. Women receive fewer awards from surgical societies and remain underrepresented as keynote speakers and session chairs at major scientific meetings, reinforcing a persistent “visibility gap” that may further hinder professional advancement [18, 19].

In Italy, despite women accounting for approximately 45–50% of surgical trainees, only 16–22% reach senior academic or leadership positions, such as full professorships or

department chair roles, according to Italian Ministry of University and Research data [20]. Evidence from specialty-specific studies, including recent national data in colorectal surgery, similarly highlights persistent inequalities in professional experience, perceived career progression, and leadership opportunities among female surgeons [21–23].

Within the context of the ongoing feminization of the medical workforce, addressing these disparities is not only an issue of equity but also a strategic priority. Failure to develop inclusive and sustainable career pathways risks exacerbating recruitment and retention challenges in an already strained system. A multidimensional approach is therefore required, encompassing structured mentorship programs, equitable access to operative training, transparent promotion criteria, and institutional policies supporting parental leave, flexible training pathways, and work–life integration. Equally important is fostering a cultural shift in which diversity is actively recognized as a driver of innovation and excellence in surgical care [21–23]. Therefore, gender inequities should not be interpreted as a separate issue, but as a core component of the surgical workforce crisis. Reduced access to mentorship and sponsorship, unequal operative exposure, work–family conflict, and limited leadership opportunities may contribute to lower retention, higher burnout risk, and reduced visibility of surgical careers among female medical students and trainees. In this sense, gender equity is directly linked to recruitment, professional development, and the long-term sustainability of general surgery. Addressing these disparities requires structured mentorship programs, equitable access to operative training, transparent promotion criteria, and institutional policies supporting parental leave, flexible training pathways, and work–life integration.

Multilevel strategies for mitigating burnout and enhancing resilience

A major and growing public health issue within the surgical workforce, burnout affects both trainees and attending surgeons. It develops in response to sustained mental, emotional, and physical demands and is further compounded by long working hours, administrative overload, workplace mistreatment, and impaired work–life integration. Its impact extends well beyond individual well-being, adversely affecting patient safety, team performance, and the long-term sustainability of the surgical workforce [24].

Efforts to address burnout cannot be limited to individual responsibility. Shanafelt et al. have emphasized that effective mitigation requires coordinated engagement from healthcare institutions, systems, and professional organizations [24, 25]. In line with this perspective, the National Academy of Medicine’s National Plan for Health Workforce

Well-Being provides a structured framework for action, fostering collaboration among hospitals, academic centers, professional societies, insurers, and governmental bodies to promote a culture that supports clinician well-being [26].

Sustainable improvement depends on interventions at multiple levels. While individual-centered strategies such as resilience training, mindfulness practices, emotional intelligence development, and self-compassion have shown measurable benefits in reducing distress and improving professional fulfillment [27–29], these approaches should be supported by systemic measures. Lower burnout rates and improved retention have been reported in institutions adopting structured wellness initiatives, mentorship programs, protected non-clinical time, and dedicated administrative support [30]. Within this framework, visible and sustained leadership commitment plays a critical role in signaling that surgeon well-being is an institutional priority.

Beyond the workplace, personal life factors also contribute significantly to burnout risk. Higher levels of burnout have been associated with work–home conflict, partner stress, and increased divorce rates, underscoring the relevance of interventions extending into the domestic sphere.

Protective measures may include protected family time, alongside institutional policies such as flexible childcare arrangements, parental leave, part-time and flexible career pathways, mid-career retraining opportunities, and couple-oriented support programs [31–33]. Complementary efforts to reduce administrative burden through task redistribution further help preserve professional engagement and sustainability.

Long-term improvement ultimately depends on sustained leadership at both institutional and national levels. By fostering mentorship, enforcing anti-bullying policies, modeling well-being, and driving structural reform, leadership can catalyze systemic change. Only through consistent, multi-layered implementation can burnout reduction strategies achieve a durable and meaningful impact on the surgical workforce [34].

Surgical enrollment in Italy: trends and challenges

Recent data underscore persistent challenges in the recruitment and retention of surgical trainees in Italy. In 2024 and 2025, the Italian Ministry of University and Research (MUR) made available 718 and 662 General Surgery residency positions, respectively; however, a substantial proportion of these positions remained unfilled. Until the most recent cycle, fewer than half of available slots were occupied, while approximately 20% of enrolled residents discontinued their training.

This persistent deficit adds to already elevated retirement rates and pre-existing workforce gaps, collectively

threatening the sustainability of the national healthcare system and its capacity to meet future surgical demand.

Beyond structural shortages, the social and professional appeal of surgery appears to have declined. Surgeons, once regarded as figures of high technical expertise and professional authority, may increasingly be perceived by trainees as overworked, legally exposed, and undercompensated, discouraging new entrants.

Within training programs, residents frequently report limited operative exposure, heterogeneity in case volume across institutions, and heavy workloads dominated by administrative tasks and frequent on-call duties. Insufficient rest, high fatigue, unclear medico-legal protection, inadequate compensation, and uncertain career prospects further undermine training satisfaction and retention [35].

These findings suggest that the Italian scenario may offer a useful national case study for examining how declining attractiveness of surgical careers can intersect with systemic workforce constraints in publicly funded healthcare systems.

In the 2025 selection cycle, according to data from the Italian medical unions Anao Assomed and ALS, 247 of 662 General Surgery positions remained unassigned, corresponding to an unassigned rate of 37.3% and a fill rate of 62.7%. The partial increase in filled General Surgery positions observed in the most recent selection cycle should be interpreted cautiously. Although several factors may have contributed to this change, including evolving perceptions of minimally invasive and robotic surgery, changes in medico-legal awareness, or broader fluctuations in candidate numbers, available data do not allow causal inference. Therefore, this finding should be considered a preliminary signal rather than evidence of a stable reversal in the attractiveness of General Surgery.

Ongoing workforce turnover, combined with increasing complexity in surgical care, is expected to sustain high demand for trained surgeons. The 2026 medical residency selection cycle introduces regulatory measures aimed at addressing shortages in critical specialties, including General Surgery. Recent national policies (2025 Budget Law and the “Milleproroghe” Decree) have implemented an asymmetrical increase in training positions, prioritizing less attractive disciplines through a variable stipend component, alongside a modest increase in the fixed quota and greater flexibility for residents to engage in limited external professional activities (up to 8 h per week). Within General Surgery, structural reforms include the introduction of dedicated subspecialty training pathways, such as Breast Surgery, reflecting the growing demand for highly specialized care. In parallel, there is a gradual transition toward a formal “work–training” model, intended to enhance residents’

professional autonomy and strengthen their legal and economic status within the National Health Service.

While these measures may partially improve the attractiveness of surgical training, their long-term impact remains uncertain. Further efforts will be required to address the underlying structural and cultural determinants of the current workforce crisis. Strengthening residency structures, ensuring consistent operative exposure, and improving working conditions remain essential priorities to secure the future of the Italian surgical workforce.

Limitations

This review has several limitations. First, as a narrative review, it does not follow the methodological requirements of a systematic review, and study selection may therefore be subject to selection bias. Second, the included studies are heterogeneous in terms of populations, settings, burnout definitions, and assessment tools, which limits direct comparability across studies. Third, much of the available evidence is cross-sectional, preventing causal inference between burnout, working conditions, gender inequities, and career outcomes. Fourth, the Italian residency data provide a useful national case study but may not be generalizable to other healthcare systems with different training structures, funding models, and workforce policies. Finally, some recent Italian data derive from institutional or professional association reports rather than peer-reviewed publications and should therefore be interpreted cautiously.

Conclusion

The crisis of surgical vocation and the persistent burden of burnout represent intertwined and systemic challenges with far-reaching implications for healthcare systems worldwide. Addressing these issues requires a paradigm shift from individual adaptation to systemic responsibility. This review highlights how burnout, generational transformations, and gender disparities are not isolated phenomena, but interconnected drivers of a broader workforce crisis. Their combined effect is progressively reshaping the identity, expectations, and sustainability of surgical careers [36, 37].

Multilevel strategies integrating individual, institutional, and policy-driven interventions are essential to restore the attractiveness and sustainability of surgical careers. In publicly funded healthcare systems, particular attention should be given to aligning remuneration with workload, responsibility, and training intensity. At the same time, improving the quality, consistency, and transparency of surgical training pathways remains a critical priority. Equally important is the need to foster inclusive professional environments

that address gender disparities and support diverse career trajectories. Concrete priorities should include standardized and repeated monitoring of burnout among surgeons and trainees, structured mentorship and sponsorship programs, equitable access to operative exposure, transparent career pathways, institutional policies supporting parental leave and work–life integration, and national workforce planning based on reliable data on training capacity, attrition, and future surgical demand. The future of general surgery will depend not only on technical excellence, but also on the ability of healthcare systems to make surgical careers sustainable, inclusive, and professionally fulfilling.

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Data Availability No new datasets were generated during the current study. Data reported in Table 1 were derived from the publicly available Anao Assomed and ALS analysis of the 2025 Italian national medical residency selection cycle, as indicated in the table footnote. All other data discussed in this narrative review are derived from the cited literature and publicly available institutional or professional sources.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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