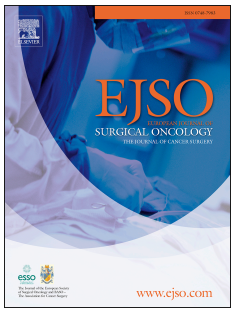
Journal Pre-proof



Current State of Surgical Oncology Fellowship Training in Türkiye: Results of a Nationwide Survey

Ezgi ALTINSOY, Veysel Cem ÖZCAN, Serdar ÇULCU, Lütfi DOĞAN, Ali Ekrem ÜNAL, Mehmet Ali GÜLÇELİK

PII: S0748-7983(26)00785-7

DOI: https://doi.org/10.1016/j.ejso.2026.112166

Reference: YEJSO 112166

To appear in: *European Journal of Surgical Oncology*

Received Date: 18 July 2026

Revised Date: 1 September 2026

Accepted Date: 21 September 2026

Please cite this article as: ALTINSOY E, ÖZCAN VC, ÇULCU S, DOĞAN L, ÜNAL AE, GÜLÇELİK MA, Current State of Surgical Oncology Fellowship Training in Türkiye: Results of a Nationwide Survey, *European Journal of Surgical Oncology*, https://doi.org/10.1016/j.ejso.2026.112166.

This is a PDF of an article that has undergone enhancements after acceptance, such as the addition of a cover page and metadata, and formatting for readability. This version will undergo additional copyediting, typesetting and review before it is published in its final form. As such, this version is no longer the Accepted Manuscript, but it is not yet the definitive Version of Record; we are providing this early version to give early visibility of the article. Please note that Elsevier's sharing policy for the Published Journal Article applies to this version, see: https://www.elsevier.com/about/policies-and-standards/sharing#4-published-journal-article. Please also note that, during the production process, errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

© 2026 Published by Elsevier Ltd.

Journal Pre-proof

Title: Current State of Surgical Oncology Fellowship Training in Türkiye: Results of a Nationwide Survey

Ezgi ALTINSOY Van Training and Research Hospital, Surgical Oncology Department

Veysel Cem ÖZCAN Antalya State Hospital, Surgical Oncology Department

Serdar ÇULCU Ankara University Faculty of Medicine, Surgical Oncology Department

Lütfi DOĞAN Ankara Etlik State Hospital, Surgical Oncology Department

Ali Ekrem ÜNAL Ankara University Faculty of Medicine, Surgical Oncology Department

Mehmet Ali GÜLÇELİK, University of Health Sciences Gülhane Faculty of Medicine, Surgical Oncology Department

Corresponding Author:

Ezgi Altınsoy
Surgical Oncology Department
Van Training and Research Hospital
ezgialtinsoy@gmail.com

Mobile: +905066453818

Journal Pre-proof

Abstract:

Introduction: Surgical oncology fellowship training plays a pivotal role in preparing surgeons for the increasing complexity of multidisciplinary cancer care. However, limited information is available regarding the current status of fellowship training in Türkiye. This study aimed to evaluate fellows' training experiences, educational environment, academic opportunities, and career expectations through a nationwide survey.

Materials and Methods: A nationwide cross-sectional electronic survey was conducted between November and December 2025 among all surgical oncology fellows actively enrolled in fellowship programs in Türkiye. The questionnaire comprised 42 items assessing demographic characteristics, operative and theoretical training, academic activities, working conditions, educational satisfaction, career expectations, and perceived training needs. Descriptive statistical analyses were performed.

Results: Thirty-six of 42 eligible fellows completed the survey (response rate, 85.7%). Most participants (69.4%) were satisfied with their practical surgical training, whereas only 33.3% considered their theoretical education satisfactory. Academic productivity was limited, with 77.8% reporting no authorship on an international publication during fellowship. More than half of the respondents considered the academic environment insufficient and reported limited participation in scientific meetings. Training experiences varied across centers regarding educational resources, faculty availability, compliance with mandatory rotations, and academic opportunities. Burnout symptoms were common, and substantial interest was expressed in national and international observerships, digital educational resources, multidisciplinary tumor boards, and structured academic development.

Conclusion: Surgical oncology fellows in Türkiye generally reported satisfaction with operative training but identified gaps in theoretical education, research opportunities, academic development, and educational standardization. These findings support ongoing efforts to strengthen fellowship training through competency-based educational strategies, enhanced academic mentorship, national accreditation, and increased international collaboration, thereby contributing to the continued advancement of multidisciplinary cancer care.

Keywords: Academic Surgery, Fellowship Training, Multidisciplinary Cancer Care, Surgical Education, Surgical Oncology, Trainee Perspectives

Journal Pre-proof

Introduction:

Cancer surgery remains a cornerstone of curative-intent treatment for many solid malignancies. However, the increasing complexity of oncologic care, driven by advances in molecular diagnostics, personalized therapies, minimally invasive techniques, and multidisciplinary treatment strategies, has expanded the competencies expected of contemporary surgical oncologists. Beyond technical proficiency in complex cancer operations, surgical oncologists are required to integrate evolving oncologic knowledge into clinical decision-making and collaborate effectively within multidisciplinary teams. Consequently, structured fellowship training has become a critical component in preparing surgeons for independent oncologic practice and leadership in cancer care (1, 2).

Subspecialty training in surgical oncology has been associated with improved clinical outcomes and greater adherence to evidence-based treatment principles. Accordingly, many countries have sought to develop structured fellowship programs that provide comprehensive exposure to complex oncologic surgery, multidisciplinary tumor management, research methodology, and academic development. Nevertheless, considerable variability persists among training programs worldwide with respect to operative volume, educational resources, mentorship opportunities, research infrastructure, and curriculum design. Such differences may influence both trainee competency and professional development, ultimately affecting the quality of cancer care delivered to patients (3-6).

Recognizing these challenges, international professional societies and educational organizations have increasingly advocated for harmonization of surgical oncology training through competency-based curricula, accreditation systems, collaborative educational initiatives, and international exchange opportunities. Understanding the strengths and limitations of local training environments is therefore essential for identifying areas of improvement and facilitating integration with evolving global educational standards (4, 5, 7).

In Türkiye, surgical oncology fellowship training was established in 1989 and has progressively expanded over the past decades. Following completion of general surgery residency, surgical oncology, gastroenterological surgery, and intensive care medicine are the formally recognized subspecialty training pathways available to general surgeons through the national subspecialty entrance examination; organ-based specialization in other areas may exist according to institutional practice but does not constitute a formally recognized subspecialty. Admission to surgical oncology fellowship is based on this centralized national examination and is restricted to board-certified general surgeons. Fellowship training lasts two years and is provided in both university hospitals and Ministry of Health-affiliated Training and Research Hospitals. Currently, 25 institutions are authorized by the Ministry of Health to provide surgical oncology subspecialty training, of which 18 maintained active fellowship programs at the time of the survey. Training is conducted according to the national Surgical Oncology Core Curriculum issued by the Board of Medical Specialties (TUKMOS), which defines the competencies expected during fellowship as well as minimum standards for training institutions and faculty (8). The curriculum includes mandatory one-month rotations in medical oncology, radiation oncology, gynecologic oncology, and plastic, reconstructive and aesthetic surgery, and fellowship training is completed following successful completion of a final theoretical and practical examination (8). The current national framework does not require completion of a thesis or other scholarly project for graduation, and nationally standardized minimum operative case numbers and a standardized operative logbook system have not been established. Following successful completion of fellowship training, graduates are subject to compulsory public service within the Turkish healthcare system, typically lasting approximately 450–650 days, which must be completed before subsequent employment in private healthcare institutions or university hospitals. These structural characteristics provide important context for interpreting fellows' educational experiences, working conditions, and future career expectations.

Although the number of training centers and fellows has increased substantially, there remains a paucity of data regarding the quality of surgical oncology fellowship training in Türkiye from the perspective of trainees. To date, no nationwide assessment has systematically evaluated fellows' experiences concerning operative exposure, academic opportunities, mentorship, research productivity, educational satisfaction, and preparedness for independent practice. Identifying these factors is essential for guiding future educational policies and quality improvement initiatives.

The present study reports the results of a nationwide survey of surgical oncology fellows in Türkiye. The objectives of this study were to characterize current training experiences, assess perceived strengths and deficiencies of existing fellowship programs, explore academic and professional expectations of trainees, and identify opportunities for improvement. By providing a comprehensive evaluation of fellowship training from the trainee perspective, this study aims to

contribute to ongoing efforts toward educational standardization, quality enhancement, and international collaboration in surgical oncology training.

Methods:

This cross-sectional descriptive survey study was conducted among surgical oncology fellows actively enrolled in subspecialty training programs in Türkiye. At the time of the survey, 42 fellows were undergoing surgical oncology training nationwide and were invited to participate.

The study was approved by Ankara University Human Research Ethics Committee (Approval number: 107-807-26).

Questionnaire Development and Administration

The survey was developed and conducted by the study authors to assess the current status of surgical oncology fellowship training in Türkiye, explore fellows' experiences and perceptions, and identify areas that could inform future educational initiatives. The 42-item questionnaire was designed as a multidomain descriptive needs-assessment instrument covering demographic characteristics, practical and theoretical training, academic activities, rotations, working conditions, professional well-being, expectations from the national society, and future career plans and concerns. Questionnaire development was conducted under the supervision of members of the Executive Board of the Turkish Society of Surgical Oncology, four of whom were among the study authors at the time of the survey. The initial questionnaire was reviewed by these experienced surgical oncologists for relevance, clarity, and comprehensiveness, and revisions were made based on their feedback. The revised questionnaire was subsequently pilot-tested in four surgical oncologists who had recently completed their fellowship training and were not included in the final study population. Pilot testing focused on the clarity and comprehensibility of the questionnaire items, and the final version was prepared based on the feedback received. As the questionnaire was designed as a multidomain descriptive survey rather than a psychometric scale, formal psychometric validation and reliability testing were not performed. Data collection and analysis were performed by the study authors. The complete questionnaire, translated into English, is provided as Supplementary Material 1.

The survey was administered electronically using Google Forms between November and December 2025. Participation was voluntary and anonymous, and completion of the questionnaire implied informed consent for the use of the data for research purposes. No patient data or personally identifiable information were collected.

The questionnaire consisted of 42 items evaluating demographic characteristics, operative exposure, educational activities, mentorship, research opportunities, international educational exposure, career expectations, and overall satisfaction with training. Most survey questions were multiple-choice, with an optional free-text section at the end allowing participants to provide additional comments regarding their training experiences.

Of the 42 eligible fellows, 36 completed the survey, corresponding to a response rate of 85.7%.

Statistical Analysis:

Data were summarized using descriptive statistics and reported as mean ± standard deviation (SD) or frequencies and percentages, as appropriate. Selected outcomes were descriptively compared according to fellowship institution type (Training and Research Hospital vs. University Hospital). Given the small sample size, no formal hypothesis testing was performed.

Results:

Participant Characteristics

At the time of the survey, 42 surgical oncology fellows were actively enrolled in fellowship training programs across Türkiye. All eligible fellows were invited to participate, and 36 completed the questionnaire, yielding a response rate of 85.7%.

Among respondents, 17 (47.2%) were aged 30–35 years, 8 (22.2%) were aged 35–40 years, 8 (22.2%) were aged 40–45 years, and 3 (8.3%) were aged 45–50 years. Three participants (8.3%) were female and 33 (91.7%) were male. Eighteen fellows (50.0%) had been practicing as board-certified general surgeons for fewer than five years prior to entering fellowship training. Detailed demographic characteristics are presented in Table 1.

Among the six non-responders, five (83.3%) were male and one (16.7%) was female; five (83.3%) were training at Training and Research Hospitals and one (16.7%) at a university hospital.

Motivations for Fellowship Training and Pre-training Preparation

When asked about their motivations for pursuing surgical oncology fellowship training (multiple responses permitted), the most frequently reported reason was personal interest in surgical oncology (75.0%, n = 27). Other commonly cited reasons included improved opportunities for appointment to public hospitals (58.3%, n = 21), expectations of an academic career (50.0%, n = 18), and avoidance of emergency department duties (50.0%, n = 18). Additional responses are summarized in Table 2.

Seventeen participants (47.2%) reported that they had not reviewed the national core curriculum before commencing fellowship training.

Academic Activity and Research Exposure

Academic productivity during fellowship training was limited. Twenty-eight fellows (77.8%) reported that they had not authored or co-authored an international scientific publication during fellowship training.

Regarding scientific meetings, 20 participants (55.6%) stated that they had been unable to attend conferences and congresses to the extent they had expected. Furthermore, 22 fellows (61.1%)

reported that they had not presented either an oral presentation or a poster at any scientific meeting during fellowship training.

When asked whether their institution provided adequate academic encouragement and sufficient case diversity for scientific research, only 15 participants (41.7%) responded positively, whereas 21 (58.3%) considered the academic environment insufficient.

Training Environment and Working Conditions

The number of faculty members available within training programs varied considerably. Seven participants (19.4%) reported training in departments with only one faculty member, while another seven (19.4%) reported having two faculty members.

Thirty-one fellows (86.1%) stated that they independently performed endoscopic procedures for their own patients within their institutions. However, 26 participants (72.2%) reported not holding formal endoscopy certification.

Compliance with off-service rotations appeared limited. Only seven fellows reported actually completing their assigned rotations within the host departments whereas the majority indicated that they continued working within their own surgical oncology departments despite being scheduled for off-service rotations.

Workload during fellowship training was substantial. Eighteen participants reported taking in-house call, seven reported taking on-call duties from home, and six reported both types of duties. Only five fellows stated that they had no after-hours responsibilities. Among fellows undertaking in-house call, 17 of 21 reported continuing their routine daytime clinical duties immediately after overnight call.

Weekly working hours, including on-call responsibilities, were reported as exceeding 60 hours per week by 14 participants (38.9%), while 10 fellows (27.8%) reported working more than 70 hours per week.

With regard to workplace culture, 28 participants (77.8%) believed that gender equality was maintained within their departments, while three (8.3%) felt that gender equality was lacking. Twenty-five fellows (69.4%) reported that they did not experience workplace bullying (mobbing), whereas six (16.7%) believed that bullying was present in their training environment.

Burnout symptoms were frequently reported. Seventeen participants (47.2%) stated that they felt burned out most of the time, while an additional 10 (27.8%) reported experiencing burnout intermittently.

Educational Satisfaction and Expectations

Most fellows considered the duration of fellowship training to be adequate, with 30 participants (83.3%) expressing satisfaction with the current training length.

Perceived satisfaction differed markedly between practical and theoretical components of fellowship training. Twenty-five fellows (69.4%) reported that their fellowship met expectations regarding practical surgical training. In contrast, only 12 participants (33.3%) felt that theoretical education met their expectations.

Training in supportive oncology appeared to be one of the weakest educational domains. When asked whether they had received sufficient education in pain management, palliative care, nutrition, psychological and spiritual support, and end-of-life care, only 10 participants (27.8%) responded positively. Nineteen fellows (52.8%) considered their training in these areas insufficient.

Interest in additional educational opportunities was high. Thirty-one participants (86.1%) expressed a desire to visit other national or international centers as observers for exposure to uncommon procedures, specialized surgical techniques, or scientific research activities.

When asked about expectations from the Turkish Society of Surgical Oncology, the most frequently requested initiatives were online multidisciplinary tumor boards, educational webinars and podcasts (n=28), followed by courses and educational programs designed to prepare candidates for international board examinations (n=23). Additional responses are presented in Table 3.

When asked whether they possessed sufficient information regarding future working conditions after completion of fellowship training, only 11 participants (30.6%) responded positively, while 19 (52.8%) stated that they did not have adequate information.

Career Plans and Future Concerns

Academic surgery was the most commonly reported career goal, selected by 25 participants (69.4%). Other frequently reported aspirations included employment in the private sector (n=13), work in public hospitals (n=11), establishing a private practice (n=11), and pursuing professional opportunities abroad (n=9). Detailed career preferences are summarized in Table 4.

Participants also reported substantial concerns regarding their future careers and quality of life. The most frequently cited concern was missing important aspects of personal life because of professional commitments (n=22), followed by inability to work in their preferred city (n=18) and concerns regarding future income (n=17). Additional concerns are summarized in Table 5.

At the end of the survey, participants were invited to provide optional free-text comments regarding their fellowship experiences. These comments are considered in the Discussion to provide additional context for the quantitative findings.

Exploratory analysis according to fellowship institution type

In an exploratory descriptive analysis, fellows training at university hospitals more frequently reported satisfaction with practical surgical training (85.7% vs. 59.1%), authorship of an international publication during fellowship (35.7% vs. 13.6%), and attendance at scientific

congresses as expected (57.1% vs. 36.4%) compared with fellows training at Training and Research Hospitals. In contrast, working more than 60 hours per week (57.1% vs. 27.3%) and frequent burnout (57.1% vs. 40.9%) were also more commonly reported among university hospital fellows. Satisfaction with theoretical education was similarly low in both groups (35.7% vs. 31.8%). Overall, no consistent pattern favoring either institution type was observed across the selected outcomes (Table 6).

Discussion:

To our knowledge, this study represents the first nationwide assessment of surgical oncology fellowship training in Türkiye and captures the perspectives of more than 85% of all fellows actively enrolled in training programs. The high response rate provides a comprehensive overview of the current educational landscape and offers valuable insight into both the strengths and challenges of contemporary surgical oncology training. The principal findings of this study are threefold: first, training experiences varied across centers with respect to educational resources, clinical exposure, and academic opportunities; second, although most fellows reported satisfaction with their operative training, opportunities for theoretical education, research participation, and academic development appeared considerably more limited; and third, fellows demonstrated a strong interest in national and international educational collaborations, observerships, and academic career development.

The demographic characteristics of our cohort suggest that surgical oncology continues to attract relatively early-career general surgeons with strong professional motivation. More than two-thirds of respondents were younger than 40 years of age, and half had less than five years of experience as board-certified general surgeons before entering fellowship training. Interest in surgical oncology was the most frequently reported motivation for pursuing subspecialty training, while approximately one-quarter of respondents stated that perceived deficiencies in their previous oncologic training contributed to their decision. These findings are consistent with reports from other countries demonstrating that exposure to complex oncologic cases during general surgery residency may be limited and that trainees frequently seek fellowship training to acquire competencies not fully achieved during residency training (9). Surgical oncology therefore serves not only as an advanced technical training pathway but also as a mechanism through which surgeons acquire expertise in multidisciplinary cancer care, oncologic decision-making, and academic leadership (3).

One of the most important findings of this study is the considerable heterogeneity observed among fellowship programs. Differences in faculty numbers, institutional resources, access to subspecialized mentorship, compliance with mandatory rotations, and academic opportunities suggest that fellowship experiences may vary substantially depending on training location. Such variability is not unique to Türkiye. Previous studies from the United States, Brazil, and other healthcare systems have similarly reported differences in operative exposure, educational experiences, and readiness for independent practice among fellowship graduates (6, 10, 11). Nevertheless, our findings indicate that the existence of a national core curriculum alone may not be sufficient to ensure educational uniformity. Several respondents highlighted concerns regarding inconsistencies in training experiences, and many expressed a desire for greater standardization between institutions.

Exploratory stratification by fellowship institution type revealed numerical differences in several educational, academic, and working-condition outcomes; however, no consistent pattern favoring either university hospitals or Training and Research Hospitals was observed. Notably, university hospital fellows reported higher practical training satisfaction and greater academic participation, but also longer working hours and more frequent burnout. These findings suggest that the variability in fellowship experiences may not be explained solely by institution type and may reflect differences at the individual program level.

These findings raise important questions regarding competency assessment and quality assurance in surgical oncology training. Although Türkiye has a national core curriculum, there are currently no nationally mandated minimum case requirements, standardized operative logbooks, or comprehensive mechanisms for monitoring curriculum implementation across institutions. In contrast, accreditation systems such as those utilized by the Accreditation Council for Graduate Medical Education (ACGME) in the United States combine curriculum requirements with minimum procedural exposure, competency-based assessment, structured fellow evaluation, and accreditation standards (12). While healthcare systems differ substantially between countries, several of these principles may inform future efforts aimed at strengthening standardization within Turkish surgical oncology training programs. Encouragingly, the recently introduced accreditation initiative of the Turkish Society of Surgical Oncology represents an important first step toward external quality assurance and educational standardization.

Academic development emerged as a second major theme. Despite strong interest in academic careers, research productivity and scholarly engagement during fellowship appeared limited. More than three-quarters of respondents reported no authorship on an international publication during fellowship training, and most had not presented scientific work at national or international meetings. Furthermore, more than half considered their institutional academic environment insufficient. These findings are particularly noteworthy given that approximately two-thirds of participants expressed an intention to pursue academic careers following graduation. Interest in academic surgery was therefore high, yet opportunities for academic development appeared substantially more limited.

Several factors may contribute to this discrepancy. Unlike many fellowship programs internationally, Turkish surgical oncology fellowships currently do not include protected research time, mandatory scholarly projects, or thesis requirements. In many contemporary training systems, academic development is considered an integral component of surgical oncology education rather than an optional activity (3). The European Society of Surgical Oncology (ESSO) Global Curriculum in Surgical Oncology and the ESSO Global Curriculum in Research Literacy both emphasize the importance of scientific methodology, critical appraisal, research participation, and academic leadership as core competencies of the modern surgical oncologist (3, 13). Our findings suggest that greater emphasis on these domains may help align fellowship training with evolving international expectations.

Workload and burnout represented another important theme emerging from the survey. A substantial proportion of fellows reported long working hours, continuation of clinical duties following overnight call, and frequent feelings of burnout. These findings are consistent with the broader surgical education literature demonstrating that excessive workload and inadequate

recovery time may negatively affect trainee well-being, educational engagement, and academic productivity (14). Notably, the most commonly reported future concern among respondents was the perception of "missing life" because of professional commitments. This observation highlights an increasingly recognized challenge in surgical training worldwide: balancing excellence in clinical education with sustainable working conditions and physician well-being.

The impact of workload on educational quality may also explain one of the most striking findings of our study. While most fellows reported satisfaction with their operative training, only one-third considered their theoretical education satisfactory. Similarly, participation in scientific meetings, research activities, and scholarly output remained limited despite strong academic aspirations. Taken together, these findings suggest that service demands may, at times, compete with educational objectives. The observation that only a minority of fellows were able to fully participate in mandatory rotations further supports this interpretation. Fellowship programs must inevitably balance clinical service and education; however, ensuring that educational objectives remain protected is essential for the development of future surgical oncologists.

Modern surgical oncology extends well beyond operative management alone. Surgical oncologists are expected to participate in multidisciplinary decision-making, communicate effectively with patients and families, understand systemic treatment strategies, and contribute to palliative and supportive care. In our study, many fellows reported insufficient exposure to pain management, palliative care, nutritional support, psychological care, and end-of-life management. Importantly, similar deficiencies have been reported internationally. Previous studies from both surgical oncology and hepatopancreatobiliary fellowship programs have demonstrated limited formal education and assessment in palliative care despite widespread recognition of its importance (15-17). These findings suggest that the challenge is not unique to Türkiye but reflects a broader educational gap within contemporary surgical oncology training. Future curriculum development should therefore ensure that multidisciplinary and supportive oncology competencies receive attention comparable to operative training.

An additional finding deserving attention is the marked underrepresentation of women among current surgical oncology fellows. Although our study was not specifically designed to evaluate gender-related barriers, only three respondents were female. Similar concerns regarding gender representation have been raised internationally, although the proportion of female applicants and trainees reported in several North American studies appears substantially higher than that observed in our cohort (2, 11). The reasons underlying this discrepancy remain unclear and cannot be determined from our data. Nevertheless, improving diversity within the surgical oncology workforce should be considered an important objective, and further studies exploring barriers to recruitment and retention of female surgical oncologists in Türkiye are warranted (18).

Many respondents emphasized the importance of educational opportunities beyond their home institutions. More than 85% expressed interest in visiting other national or international centers for exposure to uncommon procedures, specialized techniques, and scientific activities. Likewise, fellows identified webinars, online educational content, multidisciplinary tumor boards, and preparation courses for international board examinations as priorities for future educational initiatives. These findings reflect a growing recognition that contemporary surgical

education increasingly extends beyond the boundaries of individual institutions. Digital educational platforms, virtual multidisciplinary meetings, and structured online learning resources may therefore represent valuable complements to traditional institution-based apprenticeship training models (19, 20).

International collaboration may play a particularly important role in addressing several of the challenges identified in this study. In 2016, leaders of the Society of Surgical Oncology (SSO) and the ESSO jointly developed a Global Curriculum in Surgical Oncology, followed by a Global Curriculum in Research Literacy (3, 13). These initiatives recognize that modern surgical oncologists require competencies not only in operative management but also in multidisciplinary cancer care, clinical research, leadership, education, and scientific communication. The strong interest expressed by Turkish fellows in observerships, international training opportunities, and academic development suggests substantial alignment between local educational needs and the competencies prioritized in these international curricula.

Importantly, international collaboration should not be viewed as a unidirectional process. Türkiye has a large healthcare system with a substantial cancer case volume and extensive clinical experience in complex oncologic surgery (21). Integration into international educational and research networks therefore has the potential to generate mutual benefit. Collaborative research projects, fellow exchange programs, international observerships, joint educational activities, and participation in international board certification pathways may contribute not only to the development of Turkish surgical oncology training but also to the broader global surgical oncology community. The recent strengthening of institutional relationships with ESSO may provide an important framework for such initiatives.

Based on our findings, several opportunities for improvement can be identified. Greater standardization of training programs, implementation of standardized operative logbooks, establishment of minimum procedural exposure requirements, development of accreditation mechanisms, expansion of research mentorship programs, and creation of protected academic time may all contribute to improved educational outcomes. National professional organizations may play a central role in coordinating these efforts. Furthermore, structured observership pathways and interinstitutional rotation networks could help reduce disparities in case exposure between training centers.

Future curriculum development should also consider emerging technologies and evolving patterns of cancer care. Robotic surgery, advanced minimally invasive techniques, digital education platforms, and competency-based assessment models are increasingly being incorporated into surgical oncology training worldwide (22). While these areas were not directly assessed in the present study, ensuring that future generations of surgical oncologists receive appropriate exposure to these developments will likely become increasingly important.

This study has several limitations. The findings are based on self-reported survey responses and may therefore be subject to recall and response bias. In addition, objective measures of operative competency, academic productivity, and educational outcomes were not evaluated. Nevertheless, the exceptionally high response rate and nationwide representation strengthen the validity of our observations and provide a comprehensive overview of the current state of surgical oncology

fellowship training in Türkiye. Despite the high nationwide response rate (85.7%), non-response bias cannot be completely excluded. Five of the six non-responders were training at Training and Research Hospitals, and information on other potentially relevant characteristics, such as fellowship stage, was unavailable.

The small sample size limited more detailed comparative analyses, and the exploratory stratification by institution type should be interpreted descriptively rather than as evidence of differences between the two institutional settings.

Although the questionnaire underwent expert review and pilot testing in recently graduated surgical oncologists before nationwide distribution, it was developed specifically for this study and did not undergo formal psychometric validation or reliability testing. This should be considered when interpreting the findings and may limit the external reproducibility of the instrument.

In conclusion, surgical oncology fellows in Türkiye generally reported satisfaction with their operative training but identified important deficiencies in theoretical education, academic development, and research opportunities. Variability in training experiences across centers remains evident, and many fellows expressed a desire for greater national and international educational engagement. The findings of this study may also serve as a benchmark for other countries seeking to evaluate and further develop national surgical oncology fellowship training programs. Ultimately, strengthening fellowship education will contribute not only to the professional development of future surgical oncologists but also to the quality of multidisciplinary cancer care delivered to patients.

References:

1. Marano L, Verre L, Carbone L, et al. Current Trends in Volume and Surgical Outcomes in Gastric Cancer. *J Clin Med*. 2023;12(7):2708. Published 2023 Apr 4. doi:10.3390/jcm12072708

2. Tsilimigras DI, Chatzipanagiotou O, Woldesenbet S, et al. Practice Patterns and Outcomes Among Surgical Oncology Fellowship Graduates Performing Complex Cancer Surgery in the United States Across Different Career Stages. *Ann Surg Oncol*. 2024;31(8):4873-4881. doi:10.1245/s10434-024-15436-0

3. Are C, Berman RS, Wyld L, Cummings C, Lecoq C, Audisio RA. Global Curriculum in Surgical Oncology. *Ann Surg Oncol*. 2016;23(6):1782-1795. doi:10.1245/s10434-016-5239-7

4. Are C, Caniglia A, Malik M, et al. Variations in training of surgical oncologists: Proposal for a global curriculum. *Eur J Surg Oncol*. 2016;42(6):767-778. doi:10.1016/j.ejso.2016.04.004

5. Temple WJ, Morton DI, Mattheiem W, Kulakowski A, Guimaraes dos Santos J, Oldhoff J. World Federation of Surgical Oncology Societies. Surgical Oncology training programme guidelines. *Eur J Surg Oncol*. 1996;22(5):538-539. doi:10.1016/s0748-7983(96)93172-8

6. Spencer RMSSB, de Castro Ribeiro HS, de Araujo RLC, et al. Challenges in surgical oncology training in Brazil: From history to a board-certified specialization. *J Surg Oncol*. 2020;121(5):707-717. doi:10.1002/jso.25850

7. Berman RS, Kurtzman SH, Posner MC, Gershenwald JE. Society of surgical oncology fellowship training: where we have been, where we are now, and where we are going. *J Surg Oncol*. 2009;100(3):179-181. doi:10.1002/jso.21305

8. Board of Medical Specialties Curriculum Development and Standards System (TUKMOS). Core Curriculum for Surgical Oncology Subspecialty Training. Version 2.3. Republic of Türkiye Ministry of Health, Board of Medical Specialties; 2017. [in Turkish].

9. Brenner BM, De Donno MA. Assessing Gaps in Surgical Oncology Training: Results of a Survey of General Surgery Residents. *J Surg Educ*. 2020;77(4):749-756. doi:10.1016/j.jsurg.2020.01.011

10. Tsilimigras DI, Woldesenbet S, Chatzipanagiotou OP, et al. Variations in Outcomes of Surgical Oncology Fellowship Graduates Performing Hepatopancreatic Surgery in the United States Based on Fellowship Training Program. *Ann Surg Oncol*. 2025;32(9):6295-6302. doi:10.1245/s10434-025-17587-0

11. Behrens S, Lillemoe HA, Dineen SP, et al. Perceptions of Readiness for Practice After Complex General Surgical Oncology Fellowship: A Survey Study. *Ann Surg Oncol*. 2024;31(1):31-41. doi:10.1245/s10434-023-14524-x

12. Lee AY, Delman KA, Berman RS. Development of a surgical oncology training curriculum for accreditation. *J Surg Oncol*. 2020;122(1):15-20. doi:10.1002/jso.25933

13. Are C, Yanala U, Malhotra G, et al. Global Curriculum in Research Literacy for the Surgical Oncologist. *Ann Surg Oncol*. 2018;25(3):604-616. doi:10.1245/s10434-017-6277-5

14. Shanafelt TD, Boone S, Tan L, et al. Burnout and satisfaction with work-life balance among US physicians relative to the general US population. *Arch Intern Med*. 2012;172(18):1377-1385. doi:10.1001/archinternmed.2012.3199

15. Dineen S, O'Leary C, Rajasekhara S, Mullinax J. Implementation of a Palliative Surgical Oncology Rotation to Complex General Surgical Oncology Fellowship Training. Ann Surg Oncol. 2025;32(10):7124-7130. doi:10.1245/s10434-025-18152-5

16. Larrieux G, Wachi BI, Miura JT, et al. Palliative Care Training in Surgical Oncology and Hepatobiliary Fellowships: A National Survey of Program Directors. Ann Surg Oncol. 2015;22 Suppl 3:S1181-S1186. doi:10.1245/s10434-015-4805-8

17. Bonanno AM, Kiraly LN, Siegel TR, Brasel KJ, Cook MR. Surgical palliative care training in general surgery residency: an educational needs assessment. Am J Surg. 2019;217:928–931.

18. Bruce AN, Battista A, Plankey MW, Johnson LB, Marshall MB. Perceptions of gender-based discrimination during surgical training and practice. *Med Educ Online*. 2015;20:25923. Published 2015 Feb 3. doi:10.3402/meo.v20.25923

19. Barmettler G, Adnan S, Malcolm TSN, Terhune K, Joshi ART. Power of the collective: A review of multimodal internet-based surgical education resources in the 21st century. *J Surg Oncol*. 2021;124(2):174-180. doi:10.1002/jso.26482

20. Temperley H, Waters C, Larkins K, et al. The educational value of the multi-disciplinary meeting (MDM) in surgical oncology: A systematic review and thematic content analysis. *Eur J Surg Oncol*. 2022;48(5):935-945. doi:10.1016/j.ejso.2022.01.026

21. Republic of Türkiye Ministry of Health. General Directorate of Public Health. Cancer Statistics in Türkiye [Internet]. Ankara: Ministry of Health; [cited 2026 Jul 18]. Available from: https://hsgm.saglik.gov.tr/tr/kanser-istatistikleri.html

22. Al Abbas AI, Wang C, Hamad AB, et al. Mentorship and formal robotic proficiency skills curriculum improve subsequent generations' learning curve for the robotic distal pancreatectomy. *HPB (Oxford)*. 2021;23(12):1849-1855. doi:10.1016/j.hpb.2021.04.022

Tables:

Table 1. Demographic and Professional Characteristics of Surgical Oncology Fellows

Variable	Value, n (%)
Age, years	
Mean ± SD	**37.1 ± 5.1**
30–35	17 (47.2)
35–40	8 (22.2)
40–45	8 (22.2)
45–50	3 (8.3)
Sex	
Male	33 (91.7)
Female	3 (8.3)
Years in independent general surgical practice before fellowship	
Mean ± SD	**6.1 ± 4.0**
<5 years	18 (50.0)
5–10 years	12 (33.3)
>10 years	6 (16.7)

Variable	Value, n (%)
General surgery residency completed at	
Training and Research Hospital	23 (63.9)
University Hospital	13 (36.1)
Current surgical oncology fellowship institution	
Training and Research Hospital	22 (61.1)
University Hospital	14 (38.9)

Table 2. Factors Influencing the Decision to Pursue Surgical Oncology Fellowship Training

Reason	n (%)
Interest in surgical oncology	27 (75.0)
Greater likelihood of appointment to tertiary referral hospitals	21 (58.3)
Desire to pursue an academic career	18 (50.0)
Preference to avoid emergency general surgery duties	18 (50.0)
Relief from temporary compulsory assignments	13 (36.1)
Perceived inadequacy of oncologic training during general surgery residency	10 (27.8)
Social reasons (e.g., spouse relocation, family-related considerations)	10 (27.8)
Expectation of higher income	8 (22.2)

Note: Participants were allowed to select more than one response.

Table 3. Educational and Professional Expectations from the Turkish Society of Surgical Oncology

Expectation	n (%)
Online multidisciplinary tumor boards, educational webinars, and podcasts for fellows	28 (77.8)
Courses and educational programs for international board examinations	23 (63.9)
Encouragement to present scientific work at national and international meetings	21 (58.3)
Scholarships for international training programs and board examinations	20 (55.6)
Financial support for conference participation	20 (55.6)
Initiatives to incorporate endoscopy training into the fellowship curriculum	19 (52.8)

Journal Pre-proof

Expectation	n (%)
Short-term national observership programs	18 (50.0)
Surgical oncology fellows' congress	15 (41.7)
Legal support for fellows	15 (41.7)
Establishment of a fellows' committee and national fellows' network	11 (30.6)
Organization of multicenter collaborative research through disease-specific working groups	1 (2.8)

Note: Participants were allowed to select more than one response.

Table 4. Future Career Preferences of Surgical Oncology Fellows

Career Preference	n (%)
Academic career	25 (69.4)
Employment in the public healthcare sector	11 (30.6)
Employment in the private healthcare sector	13 (36.1)
Private practice	11 (30.6)
Working abroad	9 (25.0)

Note: Participants were allowed to select more than one response.

Table 5. Future Career Concerns of Surgical Oncology Fellows

Concern	n (%)
Missing out on life because of professional commitments	22 (61.1)
Not being able to work in my preferred city	18 (50.0)
Not earning the income I desire	17 (47.2)
Not being able to work at my preferred institution	13 (36.1)
Not being able to pursue an academic career	12 (33.3)
Having to continue taking emergency general surgery call	12 (33.3)
Not being happy during compulsory service	10 (27.8)

Note: Participants were allowed to select more than one response.

Table 6. Exploratory descriptive comparison of selected fellowship outcomes according to training institution type

Outcome	Training and Research Hospital (n=22), n (%)	University Hospital (n=14), n (%)
Satisfaction with practical surgical training (score 4–5)	13 (59.1)	12 (85.7)
Satisfaction with theoretical education (score 4–5)	7 (31.8)	5 (35.7)
Academic environment considered sufficient (score 4–5)	8 (36.4)	7 (50.0)
International publication during fellowship	3 (13.6)	5 (35.7)
Attendance at scientific congresses as expected	8 (36.4)	8 (57.1)
Presentation at a surgical oncology meeting	8 (36.4)	6 (42.9)
Supportive/palliative oncology training considered sufficient (score 4–5)	5 (22.7)	5 (35.7)
Frequent burnout (score 4–5)	9 (40.9)	8 (57.1)
Working >60 hours per week	6 (27.3)	8 (57.1)
Attendance at the designated rotation department*	6/16 (37.5)	1/10 (10.0)

*For the rotation analysis, fellows who had not yet undertaken a rotation were excluded (Training and Research Hospitals, n=6; University Hospitals, n=4). Data are presented as n (%). Satisfaction/sufficiency and burnout outcomes were derived from 5-point Likert-scale responses; scores of 4–5 were categorized as positive/high responses. This analysis was exploratory and descriptive; no formal hypothesis testing was performed.

Journal Pre-proof

Journal Pre-proof

CRediT Author Statement

Ezgi ALTINSOY: Writing and editing, Project administration

Veysel Cem ÖZCAN: Conceptualization, Project administration

Serdar ÇULCU: Resources

Lütfi DOĞAN: Data curation

Ali Ekrem ÜNAL: Resources, Supervision

Mehmet Ali GÜLÇELİK: Resources, Supervision

Journal Pre-proof

Journal Pre-proof

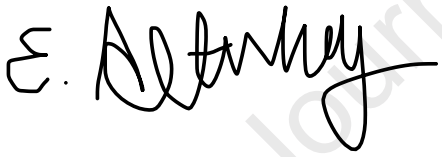
Declaration of Interest Statement

☒ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☐ The author is an Editorial Board Member/Editor-in-Chief/Associate Editor/Guest Editor for this journal and was not involved in the editorial review or the decision to publish this article.

☐ The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Ezgi Altınsoy, MD
On behalf of all authors



Journal Pre-proof