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## ORIGINAL ARTICLE

# ATTITUDES OF THORACIC SURGEONS AND RESIDENTS TOWARD THORACIC SURGERY IN ELDERLY PATIENTS

## ABSTRACT

**Introduction:** We evaluated the clinical attitudes of thoracic surgery specialists and residents in Turkey toward thoracic surgery in elderly patients, their perceptions of geriatric support in surgical decision-making, and their educational needs.

**Materials and Method:** This descriptive, cross-sectional survey study included thoracic surgery specialists, academic surgeons, and residents currently practicing in Turkey. Data were collected anonymously via Google Forms between July and September 2025. The questionnaire comprised items related to demographic characteristics, surgical decision-making, geriatric support, multidisciplinary approach, and educational needs. Statistical analysis included descriptive statistics, comparative tests, effect size calculations, and multivariable logistic regression analysis.

**Results:** The study recruited 103 participants. A large majority of participants (90.3%) reported that minimally invasive approaches were advantageous for patients aged  $\geq 65$  years, and strong agreement was observed with the statement that chronological age alone should not be considered a contraindication to surgery. Overall performance status was identified as the primary determinant in surgical decision-making. Overall, 62.1% of participants reported limited access to geriatric specialists at their institution, and 60.2% stated that they had not received structured education on the management of elderly patients. In addition, residents demonstrated a more indecisive attitude toward non-operative approaches compared with specialists and academic surgeons, with 60.0% of residents reporting uncertainty.

**Conclusion:** Thoracic surgeons support an individualized, multidisciplinary approach to surgical care in elderly patients, but limited access to geriatric support and gaps in education restrict the full implementation of this approach in clinical practice. Stronger geriatric-based multidisciplinary models and educational programs could improve the quality of care for elderly patients when they undergo thoracic surgery.

**Keywords:** Aged; Thoracic Surgery; Geriatrics; Patient Care Team; Decision Making.

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## INTRODUCTION

The global population of those aged 65 years and older has more than doubled over the past three decades, from 327.6 million in 1990 to 673.7 million in 2017, with the proportion of older adults rising from 6.1% to 8.8% of the total population. In high-income countries, the proportion of such individuals increased from 12.1% in 1990 to 17.5% in 2017. Annual rates of population aging of 0.08% in Asia and 0.15% in Europe have been reported (1, 2). Similarly, the proportion of Turkey's population aged 65 and older increased from 9.7% in 2021 to 10.6% in 2024 and is projected to exceed 16% by 2040. The nation's aging trajectory, which parallels that of European countries, underscores the need of its healthcare systems to prepare for this demographic transition (3).

The demand for thoracic surgical interventions has grown with the elderly population. Because the incidence of lung cancer rises with age, individuals aged 65 and older constitute a substantial proportion of patients undergoing thoracic oncologic surgery (4). The incidence of conditions requiring surgical management, such as pneumonia, empyema, and traumatic thoracic injuries, also increases with advancing age (5). Advances in surgical techniques, particularly the adoption of video-assisted thoracoscopic surgery (VATS) and robotic surgery, have improved surgical feasibility and outcomes in appropriately selected elderly patients (4, 6).

Aging is associated with reduced physiological reserve and increased postoperative risk. However, chronological age alone is an insufficient predictor of surgical outcomes; frailty, respiratory function, and overall functional status are more decisive. For instance, low forced expiratory volume in one second (FEV<sub>1</sub>) is linked to higher complication risk. Nonetheless, carefully selected elderly patients may achieve outcomes comparable to younger individuals (6, 7).

Consequently, multidisciplinary care models centered on comprehensive geriatric assessment

(CGA) are increasingly important in the management of elderly surgical patients. Systematic reviews have demonstrated that CGA-based multidisciplinary care reduces postoperative complications, delirium rates, and length of hospital stay. Geriatric consultation and co-management models have also been reported effective in preserving functional capacity, reducing complications, and improving discharge planning (8, 9).

Surgeons' attitudes toward elderly patients are described in the literature as heterogeneous. Some surgeons tend to adopt a more conservative or avoidant approach due to concerns about elevated complication risk, and evidence of age-related bias suggests that surgical options may be restricted solely on the basis of chronological age, even in patients with limited comorbidity and good functional status (10). Limited access to geriatric consultation, shortages of geriatric specialists, structural and communication barriers, and regulatory constraints play significant roles in this context. Improved alignment with patient goals, better complication management, and enhanced discharge planning have been reported for centers where geriatric support becomes available (11). In addition, surveys conducted in surgical and geriatric disciplines have identified substantial educational needs in areas such as frailty assessment, delirium management, and multidisciplinary collaboration. Microlearning and hands-on training approaches can enhance surgical residents' knowledge and skills in the care of elderly patients (12). To date, no study has specifically evaluated the perspectives of surgeons in Turkey regarding the management of elderly patients and collaboration with geriatric services.

This study was conducted to assess the clinical approaches of thoracic surgeons and residents regarding thoracic surgery in elderly patients, their perceptions of geriatric support in surgical decision-making, and their educational needs in this field. Specifically, the study examined which clinical factors

physicians prioritize in the management of elderly patients, their access to geriatric consultation, their views on multidisciplinary collaboration, and the challenges encountered in the current healthcare system. The findings are intended to contribute to strengthening geriatric-oriented models in the care of elderly thoracic surgery patients and to identifying areas requiring improvement.

In this study, the term “elderly” primarily refers to individuals aged  $\geq 65$  years, consistent with international demographic definitions. However, specific age subgroups (e.g.,  $\geq 80$  and  $\geq 85$  years) were explored separately to assess variations in surgical attitudes toward advanced age.

## **MATERIALS AND METHOD**

This study was designed as a descriptive, cross-sectional, questionnaire-based survey to evaluate attitudes toward thoracic surgery in elderly patients, perceptions of geriatric support, and related educational needs. The study population consisted of thoracic surgery specialists and residents actively practicing in Turkey. Questionnaires with more than 20% missing responses were excluded from analysis. As this was an exploratory national survey without a predefined primary hypothesis, no formal a priori sample size calculation was performed; the final sample reflects voluntary participation during the study period.

Participants were recruited through professional communication groups and networks that included thoracic surgery specialists and residents across Turkey. Convenience and snowball sampling methods were used concurrently, with participants encouraged to share the survey link with colleagues. Because recruitment relied on network-based dissemination, the exact number of individuals who received or viewed the invitation could not be determined; therefore, a precise response rate could not be calculated. As participation was voluntary and anonymous, non-responder analysis was not feasible. Participants were recruited via

a professional communication group of thoracic surgeons practicing in Turkey (approximately >300 members) and through snowball dissemination to residents within their clinics.

The questionnaire included sections on demographic characteristics, surgical decision-making processes, experiences and attitudes toward geriatric support, multidisciplinary collaboration, and educational needs in the management of elderly patients. A 5-point Likert scale was used for attitudinal items, while selected questions included three response options.

## **Questionnaire Development**

The questionnaire was developed through a structured multi-step process. A focused literature review was conducted in PubMed to identify key domains related to geriatric surgical care, multidisciplinary management, perioperative risk perception, and educational needs in elderly patients. Based on these domains, an initial item pool was generated by the research team. The draft instrument was reviewed by senior thoracic surgeons with substantial clinical experience to assess content relevance, clarity, and comprehensiveness. Following iterative revisions, minor refinements in wording and response structure were made, and the final version was approved for dissemination.

No formal pilot testing, Content Validity Index (CVI) calculation, or test–retest reliability assessment was conducted, as the questionnaire was designed as an exploratory descriptive instrument intended to map national attitudes rather than to establish a validated psychometric construct. This methodological approach is consistent with exploratory attitude surveys in surgical research and is acknowledged as a limitation of the study. The complete questionnaire is provided as Supplementary File 1.

Data were collected anonymously via Google Forms between July and September 2025. At the



beginning of the survey, participants were informed about the purpose and scope of the study, and electronic informed consent was obtained prior to participation. No identifiable personal data were collected, and responses were stored in a password-protected database accessible only to the research team. The study was conducted in accordance with the Declaration of Helsinki and received approval from the local ethics committee (Approval No: 431; July 8, 2025).

### Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics. Categorical variables are presented as frequencies and percentages, and continuous variables as mean  $\pm$  standard deviation or median (interquartile range), as appropriate. Comparisons between specialists and residents were conducted using chi-square or Fisher's exact tests for categorical variables and independent samples t-test, Mann–Whitney U test, or Kruskal–Wallis test for continuous or ordinal variables, depending on distributional assumptions.

A p-value  $<0.05$  was considered statistically significant. Given the exploratory nature of the study, no formal adjustment for multiple comparisons was applied; therefore, subgroup findings should be interpreted cautiously. However, inferential emphasis was placed on a limited number of pre-specified primary comparisons, particularly differences in surgical willingness between professional groups, defined a priori based on the study objectives.

Effect sizes were reported alongside p values (Cramér's V for chi-square tests, Cohen's d for between-group mean differences, and  $\eta^2$  for Kruskal–Wallis tests). A multivariable logistic regression model was used to identify independent predictors of high surgical willingness. Adjusted odds ratios (ORs) with 95% confidence intervals (CIs) were reported. As this was an exploratory descriptive survey, no a priori sample size or power calculation was performed.

## RESULTS

A total of 103 thoracic surgery specialists, residents, and academicians participated. Unless otherwise stated, percentages are reported based on the number of participants who responded to each specific question.

### Demographic and professional characteristics of participants

Of the participants, 49.5% (51/103) were specialists, 26.2% (27/103) were academicians, and 24.3% (25/103) were residents. The duration of professional experience in thoracic surgery was 1–5 years for 36.3% (37/102), 6–10 years for 30.4% (31/102), 10–20 years for 22.5% (23/102), and  $\geq 20$  years for 10.8% (11/102); one participant did not respond to this item. Overall, 66.0% (68/103) of participants were male, and 34.0% (35/103) were female.

Among the 102 respondents who answered the question regarding institution type, 40.2% (41/102) worked in training and research hospitals, 36.3% (37/102) in university hospitals, 14.7% (15/102) in state hospitals, and 8.8% (9/102) in private hospitals. Regarding surgical involvement in patients aged  $\geq 65$  years, 59.2% (61/103) reported performing  $\geq 31$  surgeries annually, 13.6% (14/103) performed 21–30, 15.5% (16/103) performed 11–20, and 11.7% (12/103) performed 0–10 such procedures. Demographic and professional characteristics are summarized in Table 1.

When asked about the most important factor influencing surgical decision-making in patients aged  $\geq 65$  years, 57.3% (59/103) identified overall performance status, 36.9% (38/103) tumor stage and extent, 3.9% (4/103) postoperative complication risk, and 1.9% (2/103) patient and family preferences.

Among the primary perceived surgical risks, 78.6% (81/103) emphasized postoperative pulmonary complications, 69.9% (72/103) cardiac risks (myocardial infarction, arrhythmia), 52.4% (54/103) prolonged hospitalization and

**Table 1.** Demographic and professional characteristics of participants (n = 103)

Variable	Category	n	%
Professional title (n = 103)	Specialist	51	49.5
	Academic surgeon	27	26.2
	Resident	25	24.3
Years in specialty (n = 102)*	1–5 years	37	36.3
	6–10 years	31	30.4
	10–20 years	23	22.5
	≥20 years	11	10.8
Gender (n=103)	Male	68	66.0
	Female	35	34.0
Type of institution (n = 102)†	Training and research hospital	41	40.2
	University hospital	37	36.3
	State hospital	15	14.7
	Private hospital	9	8.8
Annual number of surgical cases ≥65 years (n = 103)	0–10	12	11.7
	11–20	16	15.5
	21–30	14	13.6
	≥31	61	59.2

\* One participant did not respond to the question on years in specialty. † One participant did not respond to the question on institution type.

rehabilitation, and 24.3% (25/103) cognitive decline/delirium. Incorrect expectations of patients or relatives were identified as a major risk by only 1.0% (1/103) of participants.

### Surgical technique preferences and age-related considerations

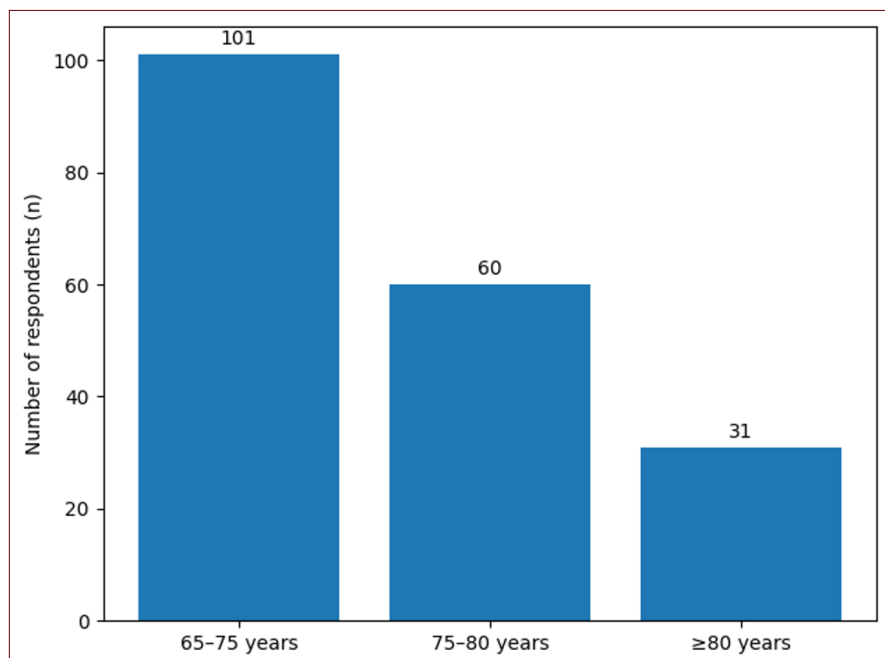
Minimally invasive surgery (VATS or robotic surgery) was identified as an appropriate option for patients aged ≥65 years by 90.3% (93/103; 95% CI: 83.0%–94.7%) of participants. Open surgery was considered appropriate by 23.3% (24/103), and non-operative treatments (e.g., radiotherapy/immunotherapy) by 20.4% (21/103) (multiple responses allowed).

Regarding age groups generally considered suitable for surgery, among the 102 respondents, 99.0% (101/102) reported 65–75 years, 58.8% (60/102) reported 75–80 years, and 30.4% (31/102) reported ≥80 years as generally appropriate for

surgical intervention (multiple responses allowed). This distribution is illustrated in Figure 1.

In response to the question “Are non-operative alternatives more appropriate for patients aged ≥65 years?”, 53.4% (55/103) answered “no,” 35.9% (37/103) were undecided, and 10.7% (11/103) answered “yes.” Among residents, 60.0% (15/25; 95% CI: 38.7%–78.9%) were undecided, compared with 27.8% (22/79) among specialists/academicians. This difference was statistically significant ( $\chi^2 = 14.9$ ,  $p < 0.001$ ), with a moderate effect size (Cramér’s  $V = 0.38$ ).

Factors perceived to accelerate postoperative recovery included physiotherapy and early mobilization (95.1%, 98/103), intensive preoperative assessment (69.9%, 72/103), nutritional support (65.0%, 67/103), and multidisciplinary follow-up involving a geriatric specialist (29.1%, 30/103) (multiple responses allowed).



**Figure 1.** Age groups generally considered suitable for surgery according to respondents (n=102). Multiple responses were allowed.

### Attitudes toward surgical decision-making

Responses to Likert-scale items (1 = strongly disagree, 5 = strongly agree) demonstrated generally positive attitudes toward individualized and multidisciplinary surgical care in patients aged  $\geq 65$  years.

Agreement with the statement “Surgery is generally safe between the ages of 65–75 years” showed a mean score of 3.94 (median 4). In contrast, the statement “Surgery is generally not recommended in patients aged  $\geq 85$  years” yielded a lower mean score of 3.07 (median 3), indicating more cautious and heterogeneous views regarding advanced age.

Participants strongly agreed that “Minimally invasive surgery is more advantageous for patients aged  $\geq 65$  years” (mean 4.38, median 5) and that “Age alone should not be considered a contraindication for surgery” (mean 4.43, median 5).

Agreement with “Surgical decisions in patients aged  $\geq 65$  years should be made by a

multidisciplinary board” had a mean score of 3.99 (median 4).

The perception that “The risk of complications is significantly higher in patients aged  $\geq 65$  years than in younger patients” (n=102) showed a high mean score of 4.48 (median 5).

Similarly, the statement “An individualized approach should be preferred over avoiding surgery in patients aged  $\geq 65$  years” (n=102) demonstrated strong agreement (mean 4.41, median 5).

### Collaboration with geriatrics, guideline awareness, and educational needs

Overall, 40.8% (42/103) of participants reported awareness of any clinical guidelines or protocols related to patients aged  $\geq 65$  years, while 59.2% (61/103) reported no such knowledge. A comprehensive overview of responses related to geriatric support, guideline awareness, and educational needs is summarized in Table 2.

When asked whether they had received specific training on patients aged  $\geq 65$  years care

**Table 2.** Participants’ responses regarding access to geriatric specialists, guideline awareness, and education

Question / Variable	Response category	n	%
Awareness of guidelines/protocols for elderly patients (n = 103)	Yes	42	40.8
	No	61	59.2
Specific training on elderly patient care during residency (n = 103)	Yes	10	9.7
	Partially	31	30.1
	No	62	60.2
Would you like additional education/support in this area? (n = 103)	Yes	84	81.6
	No	19	18.4
Availability of a geriatric specialist in the institution (n = 103)	Yes	39	37.9
	No	64	62.1
Preoperative/postoperative geriatric support (n = 100)*	No access to geriatric support	36	36.0
	Yes, but not always available	32	32.0
	Yes, regular support available	25	25.0
	No, but support obtained from another center	7	7.0
Would you communicate with a geriatric specialist if available? (n = 102)†	Yes	77	75.5
	Undecided	18	17.6
	No	7	6.9

\* Three participants did not respond to this question.† One participant did not respond to this question.

during residency, 60.2% (62/103) responded “no,” 30.1% (31/103) “some,” and 9.7% (10/103) “yes.” Nevertheless, 81.6% (84/103; 95% CI: 72.9%–88.1%) expressed a desire for additional education or support in this area.

Regarding institutional availability of geriatric specialists, 62.1% (64/103; 95% CI: 52.4%–71.0%) (64/103) reported none, while 37.9% (39/103) reported availability.

Among the 100 respondents addressing perioperative geriatric support, 36.0% (36/100) reported receiving no support, 32.0% (32/100) reported intermittent support, 25.0% (25/100) reported regular support, and 7.0% (7/100) reported accessing support from external institutions.

Among the 102 respondents, 75.5% (77/102) stated that they would like to communicate with a geriatric specialist during the surgical process if one were available, 17.6% (18/102) were undecided, and 6.9% (7/102) responded “no.”

Support services for improving the surgical process, rated on a 1–5 scale, yielded mean scores of 4.47 for nutrition/dietitian support (102/102), 4.80 for pulmonary rehabilitation (102/102), 4.27 for psychosocial support (102/102), and 4.36 for collaboration with palliative care teams (101/101), all indicating high perceived importance.

### Comparisons by professional title and experience

Of the 94 participants who responded to this item (22 residents and 72 specialists/academicians), residents demonstrated a lower mean willingness score (3.14) compared with specialists/academicians (4.03), and this difference was statistically significant ( $p < 0.001$ ; Cohen’s  $d = 0.88$ ). The effect size of this difference was large (Cohen’s  $d = 0.88$ ), suggesting substantial divergence in surgical willingness between trainees and experienced surgeons. When willingness was analyzed by years of professional



**Table 3.** Comparison of key attitudinal variables by professional title

Variable	Resident (n=25)	Specialist (n=51)	Academic surgeon (n=27)	p value*
Undecided about non-operative alternatives ( $\geq 65$ years)	15/25 (60.0%)	13/51 (25.5%)	9/27 (33.3%)	<0.001
Mean surgical willingness score (1–5)	3.14 $\pm$ 0.83	3.88 $\pm$ 0.75	4.35 $\pm$ 0.78	<0.001
High surgical willingness (Likert 4–5)	6/25 (24.0%)	34/51 (66.7%)	21/27 (77.8%)	<0.001
Awareness of guidelines	6/25 (24.0%)	21/51 (41.2%)	15/27 (55.6%)	0.084
Received structured geriatric training during residency	2/25 (8.0%)	5/51 (9.8%)	3/27 (11.1%)	0.930

Chi-square test for categorical variables; Kruskal–Wallis test for continuous variables.

experience, mean scores were 3.33 for 1–5 years, 4.07 for 6–10 years, 4.33 for 10–20 years, and 3.67 for  $\geq 20$  years, with a significant overall difference ( $H = 20.3$ ,  $p < 0.001$ ). The estimated effect size ( $\eta^2 = 0.20$ ) indicated a large effect of professional experience on surgical willingness. Subgroup analyses across three professional categories (resident, specialist, academic surgeon) revealed significant between-group differences in surgical willingness and indecision rates. Full subgroup comparisons with explicit N values are provided in Table 3.

Awareness of guidelines or protocols for patients aged  $\geq 65$  years was reported by 24.0% (6/25) of residents and 46.2% (36/78) of specialists/academicians; this difference did not reach statistical significance ( $p = 0.084$ ).

To further explore independent predictors of surgical willingness, a multivariate logistic regression analysis was performed. Willingness scores were dichotomized into high (Likert 4–5) versus low/moderate (Likert 1–3). Independent variables included professional title (resident vs specialist/academician), years of experience, availability of geriatric support, and prior training in elderly patient care. After adjustment, being a specialist/academician remained independently associated with higher surgical willingness (OR 3.21, 95% CI 1.42–7.25,  $p = 0.005$ ), and having 6–20 years of experience was also an independent predictor (OR 2.87, 95% CI 1.18–6.94,  $p = 0.020$ ). Availability of geriatric support and prior training

did not reach statistical significance in the adjusted model.

## DISCUSSION

In this study, we evaluated the clinical approaches, risk perceptions, attitudes toward geriatric support, and educational needs of thoracic surgery specialists and residents practicing in Turkey with regard to surgical management of elderly patients. Our findings indicate a strong consensus that chronological age alone should not be a determining factor in surgical decision-making; however, decision-making remains heterogeneous and cautious regarding more advanced age groups. The widespread preference for minimally invasive surgery, support for multidisciplinary care, and emphasis on individualized decision-making are consistent with contemporary trends described in the literature. Nevertheless, limited access to geriatric support and the lack of structured education appear to hinder the full translation of these principles into routine clinical practice.

In the literature, decision-making regarding elderly surgical patients is frequently described as “not quite shared,” as surgeons tend to focus primarily on risk assessment and management of potential complications, while patients are only partially involved as active decision partners (13, 14). In oncologic surgery in particular, elderly patients have been shown to receive guideline-concordant treatments less frequently, largely due

to age-related treatment hesitancy (10). In our study, the prioritization of overall performance status as the key determinant of surgical decisions and the high perceived complication risk in elderly patients support this risk-oriented decision-making pattern. At the same time, the fact that nearly all participants considered surgery appropriate in the 65–75-year age group suggests that age is not viewed as an absolute contraindication, although greater caution is evident at more advanced ages.

Studies examining surgeons' risk perception in elderly patients indicate that decisions are often based on personal experience, perceived "physiological age," and clinical judgment rather than formal risk scores (13). Research in various surgical fields, including breast, colorectal, and pancreatic surgery, has demonstrated that even fit elderly patients may receive less aggressive treatment, which potentially reflects age-related bias (10, 15, 16). Although thoracic surgery-specific data are limited, lower resection rates in older patients suggest a similar mismatch between stated attitudes and actual practice (10, 15). In our cohort, despite strong agreement that age alone should not be considered a contraindication, the more hesitant and heterogeneous attitudes toward surgery in patients aged  $\geq 85$  years reflect this ongoing discrepancy.

The impact of CGA and geriatric consultation on surgical outcomes remains a subject of active debate. Recent meta-analyses have demonstrated that CGA significantly reduces postoperative delirium, whereas its effects on length of hospital stay and functional outcomes are more limited and heterogeneous (8, 17). Importantly, reactive, recommendation-based geriatric consultations alone have not consistently improved outcomes, while proactive, team-based co-management models appear more effective (9, 18, 19). In our study, the strong support for multidisciplinary collaboration with geriatric specialists, coupled with reported limitations in access to such support, aligns with this structural gap.

Studies on multidisciplinary and geriatric co-management models have reported favorable effects on delirium, complication rates, and length of hospital stay (9, 20, 21). Evidence from vascular and orthopedic surgery suggests that similar benefits could potentially be achieved in thoracic surgery. In our findings, the high importance attributed to physiotherapy, early mobilization, and intensive preoperative assessment underscores a strong awareness of Enhanced Recovery After Surgery (ERAS) based and multidisciplinary principles. However, restricted access to geriatric services appears to limit the practical implementation of these approaches.

Similar training gaps have been reported in other surgical specialties, particularly in general surgery and orthopedics, where residents and practicing surgeons cite unmet needs in frailty assessment, delirium prevention, and interdisciplinary coordination (22–24). In our cohort, 60.2% of participants reported not receiving structured education in elderly patient management during residency, and residents demonstrated significantly greater indecision regarding non-operative alternatives compared with specialists. These findings suggest that the educational gap observed in other surgical disciplines is also present in thoracic surgery and may directly influence clinical decision-making patterns. Given evidence supporting the effectiveness of microlearning, structured geriatric rotations, and multidisciplinary educational models (12, 24), integrating similar approaches into thoracic surgery training emerges as an important unmet need.

An interesting finding was the discrepancy between the high perceived importance of multidisciplinary support services (e.g., physiotherapy and geriatric involvement) and the relatively low proportion of participants who believed that geriatric support directly accelerates postoperative recovery. This may reflect a perception of geriatrics primarily as a consultative



or risk-assessment service rather than an integrated rehabilitation partner. Such a perception gap highlights the need to strengthen awareness of evidence-based geriatric co-management models.

The cautious attitude toward patients aged  $\geq 85$  years may reflect both evidence-based clinical concern and potential age-related bias. While advanced age is associated with higher perioperative risk, contemporary literature suggests that carefully selected very elderly patients can benefit from surgery. Distinguishing between appropriate clinical caution and age-based therapeutic nihilism remains a critical challenge.

In the Turkish healthcare context, the availability of minimally invasive technologies such as VATS and robotic surgery may vary across institutions. Differences in technological access could influence attitudes toward surgical feasibility in elderly patients.

Although the survey was distributed nationally through professional networks, the sample may not fully represent all thoracic surgeons in Turkey, particularly those not engaged in professional communication groups.

### **Strengths and limitations**

One of the main strengths of this study is the inclusion of thoracic surgery specialists, academicians, and residents from various institution types across Turkey, allowing evaluation of attitudes toward elderly thoracic surgical care at different levels of experience and practice settings. The combined assessment of surgical decision-making, perspectives on geriatric support, and educational needs enhances the clinical relevance of the findings.

Several limitations should also be acknowledged. The cross-sectional, survey-based design limits causal interpretation of the results. The use of convenience and snowball sampling may affect generalizability. Additionally, the reliance on self-reported data reflects perceived attitudes rather than actual

clinical practice. Despite these limitations, the study provides novel and valuable insights into thoracic surgeons' perspectives on elderly patient care and geriatric collaboration in Turkey.

The questionnaire did not undergo formal psychometric validation procedures such as CVI calculation or test-retest reliability analysis. As this study was exploratory and descriptive in nature, the findings should be interpreted as reflecting perceived attitudes rather than validated behavioral measures.

Selection bias cannot be excluded, as surgeons with a greater interest in geriatric care may have been more likely to participate. Furthermore, the inability to determine the exact response rate and perform non-responder analysis limits the assessment of representativeness, and the reliance on self-reported attitudes may not fully reflect real-world surgical decision-making patterns. Although the survey was distributed nationally through professional networks, participants may have been more likely to respond if they had a particular interest in geriatric care, which could have influenced the overall attitudinal distribution.

### **Future research directions**

Future studies should prospectively and multicentrically evaluate the impact of geriatric-based multidisciplinary approaches on clinical outcomes in elderly thoracic surgery patients. In particular, the effects of CGA and co-management models on complications, functional outcomes, quality of life, and healthcare utilization should be assessed using standardized outcome measures. Interventional studies examining the impact of structured geriatric education programs integrated into surgical training on surgeons' knowledge, decision-making processes, and patient outcomes would also be valuable. In the Turkish context, defining feasible models of geriatric-surgical collaboration and assessing their sustainability in different healthcare settings may improve the quality of care for elderly thoracic surgery patients.

## CONCLUSION

This study demonstrates that thoracic surgery specialists and residents in Turkey generally adopt a decision-making framework for elderly patients that prioritizes functional status and individualized risk assessment over chronological age, and they strongly support minimally invasive surgery and multidisciplinary care. Nevertheless, heterogeneity in decision-making for advanced age groups, limited access to geriatric support, and the absence of structured education in elderly patient management continue to challenge the translation of these principles into daily practice. Our findings highlight the need to strengthen geriatric-based multidisciplinary workflows at the institutional level and to integrate practical, geriatric-focused content into thoracic surgery training programs. Addressing these gaps may contribute to the standardization of perioperative care and improved clinical outcomes for elderly thoracic surgery patients.

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