

IMPACT OF MULTIDISCIPLINARY TEAM IMPLEMENTATION ON SURVIVAL AND QUALITY OF CARE INDICATORS IN METASTATIC NON-SMALL CELL LUNG CANCER: A RETROSPECTIVE SINGLE-CENTER COHORT STUDY IN THAILAND

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Abstract

Background: In resource-limited settings such as Thailand, metastatic non-small cell lung cancer (NSCLC) outcomes are adversely affected by fragmented care and delayed diagnosis and treatment. At the same time, the impact of the multidisciplinary team (MDT) remains uncertain.

Objectives: The study aimed to evaluate the effect of MDT implementation on overall survival (OS), time to treatment initiation, and molecular testing rates in patients with metastatic NSCLC at a Thai tertiary cancer center.

Methods: This retrospective study included patients with newly diagnosed metastatic NSCLC treated between 2018 and 2023. Patients were categorized according to whether their treatment was planned before or after the establishment of MDT in 2020. Baseline characteristics, molecular testing rates, and treatments were compared. The OS was the primary endpoint and was analyzed using Kaplan–Meier methods and multivariable Cox proportional hazards models.

Results: Among 248 eligible patients, 158 were managed in the MDT era and 90 in the pre-MDT era. Patients in the MDT group demonstrated a trend toward earlier treatment initiation (median 1.21 vs 1.52 months; approximately 33.8 vs 42.5 days; $p = 0.18$) and numerically higher EGFR testing rates (66.89 % vs 56.79 %; $p = 0.09$), whereas ALK testing was significantly more frequent in this group (32.10 % vs 18.03 %; $p = 0.04$). There was no statistically significant difference in OS between groups (median OS 10.44 vs 15.73 months; adjusted HR 1.25 (95% CI 0.94–1.67; $p = 0.12$). After adjustment for possible confounders, age ≥ 65 years (HR 2.09; 95% CI 1.07–4.11; $p = 0.03$), male sex (HR 3.90; 95% CI 1.28–11.88; $p = 0.02$), ECOG performance status ≥ 2 (HR 3.58; 95% CI 1.34–9.59; $p = 0.01$), non-adenocarcinoma histology (HR 12.30; 95% CI 1.44–104.44; $p = 0.02$), and multiple metastatic sites (HR 2.73; 95% CI 1.22–6.14; $p = 0.01$) were independently associated with poorer survival.

Conclusion: MDT implementation was associated with earlier treatment initiation and higher rates of molecular testing in metastatic NSCLC. Although no significant survival benefit was observed, MDTs remain important in real-world practice.

Keywords: metastatic non-small cell lung cancer, multidisciplinary team, molecular testing, time to treatment initiation, real-world evidence

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Introduction

Lung cancer remains the leading cause of cancer-related mortality worldwide. Non-small cell lung cancer (NSCLC) accounts for about 85% of all cases, with metastatic disease driving most of its lethality.^(1,2) In Thailand, lung cancer ranks second in both incidence and cancer-related deaths.⁽¹⁾ The burden is particularly high in metastatic NSCLC, where five-year survival remains below 10%.^(1,3) Despite advances in systemic therapies, real-world survival outcomes remain suboptimal, highlighting the need for effective multidisciplinary models of care to translate therapeutic advances into clinical benefit.^(4,5)

The complexity of managing metastatic NSCLC necessitates coordinated expertise across diagnostics, molecular profiling, and multimodal treatment strategies. In many Southeast Asian healthcare systems, including Thailand, these efforts are further constrained by reimbursement limitations and restricted access to comprehensive molecular testing, which may delay optimal treatment selection. As a result, traditional care pathways often lead to fragmented services, prolonged diagnostic timelines, and inconsistent adherence to clinical guidelines.^(6,7) The multidisciplinary team (MDT) care has emerged as a paradigm-shifting framework, integrating thoracic surgeons, medical oncologists, diagnostic radiologists, radiation oncologists, pathologists, pulmonologists, and palliative care specialists to optimize decision-making.⁽⁸⁾ Prior studies report that MDT implementation is associated with improved survival and shorter diagnostic work-up times.⁽⁹⁻¹¹⁾ However, data on the metastatic stage remain scarce, particularly in resource-limited settings such as Thailand.

A formal thoracic MDT was implemented in 2020 as part of an institutional initiative to optimize the management of thoracic malignancies. The MDT was designed to integrate services

across specialties, shorten diagnostic and treatment timelines, and improve access to molecular profiling and evidence-based therapies.

Methods

This retrospective cohort study was conducted in a real-world clinical setting. The institutional thoracic MDT comprises specialists in medical oncology, pulmonology, pathology, diagnostic radiology, radiation oncology, thoracic surgery, and palliative care. Monthly meetings are held to facilitate timely diagnosis and consensus-based treatment planning ($\geq 80\%$ -member agreement). For cases discussed at MDT meetings, treatment decisions were implemented as institutional standard practice unless contraindicated by patient-specific clinical factors or based on patient preference.

Adult patients aged ≥ 18 years with histologically confirmed, newly diagnosed metastatic NSCLC, treated between January 2018 and December 2023, were included. Patients with incomplete records, no oncologic treatment, or loss to follow-up before therapy initiation were excluded. Eligible patients were categorized into two groups: the pre-MDT group (2018–2019), managed before formal MDT implementation, and the MDT group (2020–2023), whose treatment was planned within the structured MDT framework, as clinically indicated by the treating team.

Clinical data were extracted from electronic medical records using a standardized case report form. Collected variables included demographics, Eastern Cooperative Oncology Group (ECOG) performance status, comorbidities as assessed by the Charlson Comorbidity Index (CCI), tumor histology, molecular diagnostic results (EGFR, ALK, and others), and treatment modalities—time intervals from diagnosis to treatment initiation and completion of molecular

testing before first-line therapy were documented. MDT-related data, including evidence of case discussion, the date of consensus, and recorded recommendations, were also collected to evaluate the impact of MDT involvement on clinical workflow. The study protocol was approved by the Committee of Medical Research Ethics, Navamindradhiraj University (COE 177/67E).

Study outcomes

The primary outcome was overall survival (OS), defined as the time from histological diagnosis to death from any cause or last follow-up. Secondary outcomes included time to treatment initiation, defined as the interval from diagnosis to the first systemic therapy, and the rate of molecular testing.

Statistical analysis

Descriptive statistics were used to summarize baseline characteristics. Continuous variables were reported as medians with interquartile ranges (IQRs), depending on the distribution of the data. Categorical variables were presented as frequencies and percentages. Group comparisons were conducted using Chi-square or Fisher's exact test for categorical variables and Student's t-test or Mann-Whitney U test for continuous variables, as appropriate.

Survival analyses were performed using Kaplan-Meier methodology and compared using the log-rank test. HRs and 95% CIs were calculated using a stratified Cox proportional hazards (PH) model, with PH assumptions confirmed by Schoenfeld residuals. Multivariable models were adjusted for potential confounders, including age, sex, comorbidities (as measured by CCI), smoking status, ECOG performance status, tumor histology, treatment, and sites of metastatic involvement. A p -value of <0.05 was considered statistically significant. All analyses were performed using SPSS software version 28.0 (IBM Corp., Armonk, NY, USA).

Results

A total of 251 patients newly diagnosed with metastatic NSCLC between 2018 and 2023 were

initially assessed for eligibility. Among these, three patients were excluded from the analysis due to incomplete clinical data. Consequently, 248 patients were included in the final cohort. Patients were subsequently categorized into two groups based on the time of diagnosis relative to the implementation of a formal MDT structure: 90 patients diagnosed between 2018 and 2019 were allocated to the Pre-MDT group, while 158 patients diagnosed between 2020 and 2023, following the establishment of the MDT, were assigned to the MDT group, as shown in **Figure 1**. The data cut-off date was 31 December 2023, with a mean follow-up of 17.29 months (95% CI: 4.26-24.50).

Baseline demographic and clinical characteristics of the patients are summarized in **Table 1**. The median age was 69 years and comparable between groups (69.0 in pre-MDT vs. 68.5 in MDT, $p = 0.36$). Half of the patients were male (51.21%), with a similar sex distribution across groups (54.44% vs. 49.37%, $p = 0.44$). Most patients (72.58 %) had an ECOG performance status of 0-1, with no significant difference between groups. Smoking status was the only baseline characteristic that differed significantly, with a higher proportion of never-smokers in the pre-MDT group (64.44% vs. 50.63%; $p = 0.04$). No significant difference was observed in comorbidity burden, as measured by the Charlson Comorbidity Index (CCI ≥ 9 in 58.89 % vs. 54.43%, $p = 0.50$). Adenocarcinoma was the predominant histological subtype in both groups (89.17%). Rates of brain (23.33 % vs. 19.62 %, $p = 0.49$) and liver metastases (20.00 % vs. 22.78 %, $p = 0.61$) were also comparable. Overall, aside from smoking status, baseline characteristics were well balanced between groups.

Among the 248 patients with metastatic NSCLC included in the analysis, no statistically significant difference in OS was observed. Median OS was 15.73 months (95% CI: 10.04-18.39) in the pre-MDT group and 10.44 months (95% CI: 6.96-11.92) in the MDT group, with an adjusted hazard ratio of 1.25 (95% CI: 0.94-1.67; $p = 0.12$). (**Figure 2**).

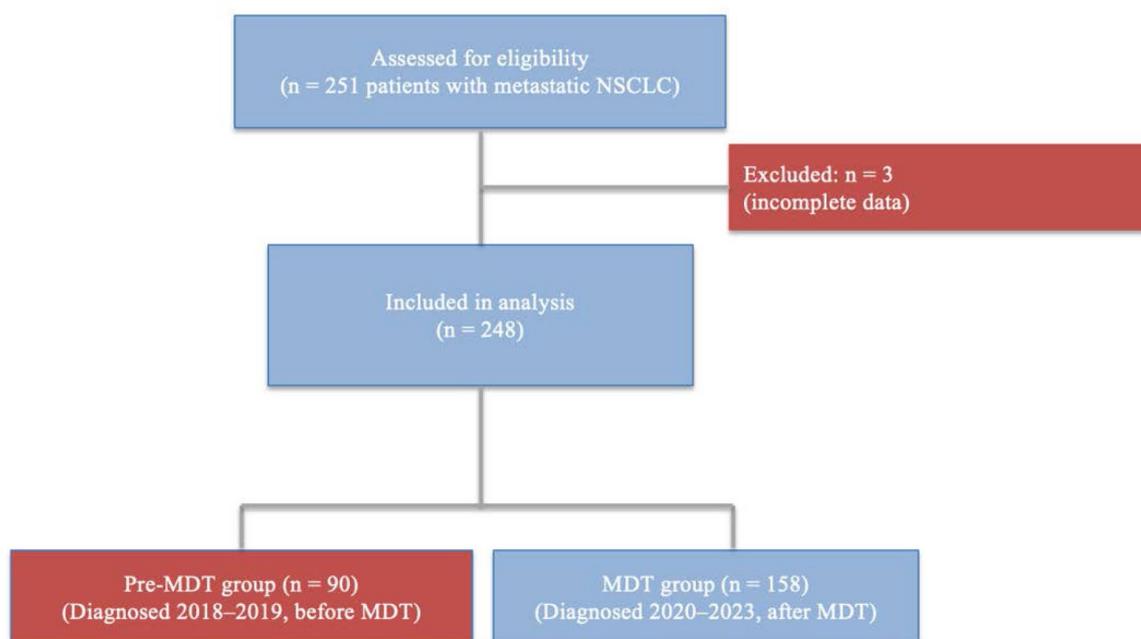


Figure 1. Study flow diagram

Table 1. Baseline demographics and clinical characteristics of participants diagnosed before (pre-MDT group) and after the establishment of the Thoracic MDT (MDT group)

Characteristics	Pre-MDT (N = 90)	MDT (N = 158)	Overall (N = 248)	<i>p</i> -value
Age (years); median (IQR)	69.0 (61-76)	68.5 (61-74)	69.0 (61-75)	0.36
Sex – no. (%)				0.44
Male	49 (54.44)	78 (49.37)	127 (51.21)	
Female	41 (45.56)	80 (50.63)	121 (48.79)	
Smoking status – no. (%)				0.04
Never	58 (64.44)	80 (50.63)	138 (55.65)	
Previous/Current	32 (35.56)	78 (49.37)	110 (44.35)	
Charlson Comorbidity Index (CCI); median – no. (%)			9	0.50
<9	37 (41.11)	72 (45.57)	109 (43.95)	
≥9	53 (58.89)	86 (54.43)	139 (56.05)	
ECOG status – no. (%)				0.92
0-1	65 (72.22)	115 (72.78)	180 (72.58)	
≥2	25 (27.78)	43 (27.22)	68 (27.42)	
Histology – no. (%)				0.29
Adenocarcinoma	83 (93.26)	131 (86.75)	214 (89.17)	
Squamous cell carcinoma	3 (3.37)	11 (7.28)	14 (5.83)	
NOS [†]	3 (3.37)	9 (5.96)	12 (5.00)	
Metastatic sites – no. (%)				
Brain	21 (23.33)	31 (19.62)	52 (20.97)	0.49
Liver	18 (20.00)	36 (22.78)	54 (21.77)	0.61

Table 1. Baseline demographics and clinical characteristics of participants diagnosed before (pre-MDT group) and after the establishment of the Thoracic MDT (MDT group) (Cont.)

Characteristics	Pre-MDT (N = 90)	MDT (N = 158)	Overall (N = 248)	p-value
Number of metastatic sites – no. (%)				0.44
Single	41 (45.56)	64 (40.51)	105 (42.34)	
Multiple	49 (54.44)	94 (59.49)	143 (57.66)	

† NOS: Not otherwise specified

Differences in molecular testing and initial treatment were observed between groups (Table 2). A greater proportion of patients in the MDT group underwent EGFR and ALK testing than in the pre-MDT group (66.89% vs. 56.79%, $p = 0.09$; and 32.10% vs. 18.03%, $p = 0.04$, respectively). While the increase in EGFR testing did not reach statistical significance, the difference in ALK testing was statistically significant. Chemotherapy was the most common upfront therapy in both groups, while targeted therapy was used slightly more often in the MDT group (20.89%

vs. 18.89%). Notably, best supportive care was more frequently administered in the MDT group (16.46% vs. 8.89%). The median time to treatment initiation was numerically shorter in the MDT group compared to the pre-MDT group (1.21 vs. 1.52 months, $p = 0.18$), corresponding to a reduction of approximately 9 days.

To identify factors associated with survival, univariate and multivariate Cox regression analyses were conducted, as shown in Table 3. Variables with a $p < 0.20$ in the univariate analysis were included in the multivariable model.

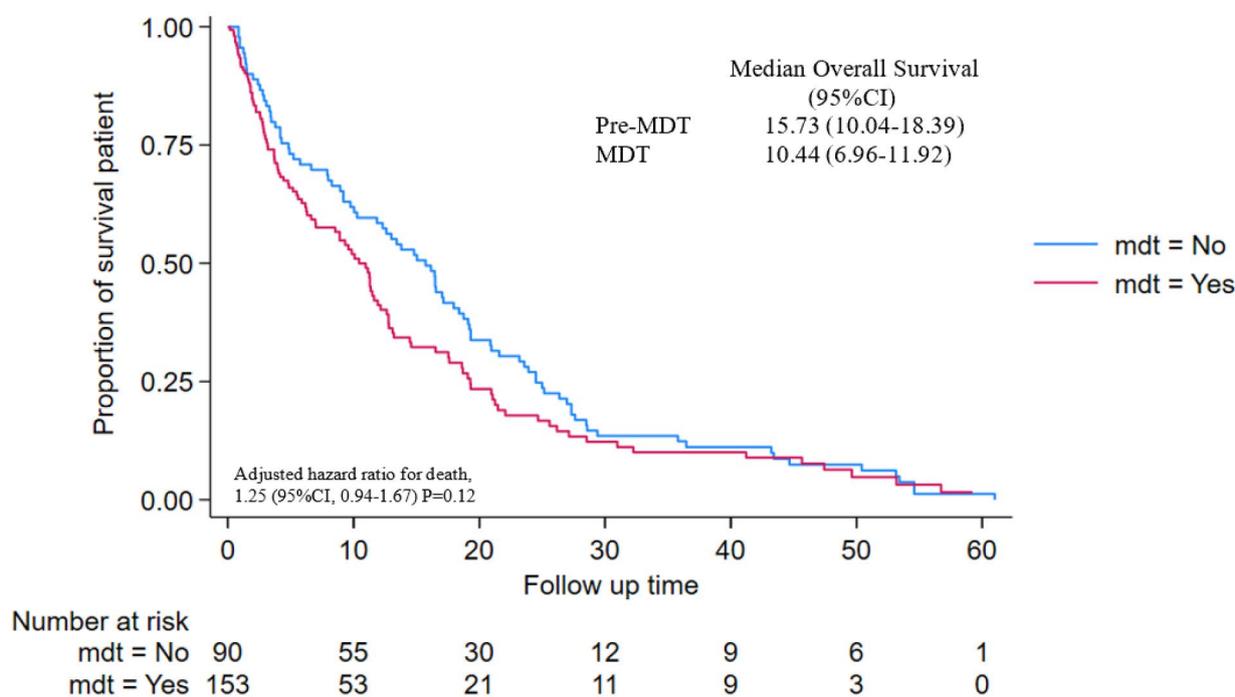


Figure 2. Kaplan–Meier overall survival by MDT status

Table 2. Molecular testing and upfront therapy modalities stratified by MDT status

Variables	Pre-MDT, N (%)	MDT, N (%)	Total, N (%)	<i>p</i> -value
<i>EGFR</i> tested [†]	46 (56.79)	99 (66.89)	145 (63.32)	0.09
<i>ALK</i> tested [‡]	11 (18.03)	26 (32.10)	37 (26.06)	0.04
Upfront treatment				0.44
- Chemotherapy	52 (57.78)	83 (52.53)	135 (54.44)	
- Targeted therapy	17 (18.89)	33 (20.89)	50 (20.16)	
- Radiotherapy	11 (12.22)	14 (8.86)	25 (10.08)	
- Best supportive care	8 (8.89)	26 (16.46)	34 (13.71)	
Median Time to Treatment (mo)	1.52	1.21	1.24	0.18

[†] *EGFR*; Epidermal Growth Factor Receptor, *ALK*; Anaplastic Lymphoma Kinase. [‡] *ALK*; Anaplastic Lymphoma Kinase

Table 3. Univariate and multivariate analyses of factors associated with overall survival

Variables	Univariate analysis		Multivariate analysis	
	HR (95%CI)	<i>p</i> -value	HR (95%CI)	<i>p</i> -value
Age (years)				
< 65	Reference		Reference	
≥ 65	2.19 (1.13-4.24)	0.02	2.09 (1.07-4.11)	0.03
Sex				
Female	Reference		Reference	
Male	1.66 (0.86-3.21)	0.13	3.90 (1.28-11.88)	0.02
Charlson comorbidity index				
<9	Reference			
≥9	0.96 (0.49-1.86)	0.91		
Smoking status				
Never	Reference			
Previous/current	0.85 (0.44-1.63)	0.62		
ECOG Performance status [†]				
0-1	Reference		Reference	
≥2	3.49 (1.31-9.26)	0.01	3.58 (1.34-9.59)	0.01
Histology				
Adenocarcinoma	Reference		Reference	
Non-adenocarcinoma	6.29 (0.83-47.70)	0.08	12.30 (1.44-104.44)	0.02
Treatment				
BSC	Reference		Reference	
Chemotherapy	0.28 (0.06-1.22)	0.09	0.33 (0.07-1.65)	0.18
Targeted therapy	0.18 (0.04-0.85)	0.03	0.28 (0.05-1.53)	0.14
Sites of metastasis				
Single	Reference		Reference	
Multiple	1.82 (0.95-3.51)	0.07	2.73 (1.22-6.14)	0.01

[†] Eastern Cooperative Oncology Group (ECOG) performance status scores range from 0 to 5, with 0 indicating no symptoms, 1 indicating mild symptoms, and a higher number indicating increasing degrees of disability.

Several factors were independently associated with worse survival, including age ≥ 65 years (HR 2.09; 95%CI; 1.07–4.11; $p = 0.03$), male sex (HR 3.90; 95% CI; 1.28–11.88; $p = 0.02$), ECOG performance status ≥ 2 (HR 3.58; 95% CI; 1.34–9.59; $p = 0.01$), non-adenocarcinoma histology (HR 12.30; 95%CI; 1.44–104.44; $p = 0.02$), and the presence of multiple metastatic sites (HR 2.73; 95%CI; 1.22–6.14; $p = 0.01$).

Discussion

This study demonstrates that MDT implementation in metastatic NSCLC was associated with increased rates of molecular testing and a numerically shorter time to treatment initiation. However, no statistically significant survival benefit was observed. Notably, MDT care was associated with better adherence to guideline-recommended molecular testing, as evidenced by a significant increase in ALK testing from 18.03% to 32.10% ($p = 0.04$) and a favorable upward trend in EGFR testing from 56.79% to 66.89% ($p = 0.09$). These findings are consistent with previous studies^(11,15,16) and highlight the important role of multidisciplinary coordination in optimizing diagnostic evaluation in routine clinical practice. Furthermore, patients managed through MDT-initiated first-line therapy numerically earlier than those treated before MDT implementation, reflecting improved care coordination and more streamlined clinical decision-making, consistent with prior reports.^(10,15,20,21)

While MDT care has traditionally been emphasized in non-metastatic disease, where multidisciplinary treatment planning is essential, our findings suggest that MDT implementation also provides meaningful benefits in the metastatic setting, particularly in optimizing diagnostic evaluation and treatment coordination.

Despite these improvements in care processes, there was no significant difference in survival. This finding may reflect greater clinical complexity among patients discussed in MDT, as well as structural limitations in a resource-constrained healthcare setting. Notably, referral to MDT was not systematic; instead, cases were selectively presented at the discretion of treating clinicians when multidisciplinary input was con-

sidered necessary. Such cases typically involved complex clinical scenarios, advanced disease, multiple comorbidities, or challenging treatment decisions requiring input from multiple specialties. Consequently, the MDT cohort likely represented a higher-risk population with a poorer prognosis, which may also explain the higher proportion of patients receiving best supportive care, reflecting a more comprehensive, holistic evaluation.

Furthermore, although MDT implementation was associated with higher rates of molecular testing, this did not consistently translate into increased use of targeted therapies due to reimbursement constraints. Access to molecularly guided and novel treatments, including targeted therapy, immunotherapy, and antibody–drug conjugates, remains limited in Thailand, leading to discordance between molecular test results and treatment selection. For instance, erlotinib became reimbursable under the Universal Coverage Scheme only in late 2021, restricting its availability during much of the study period. This diagnostic–therapeutic discordance likely attenuated the potential survival benefit of MDT care. Multivariable analysis further identified several factors independently associated with survival. Older age, male sex, ECOG performance status ≥ 2 , non-adenocarcinoma histology, and the presence of multiple metastatic sites were associated with worse survival, in line with the available literature.^(12–14)

Previous studies indicate that MDTs are often engaged in more challenging oncologic cases.^(10,15,16,17) Consistent with our findings, MDTs, through integrated expertise, expedited decision-making, and early palliative care integration, may help preserve survival outcomes in high-risk populations where clinical deterioration would otherwise be expected. In this context, MDT participation should be viewed not merely as a procedural enhancement but as a critical intervention to optimize both the timeliness and quality of oncologic care^[18,19], particularly in resource-limited settings where disparities in biomarker access and therapeutic availability persist. Overall, our findings support the clinical and operational benefits of MDT structures in advanced NSCLC.

However, several important limitations must be acknowledged. First, the retrospective, single-center design introduces potential biases inherent to observational studies and may limit the generalizability of the findings. Second, selection bias is a key concern, as referral to MDT was discretionary rather than systematic, with a tendency to include patients with greater clinical complexity or poorer prognosis. Third, unmeasured confounding factors, such as disease burden, socioeconomic status, and provider-specific practice patterns, may have influenced outcomes. Fourth, temporal confounding may have influenced the findings, as the pre-MDT and MDT cohorts were managed in different time periods during which treatment practices, reimbursement policies, and overall healthcare system pressures evolved, including disruptions related to the COVID-19 pandemic. Fifth, the relatively modest sample size and limited follow-up duration may have reduced the statistical power to detect survival differences between groups. Finally, although higher rates of molecular testing were observed following MDT implementation, limited access to reimbursed targeted therapies led to discordance between diagnostic findings and treatment delivery, potentially attenuating the survival impact of MDT care. In addition, downstream outcomes such as quality of life, treatment-related toxicity, and cost-effectiveness were not assessed and warrant further investigation.

Conclusion

In this single-center retrospective study of metastatic NSCLC, MDT implementation was associated with improvements in key aspects of oncologic care. Although overall survival did not differ significantly, MDT-managed patients had a numerically shorter time to treatment initiation and higher rates of molecular testing, particularly for ALK rearrangements, supporting the continued importance of MDT-based care in real-world practice. However, further prospective studies are needed to define its impact on survival outcomes.

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