Survival and Cost of Care by Type of First-Line Therapy in Metastatic Non-Small Lung Cancer Using SEER-Medicare Data

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Background

- In the last decade new types of systemic therapy for first-line metastatic non-small cell lung cancer (mNSCLC) were approved in the US, including targeted therapy and immunotherapy-based regimens.¹
- Furthermore, the development of tests to identify specific biomarkers has helped to identify appropriate systemic therapy agents.¹
- Given these changes in practice patterns, this research was designed to characterize current trends in survival and cost of care for patients with mNSCLC defined by type of systemic therapy.

Methods

Study Design

• This was an observational cohort study based on the Surveillance, Epidemiology, and End Results (SEER) cancer registry linked to Medicare administrative and claims data (SEER-Medicare).

Population

• The study population was defined as patients diagnosed with mNSCLC in a SEER cancer registry catchment area between January 1, 2017 and December 31, 2019 who satisfied the study inclusion and exclusion criteria.

Inclusion Criteria

- Lung cancer was the first, primary cancer for the individual and was microscopically confirmed.
- Age ≥ 66 at the time of diagnosis (to allow for at least 12 months of prediagnosis history in Medicare patients).
- At least 12 months of Medicare Part A, Part B, and Part D coverage and no HMO coverage prior to the date of diagnosis.

Exclusion Criteria

- Patients with small-cell lung cancer.
- Patients diagnosed at autopsy or on their death certificate.
- Patients missing staging at diagnosis.

Follow-up

• Patients were followed until the first occurrence of the following: end of continuous enrollment in fee-for-service Medicare, development of a second primary tumor, death, or end of the study period (December 31, 2020)

Variable Definitions

- First-line systemic therapy was defined as the initiation of at least one systemic agent in the outpatient setting.
- -All unique agents received within the first 8 days after first-line initiation were used to define the specific intended regimen.
- Systemic therapy subgroups were created for targeted therapy (e.g., EGFR, ROS1, etc.), chemotherapy, and immunotherapy (IO).
- -Vascular endothelial growth factor (VEGF) inhibitors were included with chemotherapy.
- Hospitalization use was identified from Medicare inpatient facility records.
- Emergency Department (ED) use was identified using outpatient facility revenue center codes for emergency department visits.
- Hospice use was based on claims present in the Medicare hospice file.

Mortality Analyses

• Overall survival was calculated from the initiation of first-line therapy until the end of the study observation period using the Kaplan-Meier estimator.

Cost Analyses

- Costs were inflated to 2023 dollars using the full-year medical component of the Consumer Price Index.
- The total cost of care per patient was calculated by adding the total cost reimbursed by Medicare with patient deductible and coinsurance amounts reported on Medicare claims data.

• Costs were further categorized into

- -Inpatient services (including physician services provided in the hospital)
- -Outpatient services (including all non-hospital physician services)
- -Systemic therapy
- -Hospice

-All other costs (including durable medical equipment, home health, and non-cancer directed prescriptions).

- Unadjusted cumulative costs were estimated by partitioning the cost totals into 48 monthly intervals and accounting for administrative censoring.
- -Results were stratified by cost type, by payer, and by type of systemic therapy in separate analyses.
- -Note that patients who died were not considered to be lost to follow-up because their total costs were captured and were 0 after death.
- Unadjusted costs per patient per month were estimated for 36 months after diagnosis and stratified by first-line therapy type.
- -In these cost analyses, only patients alive in each month were included.

Results

- Among 7,306 patients with mNSCLC, 3,794 received first-line outpatient systemic therapy, 1,323 received chemotherapy, 559 received targeted therapy, and 1,912 received immunotherapy
- Baseline clinical and demographic information is described in Table 1.
- Patients receiving targeted therapy or immunotherapy had longer unadjusted survival compared to those who received chemotherapy (Figure 1).
- Cumulative 48-month total cost was highest for patients who received targeted therapy compared to those who received immunotherapy and chemotherapy (Figure 2).
- Patients receiving targeted therapy tended to have higher monthly costs for systemic therapy (Figure 3).

Figure 1. Overall Survival from First-line Initiation by Type of Systemic Therapy



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- This study used the linked SEER-Medicare database. The interpretation and reporting of these data are the sole responsibility of the authors. The authors acknowledge the efforts of the National Cancer Institute; Information Management Services (IMS), Inc.; and the SEER Program tumor registries in the creation of the SEER-Medicare database.

Variable	All N = 7,306 % (N) or Mean (SD)	No First-line N = 3,512 % (N) or Mean (SD)	Chemotherapy N = 1,323 % (N) or Mean (SD)	Targeted Therapy N = 559 % (N) or Mean (SD)	Immunotherapy N = 1,912 % (N) or Mean (SD)						
						Age, Sex and Race					
						Age (years)	76.2 (6.9)	77.4 (7.3)	74.2 (6.0)	76.5 (7.0)	75.2 (6.3)
Male	48.9% (3,571)	48.6% (1,708)	52.5% (695)	34.9% (195)	50.9% (973)						
White	82.5% (6,029)	82.2% (2,886)	86.3% (1,142)	63.1% (353)	86.2% (1,648)						
Histology											
Squamous	21.1% (1,543)	22.4% (788)	27.9% (369)	2.7% (15)	19.4% (371)						
Adenocarcinoma	62.8% (4,585)	58.0% (2,038)	54.1% (716)	91.2% (510)	69.1% (1,321)						
All other	16.1% (1,178)	19.5% (686)	18.0% (238)	6.1% (34)	11.5% (220)						
Yost Socioeconomic Status	s Quintiles										
Quintile 1 (lowest)	17.2% (1,254)	21.0% (736)	14.6% (193)	11.3% (63)	13.7% (262)						
Quintile 2	17.1% (1,249)	19.4% (681)	16.0% (212)	13.2% (74)	14.7% (282)						
Quintile 3	17.8% (1,297)	18.2% (639)	19.3% (256)	13.1% (73)	17.2% (329)						
Quintile 4	20.9% (1,530)	19.4% (683)	21.8% (289)	21.1% (118)	23.0% (440)						
Quintile 5 (highest)	26.7% (1,948)	21.6% (759)	27.7% (367)	40.6% (227)	31.1% (595)						
NCI Comorbidity Index and	d Selected Conditions at	Diagnosis									
NCI Index (continuous)	3.3 (3.0)	3.8 (3.3)	2.9 (2.7)	2.2 (2.5)	2.9 (2.8)						
Myocardial infarction	11.9% (872)	14.0% (491)	10.5% (139)	5.7% (32)	11.0% (210)						
Congestive heart failure	21.0% (1,531)	26.3% (924)	16.5% (218)	9.7% (54)	17.5% (335)						
Cerebrovascular disease	23.1% (1,687)	26.8% (942)	18.8% (249)	18.6% (104)	20.5% (392)						
Diabetes	37.0% (2,702)	39.1% (1,374)	36.7% (485)	32.2% (180)	34.7% (663)						
Renal disease	18.6% (1,361)	22.9% (806)	16.1% (213)	13.4% (75)	14.0% (267)						
Liver disease	8.0% (583)	8.4% (294)	6.8% (90)	9.5% (53)	7.6% (146)						

Figure 2. Cumulative 48-Month Cost of Care Per Patient by Type of Systemic Therapy





Limitations

- Data are limited to Medicare fee-for-service patients.
- Practice patterns reflect the 2018-2020 period.
- Detailed information was not available regarding the use of tests to identify specific biomarkers to guide treatment.

References

1. Wood DE, Aisner DL, et al. Non-Small Cell Lung Cancer, Version 3.2022, NCCN Clinical Practice Guidelines in Oncology. J Natl Compr Canc Netw. 2022;20(5):497-530. doi:10.6004/jnccn.2022.0025

Figure 3. Monthly Cost Per Patient From First-Line Initiation by Type of Cost and Type of Systemic Therapy

Conclusions

• Patients with mNSCLC who received targeted therapy or immunotherapy showed notably longer unadjusted survival than those who received chemotherapy.

The higher total cost of care observed with targeted therapy may be related to the better prognoses for specific genetic mutations and to "treat-to-progression" dosing.

• Further adjusted analyses of differences are warranted.

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