Poster EE270

The Economic Burden of Metastatic Non-Small Cell Lung Cancer in US Patients without an EGFR or ALK Mutation

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Objective

- The objective of this study was to describe the real-world economic burden of metastatic non-small cell lung cancer (mNSCLC) in patients without an EGFR or ALK mutation.

Conclusions

- Metastatic NSCLC is associated with a substantial economic burden for the US healthcare system and patients.
- The period with the highest monthly claims and monthly cost for both patients and payers was the period from diagnosis to the start of first-line treatment.
- Patients with Medicare had a lower monthly cost to the healthcare system compared to patients with commercial insurance despite a similar number of monthly claims.

Limitations

- This study evaluated insurance claims from commercially and Medicare Advantage insured patients and may not represent all patients or services.
- Insurance claims data are designed for administrative purposes and may lack specificity about disease characteristics and treatments.

Plain language summary

Why did we perform this research?

Non-small cell lung cancer is one of the most common cancers among patients in the US. Most lung cancer is identified when it has spread to multiple parts of the body. Over the past five years, several new treatments have been developed and approved for patients whose cancer does not have specific gene mutations. There are questions about the overall cost of treating NSCLC and its impact on what patients pay out of pocket.

How did we perform this research?

We collected data from the Optum Clinformatics Database which has data from US private insurance and Medicare Advantage insurance plans. We selected patients who had lung cancer insurance claims between November 2016 and June 2021. We split each patient's records into time from diagnosis to treatment, first treatment, time after first treatment, and last 60 days of life (if a patient passed away). During each time period we looked at the average number of bills from different healthcare providers and the average total cost and patient out-of-pocket cost paid each month.

What were the findings and implication of this research?

We evaluated data from 8,234 patients over the study period. Overall, lung cancer patients had many insurance claims each month. The period with the most bills and highest monthly cost for patients and the insurance company was the time from diagnosis to first treatment. The second most expensive period per month was the time on first treatment. Lung cancer treatment requires coordination of multiple parts of the healthcare system and is expensive. Earlier detection may help identify the cancer when it is easier to treat, but more research is needed. These results may be useful for future economic models to understand the value of new treatments.

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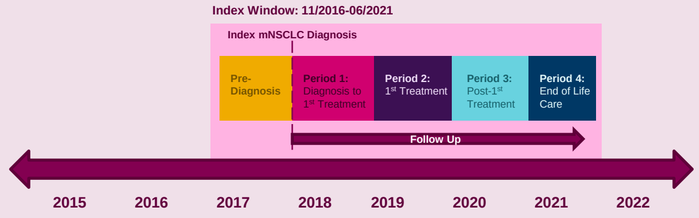
Introduction

- Non-small cell lung cancer (NSCLC) is one of the most common types of cancer in the US
- Most patients present with metastatic disease that does not have an EGFR or ALK genetic mutation
- In the past five years several new treatments have been approved to treat patients with metastatic NSCLC (mNSCLC)
- There is a lack of information on the monthly healthcare resource utilization and costs (including patient out of pocket spend) for mNSCLC
- Updated resource utilization and cost data could be used for economic modeling for new treatments entering the mNSCLC space

Methods

- We conducted a retrospective observational cohort study using Optum Clinformatics US insurance claims (Commercial and Medicare Advantage)
- Patients were included if they had ≥ 2 claims for metastatic lung cancer between Nov-2016 and Jun-2021 and were excluded for etoposide treatment, EGFR/ALK therapies, other cancers, or clinical trial participation. Patients were required to have started first-line systemic treatment (chemotherapy, immuno-oncology (IO), or targeted therapies)
- The index date was set at the data of diagnosis with mNSCLC
- Follow-up time was divided into 4 periods (Per1: diagnosis to treatment, Per2 first-line treatment, Per3: post-first-line treatment, Per4: last 60 days of life). Not all patients experienced all four study periods
- Demographics, characteristics, resource use, and per-patient-per-month (PPPM) costs were assessed with descriptive statistics

Figure 1: Study Schema



Results and interpretation

- Data was available for 8,234 mNSCLC patients without an EGFR or ALK mutation
- The median patient age was 71 and the majority were covered by Medicare
- Patients with Medicare insurance had a lower monthly cost across all phases of care
- Out of pocket costs were higher for commercially insured patients during period 1 and higher for Medicare insured patients during period 2
- Healthcare resource use was similar in both groups

Figure 2: Patient Funnel

	N
Include ≥2 primary lung cancer diagnoses ≥30 days apart 01/2007-06/2021	240,422
Exclude etoposide treatment before or up to 90 days post diagnosis (SCLC proxy)	225,096
Include ≥2 diagnoses indicating metastatic disease ≥30 days apart 11/2016-06/2021	42,458
Exclude patients with EGFR or ALK targeted therapy	35,197
Include patients who initiated chemo, IO, or targeted therapy as their 1L treatment	16,735
Include patients at age ≥ 18 on their index date	16,735
Include patients with ≥6 months baseline continuous enrollment	12,431
Include patients with ≥3 months follow up (include those who pass away during follow-up enrollment period)	11,459
Exclude clinical trial participants (ICD-9: V70.7, ICD-10: Z00.6)	10,906
Exclude patients with ≥ two diagnoses for other cancers at least 30 days apart during 6 months prior to index	9,677
Exclude patients with cancer treatment prior to their mNSCLC diagnosis	8,251
Exclude patients who disenrolled <28 days after treatment initiation	8,234

8,234 Patients

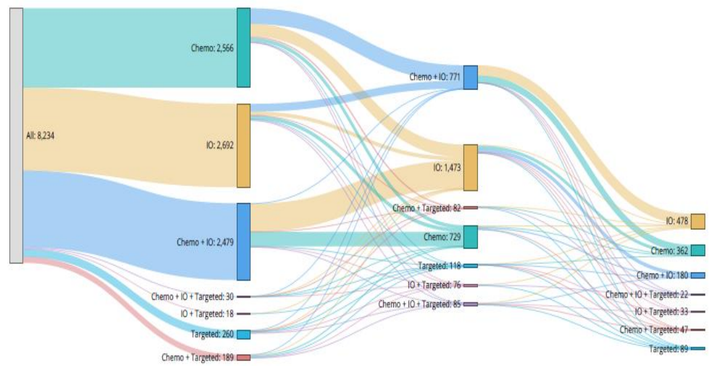
IO: Immuno-Oncology; EGFR: Epidermal Growth Factor Receptor; ALK: Anaplastic Lymphoma Kinase; SCLC: Small-Cell Lung Cancer

Table 1: Baseline Patient Characteristics

Statistic		Statistic	
Eligible Patients:		**Insurance Type:** N (%)	
N	**8,234**	Medicare	**6,659 (80.9)**
Age:		Commercial	**1,220 (65.7)**
Median (IQR)	**71 (65-77)**	Both	**23 (0.3)**
Sex: N (%)		**Charlson Comorbidities**:	
Female	**3,929 (47.4)**	Median (IQR)	**7 (6-8)**
Male	**4,300 (52.2)**	**Charlson Comorbidities**: N (%)	
Race: N (%)		0	**54 (0.7)**
Asian	**173 (2.1)**	1-2	**205 (2.5)**
Black	**967 (11.7)**	3-4	**398 (4.8)**
White	**6,039 (73.3)**	5+	**7,577 (92.0)**
Hispanic	**573 (7.0)**	**Region:** N (%)	
Year of Study Initiation: N (%)		Midwest	**2,202 (26.7)**
2016	**266 (3.2)**	Northeast	**1,153 (14.0)**
2017	**1,591 (19.3)**	South	**3,628 (44.1)**
2018	**1,778 (21.6)**	West	**1,236 (15.0)**
2019	**2,029 (24.6)**	**Death During Follow Up**:	
2020	**1,896 (23.0)**	N (%)	5,765 (70.0)
2021	**674 (8.2)**		

IQR: Interquartile Range. *Values do not add to 100% due to patients with missing data for some variables

Figure 3: Treatment Patterns



First Line Treatment

	Chemo Only	IO + Chemo	IO Only	Other
N	2,566	2,479	2,692	497

IO: Immuno-Oncology; Chemo: Chemotherapy.

Table 2: Impact to Patients

	Out of Pocket Cost PPPM	
	Commercial	**Medicare**
Period 1: Mean (95% CI)	$2,364 (2,196-2,532)	$1,031 (1,000-1,061)
Period 2: Mean (95% CI)	$615 (554-676)	$1,227 (1,160-1,294)
Period 3: Mean (95% CI)	$321 (270-372)	$352 (326-377)
Period 4: Mean (95% CI)	$391 (306-477)	$322 (304-340)

PPPM: Per-Patient Per Month; CI: Confidence Interval

Table 3: Healthcare Resource Use and Costs by Phase of Care

Measure		Period 1		Period 2		Period 3		Period 4	
		Commercial	**Medicare**	**Commercial**	**Medicare**	**Commercial**	**Medicare**	**Commercial**	**Medicare**
	N	1,412	6,048	1,523	6,485	1,299	4,790	778	4,972
	Duration (Months): Median (IQR)	1.1 (0.7-1.6)		3.7 (1.8-6.4)		6.0 (1.7-14.6)		2.0 (Standardized)	
Resource Use	**Ambulatory Visits PPPM:** Mean (95% CI)	7.7 (7.4-7.9)	7.7 (7.5-7.8)	5.8 (5.6-5.9)	5.8 (5.7-5.9)	3.4 (3.2-3.5)	3.6 (3.5-3.7)	2.1 (1.9-2.3)	2.0 (1.9-2.0)
	Emergency Department Visits PPPM: Mean (95% CI)	0.2 (0.2-0.3)	0.2 (0.2-0.2)	0.2 (0.1-0.2)	0.2 (0.2-0.2)	0.1 (0.1-0.1)	0.1 (0.1-0.1)	0.2 (0.1-0.2)	0.2 (0.2-0.2)
	Inpatient Visits PPPM: Mean (95% CI)	0.5 (0.5-0.5)	0.4 (0.3-0.4)	0.2 (0.2-0.2)	0.2 (0.2-0.2)	0.1 (0.1-0.1)	0.1 (0.1-0.1)	0.3 (0.3-0.3)	0.3 (0.3-0.3)
	Other Service Claims PPPM: Mean (95% CI)	9.1 (8.7-9.4)	8.7 (8.5-8.9)	6.9 (6.3-7.2)	7.1 (7.0-7.3)	5.4 (5.1-5.7)	5.9 (5.7-6.1)	5.0 (4.6-5.3)	5.1 (4.9-5.2)
Costs	**Total Cost PPPM (Dollars):** Mean (95% CI)	$64,253 (60,042-68,463)	$34,937 (34,030-35,843)	$44,210 (42,255-46,164)	$36,717 (35,658-37,777)	$23,512 (21,905-25,118)	$16,938 (16,296-17,579)	$24,117 (22,205-26,030)	$18,148 (17,528-18,768)
	Medical Cost PPPM (Dollars): Mean (95% CI)	$61,824 (57,650-65,997)	$32,321 (31,430-33,212)	$20,180 (18,504-21,855)	$13,519 (12,933-14,106)	$10,479 (9,548-11,410)	$8,001 (7,542-8,459)	$18,613 (17,013-20,213)	$13,756 (13,208-14,304)
	Pharmacy Cost PPPM (Dollars): Mean (95% CI)	$2,429 (2,032-2,826)	$2,615 (2,490-2,742)	$24,030 (22,999-25,061)	$23,198 (22,346-24,050)	$13,032 (11,764-14,301)	$8,937 (8,494-9,380)	$5,505 (4,853-6,157)	$4,392 (4,178-4,606)

PPPM: Per-Patient-Per-Month; IQR: Interquartile Range; CI: Confidence Interval *Patients with both commercial and Medicare insurance were excluded from this cost analysis