

The Economic Burden Associated with Treating Resected Non-Small Cell Lung Cancer in the US

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Objective

- The objective of this study is to describe the historic economic burden of managing rNSCLC in the United States

Conclusions

- The highest average monthly costs for rNSCLC patients were observed during the initial surgery period followed by end-of-life care for those who were deceased
- These results highlight the historic cost of treating rNSCLC and can inform economic models to assess the value of new therapies which may reduce recurrence and mortality

Limitations

- This study utilized Optum insurance claims which are designed for administrative purposes and contain limited clinical information
- Patient stage was not available in the data, so proxy measures were used to identify early-stage patients and recurrence in lieu of accurate staging data
- Costs are estimated and may not reflect those of all payers

Plain language summary



Why did we perform this research?

Non-small cell lung cancer is one of the most commonly detected cancers in the US. About 30% of these patients are identified when the disease can be treated by surgery. New treatments are being developed to help delay or prevent recurrence in these patients, but these regimens have upfront costs. To understand the value of these treatments through economic modeling, it is essential to understand the baseline cost of disease. This study evaluates the historic cost of treating rNSCLC.

How did we perform this research?

This study used insurance data from Optum Clinformatics. It includes 10,563 Medicare or commercially insured adults who received lung cancer surgery between 2017 and 2023. We divided the follow up time for each patient into 5 distinct time periods to track spending from before diagnosis to long term follow-up after treatment or death. We calculated the average monthly cost for the insurance provider and for the patient during each period.

What were the findings and implications of this research?

We found that historically, there have been high costs for treating rNSCLC. The most expensive period was the surgery (including 30-day recovery period) followed by end-of-life care for patients who died. For patients who had their disease recur after surgery, costs were substantially higher after recurrence. These results provide baseline knowledge on the historic cost of treating rNSCLC. The results can be utilized in economic models evaluating the value of new treatments that can delay recurrence or prolong survival.



Poster

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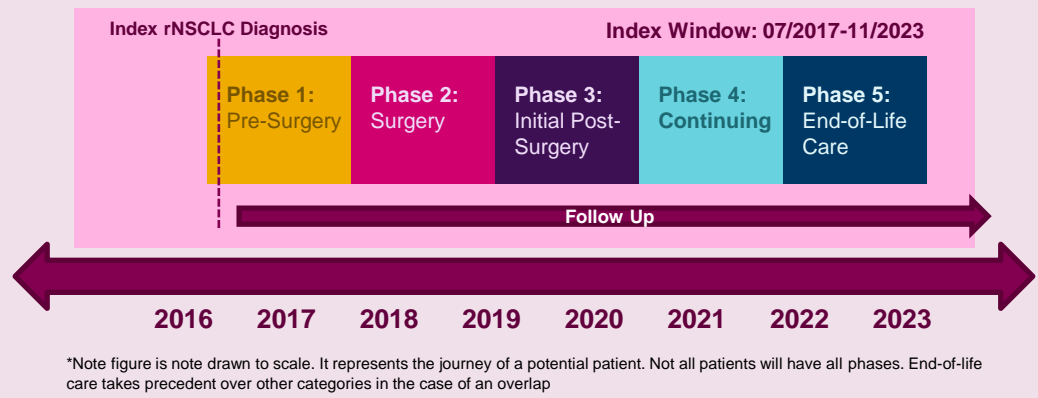
Introduction

- About 30% of non-small cell lung cancer (NSCLC) patients in the US are diagnosed when their disease is eligible for surgical resection^{1,2}
- Historically, resectable NSCLC (rNSCLC) was treated with surgery +/- chemotherapy, but recent advancements have included the introduction of immunotherapy and targeted agents which have improved patient outcomes in clinical trials³
- New treatments are associated with upfront costs, but may deliver better clinical outcomes
- This study evaluates the historic economic burden associated with managing rNSCLC to inform economic modelling of the health economic value of new treatments

Methods

- This observational cohort study utilized Medicare Advantage and commercial claims data from the Optum Clinformatics Data Mart
- Analysis included adults with evidence of NSCLC diagnosis between July 2017 and Feb 2023, surgical resection (≤4 months post-diagnosis), no evidence of metastasis within 90 days post-diagnosis, and >1 month in the insurance plan post-diagnosis
- Exclusion criteria were evidence of cancer in the period prior to NSCLC diagnosis, clinical trial participation, or osimertinib prescription
- Index date was set to date of NSCLC diagnosis
- Patients were divided into five treatment phases: pre-surgery phase (30 days pre-index to surgery), 30-day surgery phase, initial post-surgery phase (180 days following surgery phase), continuing phase (>180 days post-surgery phase), and a 60-day end-of-life phase (for deceased)
- Descriptive statistics evaluated per patient per month (PPPM) treatment costs

Figure 1: Study Schema



*Note figure is note drawn to scale. It represents the journey of a potential patient. Not all patients will have all phases. End-of-life care takes precedent over other categories in the case of an overlap

Results and interpretation

- A total of 10,563 patients were included with a median age of 71 and median of 1.4 comorbidities
- Most patients were Medicare insured (85.8%)
- Average per-patient-per-month healthcare costs for payers were \$8,312 from 30 days before diagnosis to surgery, \$59,923 for surgery and 30-day recovery period, \$6,189 for the initial post surgery phase and \$5,057 for the period >180 days after surgery
- For patients who died, end of life care averaged \$39,736 per month for payers
- For patients who recur, higher costs were seen following recurrence

Figure 2: Patient Funnel

	N
Include primary lung cancer diagnoses	153,032
Exclude surgical resection of primary NSCLC	16,491
Exclude metastatic NSCLC diagnosis 6 months pre-surgery through 90-days post-surgery	13,897
Include patients at age ≥18 on their index date	13,894
Include patients with ≥6 months baseline continuous enrollment	12,177
Include patients with ≥1-month continuous enrollment post-diagnosis (unless deceased)	12,155
Exclude patients with pre-index lung cancer diagnosis	11,865
Exclude patients with pre-index chemotherapy, radiation, and/or surgical resection	11,499
Exclude patients with pre-index other primary cancer diagnosis	11,041
Exclude patients with evidence of clinical trial participation (ICD-9: V70.7, ICD-10: Z00.6) from 6 months before index date to end of study	10,755
Exclude patients with osimertinib use during study period	10,616
Exclude patients with death date before surgery date and diagnosis of metastasis on or before surgery date	10,563

N=10,563 Patients

Table 2: Cost of Recurrence

Cost PPPM for patients who reoccur		
	Pre-Recurrence	Post-Recurrence
Commercial		
Mean PPPM (SD)	\$19,878 (22,335)	\$28,010 (35,021)
N=233		
Medicare		
Mean PPPM (SD)	\$16,002 (14,699)	\$24,739 (105,090)
N= 2,609		

PPPM: Per-Patient Per Month ;SD: Standard Deviation

Table 1: Patient Characteristics

Statistic	Year of NSCLC diagnosis: N (%)		Insurance Type: N (%)	
Eligible Patients:	N	10,563	Medicare	9,062 (85.8)
	Age (years):		Commercial	1,501 (14.2)
Median (IQR)	71 (66-76)		Modified Charlson Comorbidities:	
Sex: N (%)				
Male	4,339 (41.1)		Median (IQR)	1.41 (1.26-3.58)
Female	6,222 (58.9)		Region: N (%)	
Race: N (%)				
Asian	297 (2.8)		Midwest	2,561 (24.3)
Black	1,047 (9.9)		Northeast	1,876 (17.8)
White	8,026 (76.0)		South	4,312 (40.8)
Hispanic	678 (6.4)		West	1,809 (17.1)
			Follow-up in Months (IQR)	
			Median	22.1 (11.0-39.5)

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

Table 3: Out of Pocket Costs by Phase of Care

rNSCLC Patients	Phase 1: Pre-Surgery	Phase 2: Surgery	Phase 3: Initial Post-Surgery	Phase 4: Continuing	Phase 5: End-of-Life Care
N	10,563	10,414	10,241	8,391	1,494
Cost Per Patient Per Month to Payer (Dollars): Mean (SD)	\$8,312 (8,380)	\$59,923 (57,292)	\$6,189 (14,039)	\$5,057 (10,824)	\$39,736 (116,917)
Cost Per Patient Per Month to Patient (Dollars): Mean (SD)	\$411 (516)	\$1,050 (1,463)	\$216 (328)	\$183 (447)	\$614 (1,849)

PPPM: Per-Patient Per Month ;SD: Standard Deviation

Table 4: Costs by Phase of Care

	Phase 1: Pre-Surgery		Phase 2: Surgery		Phase 3: Initial Post-Surgery		Phase 4: Continuing		Phase 5: End-of-Life Care	
Measure	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5	
	Commercial	Medicare	Commercial	Medicare	Commercial	Medicare	Commercial	Medicare	Commercial	Medicare
N	1,501	9,062	1,493	8,921	1,461	8,780	1,111	7,280	70	1,424
Total Cost PPPM (Dollars): Mean (95% CI)	\$10,564 (10,027-11,101)	\$8,418 (8,106-8,251)	\$62,532 (59,803-65,262)	\$60,710 (59,496-61,923)	\$8,103 (6,580-9,626)	\$6,123 (5,928-6,317)	\$5,255 (4,599-5,912)	\$5,238 (4,983-5,493)	\$46,856 (33,085-60,626)	\$40,031 (\$33,788-46,274)
Inpatient Stay PPPM (Dollars): Mean (95% CI)	\$1,226 (960-1,573)	\$1,077 (964-1,190)	\$57,008 (54,403-59,614)	\$55,804 (54,582-57,026)	\$1,764 (410-3,117)	\$1,176 (1,070-1,281)	\$977 (574-1,380)	\$1,084 (886-1,282)	\$33,363 (19,551-47,174)	\$32,107 (25,845-38,369)
Ambulatory Visits PPPM (Dollars): Mean (95% CI)	\$7,033 (6,648-7,419)	\$5,415 (5,318-5,512)	\$1,295 (1,025-1,566)	\$974 (930-1,018)	\$2,581 (2,099-3,062)	\$1,829 (1,749-1,908)	\$1,344 (1,173-1,515)	\$1,282 (1,232-1,331)	\$4718 (2,184-7,252)	\$2150 (1,915-2,384)
Hospital Outpatient Visits PPPM (Dollars): Mean (95% CI)	\$6,196 (5,811-6,581)	\$4,648 (4,550-4,745)	\$1,019 (750-1,287)	\$724 (682-765)	\$2,080 (1,608-2,552)	\$1,413 (1,336-1,490)	\$1,017 (856-1,178)	\$942 (895-989)	\$4,186 (1,700-6,672)	\$1,759 (1,531-1,987)
Office Visits PPPM (Dollars): Mean (95% CI)	\$837 (777-897)	\$767 (749-786)	\$277 (240-314)	\$250 (239-263)	\$502 (410-594)	\$416 (397-434)	\$329 (277-380)	\$340 (327-354)	\$532 (278-786)	\$391 (333-448)
Emergency Room Visits PPPM (Dollars): Mean (95% CI)	\$390 (303-476)	\$241 (218-265)	\$477 (333-620)	\$428 (387-470)	\$219 (171-267)	\$239 (197-282)	\$171 (1106-236)	\$183 (168-199)	\$1,064 (541-1,587)	\$1,121 (949-1,293)
Hospice Visits PPPM (Dollars): Mean (95% CI)	\$0 (0-0)	\$0 (0-0)	\$0 (0-0)	\$0 (0-0)	\$8.73 (-2,60-20.06)	\$1.20 (-1.15-3.55)	\$25.43 (-2,52-53.38)	\$0.60 (-0.22-1.42)	\$712 (-10,1,433)	\$8.34 (0.85-15.83)
Other Visits PPPM (Dollars): Mean (95% CI)	\$687 (581-792)	\$423 (376-469)	\$2,084 (1,532-2,636)	\$2,191 (2058-2,325)	\$286 (189-384)	\$327 (303-350)	\$220 (170-272)	\$250 (220-279)	\$2,227 (823-3,631)	\$1,549 (1,335-1,763)
Pharmacy Cost PPPM (Dollars): Mean (95% CI)	\$1,188 (1,059-1,316)	\$1,264 (1,209-1318)	\$1,668 (1,340-1,995)	\$1,332 (1,274-1,390)	\$3,257 (2,853-3,662)	\$2,554 (2,453-2,656)	\$2,553 (2,191-2,914)	\$2,440 (2,313-2567)	\$5,484 (3,286-7,681)	\$3,112 (2,782-3,441)

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