Costs of Biopsy and Complications in Patients with Lung Cancer

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BACKGROUND

- Lung cancer is one of the most common cancer diagnoses in the United States. It is estimated that in 2017, over 222,000 people were diagnosed with lung or bronchus cancer and over 155,000 of those people died with the diagnosis
- There are concerns that one of the drivers of the poor 5-year survivability of lung cancer stems from the delay between onset of symptoms, diagnosis, and initiation of treatment
- Due to poor diagnostic yields, many patients require multiple biopsies to achieve a confirmed diagnosis
- This adds unnecessary intervals in time and cumulative time in many cases
- These delays in treatment result in further cancer progression as well as undue psychological stress for patients and their families

OBJECTIVE

- To describe the distribution of diagnostic procedures and the costs associated with different diagnostic approaches and complications.

METHODS

- Observational study using data from the IBM Marketscan® Databases for continuously insured patients aged 18 and older with a primary lung cancer diagnosis and treatment between July 2013 and June 2017.
- Cost Analysis: Total episodic costs associated with lung cancer diagnosis from the combined payer and patient perspectives beginning 6 months prior to index biopsy through treatment date were included in the analyses.
  - To derive complications and costs associated with a particular type of biopsy, we excluded patients who received more than one type of biopsy from the analysis.
  - Biopsy-related complications captured were pneumothorax, prolonged air leak, hemorrhage, post-treatment change to intubated / mechanical ventilation, mediastinitis, pneumonia, empyema and abscess of lung.
  - Costs of chest CT scans, biopsy, and post-procedural complications were estimated from total payments by payers and patient as reported in the claims data.
  - Costs for services provided under capitated arrangements were estimated using payment proxies that were computed based on average paid claims at the procedure level in the claims data.
  - Costs of biopsy included both procedure and physician payment in the outpatient setting. Biopsy procedure performed in the inpatient setting included all costs incurred to the payers during the entire hospital stay, including complication costs.
  - All costs were normalized to 2017 US dollars using the U.S. Bureau of Labor Statistics' Consumer Price Index Medical Care Component.

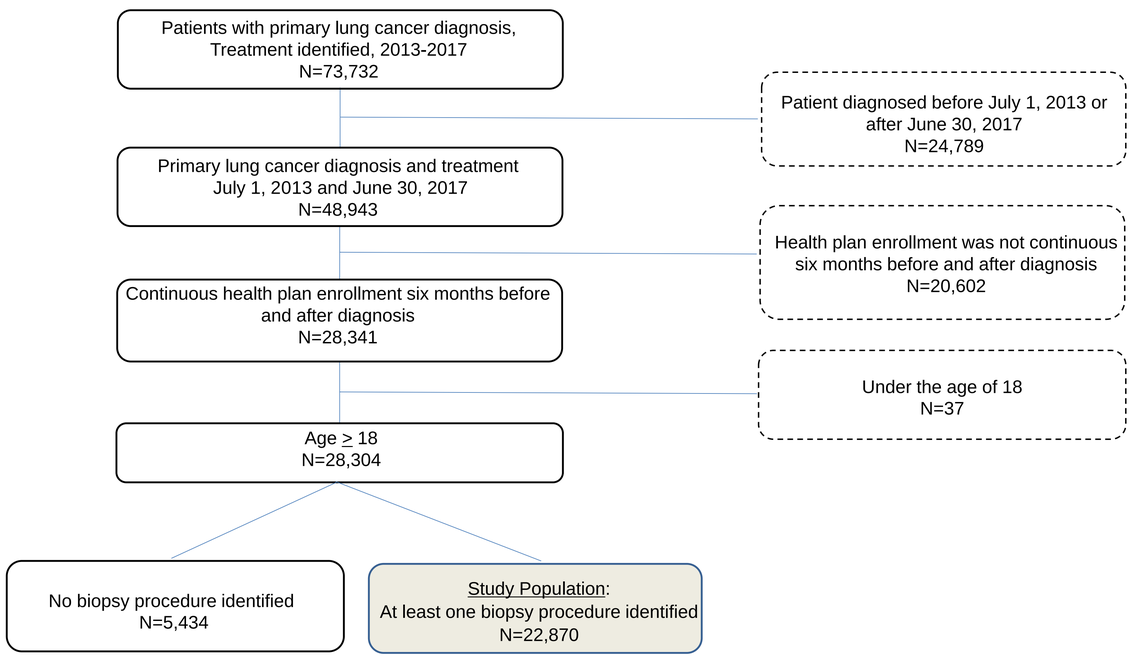


Figure 1 Selection criteria and final analytical sample

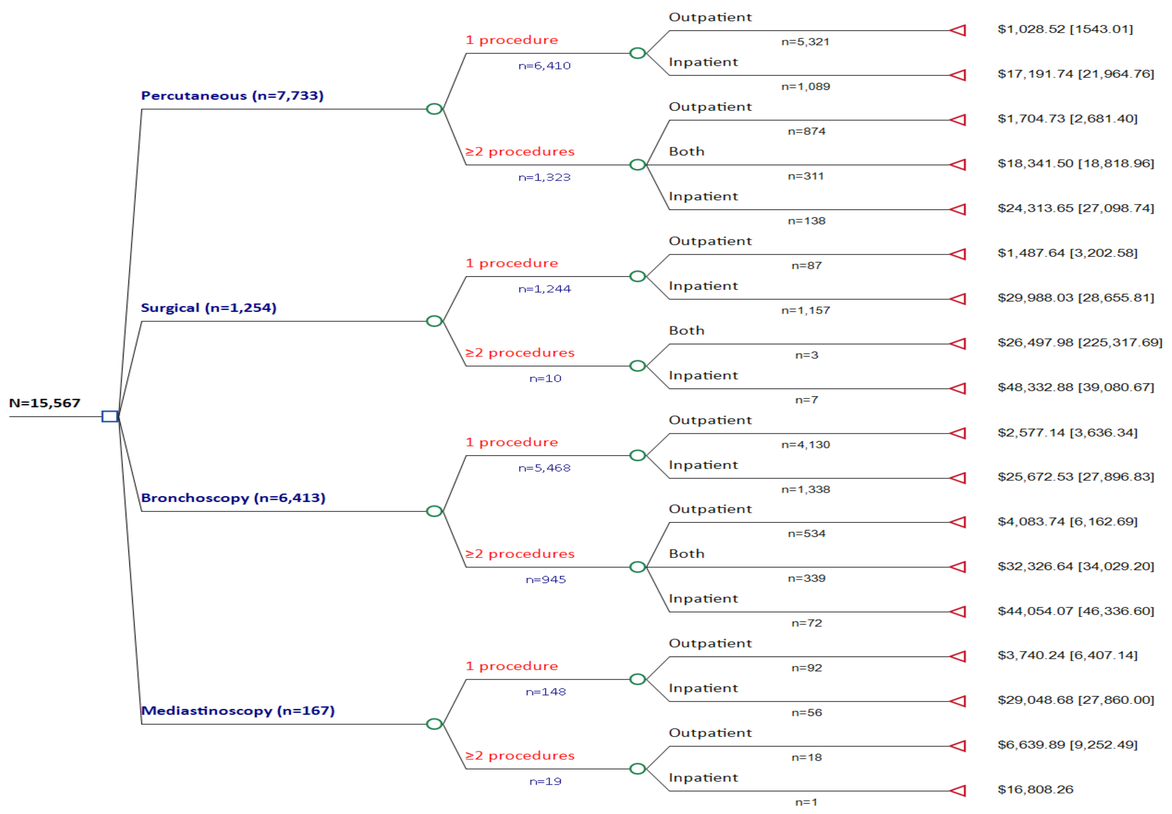
RESULTS

- A total of 22,870 patients who had evidence of one or more biopsies in their claims data were included for the final analytical sample. (Figure 1).
- Table 1 shows that 33.8% of patients had one or more percutaneous biopsies, 28.0% had one or more bronchoscopic biopsies, 5.5% had one or more surgical biopsies and less that 1% had one or more mediastinoscopies. Approximately 32% had multiple biopsies of different types.
- Repeat biopsy procedures of the same type were most common in patients who had a percutaneous or bronchoscopic biopsy.
- Biopsy, CT scan, and complications median total costs were highest for inpatient surgical biopsies ($29,988) and lowest for outpatient percutaneous biopsies ($1,028). (Figure 2)
- Repeat biopsies of the same type increased costs by 40-80%, with the exception of mediastinoscopy where the low volume of patients precluded meaningful interpretation.
- Over one-quarter of all procedures were performed on an inpatient basis: 17.9% percutaneous, 92.8% surgical, 24.6% bronchoscopic, and 34.1% mediastinoscopy.
- Inpatient biopsies were more costly than outpatient biopsies by a factor of 8 (single mediastinoscopy) to 20 (single surgical).

Table 1. Biopsy patterns and frequency among patients who had at least one biopsy procedure

	Patients		One procedure		Two procedures		Three procedures		Four or more procedures	
Type of biopsy	n	%	n	%	n	%	n	%	n	%
Percutaneous biopsies	7733	33.8	6410	82.9	1027	13.3	207	2.7	89	1.2
Surgical biopsies	1254	5.5	1244	99.2	10	0.8	0	0.0	0	0.0
Bronchoscopic biopsies	6413	28.0	5468	85.3	847	13.2	86	1.3	12	0.2
Mediastinoscopy biopsies	167	0.7	148	88.6	19	11.4	0	0.0	0	0.0
Multiple biopsy types	7303	31.9	0	0.0	4439	60.8	1973	27.0	891	12.2
Overall	22870	100.0	13270	58.0	6342	27.7	2266	9.9	992	4.3

Figure 2. Median cost of biopsy procedure and interquartile range (IQR) by type, number of procedures and care setting, inclusive of complications cost



CONCLUSION

- Costs of biopsies to confirm lung cancer diagnosis vary substantially by type of biopsy and setting. Multiple biopsies, inpatient procedures and complications result in higher costs.

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