Comprehensive Value Implications of Surgeon Volume for Lung Cancer Surgery: Utilization of an Analytic Framework Within a Regional Health System

Objective: With cancer care transitioning towards a more centralized approach, there is no tool to quantify the total value of this change. We use a framework to assess the value implications of surgeon operative volume within an 8-hospital health system.

Methods: Patients undergoing surgery for non-small cell lung cancer (NSCLC) from March 2015 to March 2021 were assessed. High volume (HV) surgeons were defined as those that performed >25 pulmonary resections (pneumonectomy, lobectomy, segmentectomy or wedge) per year in the defined time period. Value metrics include length of stay (LOS), post-operative infection rates, 30-day readmission, in-hospital mortality, median 30-day charges and direct costs, 3yr recurrence-free (RFS) and overall survival (OS). Multivariate regression-based propensity scores were utilized to match patients between groups. Metrics were graphed on radar charts to conceptualize total value.

Results: There were 636 surgical cases reviewed. Operations were performed by 12 surgeons across 6 hospitals. 2 HV surgeons performed 51% (n=323) operations, while 49% (n=313) were performed by 10 low-volume (LV) surgeons. Patients were 68±9yr and 54% (n=346) female. Median follow up was 27.3(12.5-40.9) months. Both groups operated on predominantly stage I disease (75%, n=400). Lobectomy was performed in 71% (n=450) of cases. There were more segmentectomies performed by HV (33% [n=107] vs. 3% [n=8]; p<0.001). To account for differences in patient clinicodemographics, 340 patients (170 HV, 170 LV) were 1:1 matched according to age, Charlson Comorbidty Index, race and stage. When comparing cohorts, HV surgeons had a lower LOS (3[2-4] vs. 5[3-7]; p<0.001) and infection rates (0.6% [n=1] vs. 4% [n=7]; p=0.03). LV and HV had similar 30-day readmission rates (14% [n=23] vs. 7% [n=12]; p=0.12) and in-hospital mortality (0% [n=0] vs. 0.6% [n=1]; p=0.33). Oncologic outcomes were similar; 3yr RFS was 74% vs. 68%; p=0.44, and 3yr OS was 80% vs. 79%; p=0.87. For cases performed by HV surgeons, charges were reduced by 28% and direct costs reduced by 23% (both p<0.001). The figure depicts total value implications associated with surgeon operative volume.

Conclusions: HV surgeons provide comprehensive value within a regional health network. This multi-domain framework can be utilized by patients, providers and payers to drive oncologic care decisions within a health system.

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