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 Comorobity 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.

Conor Maxwell (1), Samantha Falls (1), Matthew Bigbee (2), Sricharan Chalikonda (1), Chan Shen (3), David Bartlett (2), Hiran Fernando (1), Casey Allen (1), (1) Allegheny General Hospital, Pittsburgh, PA, (2) Allegheny Health Network, Pittsburgh, PA, (3) Penn State Milton S. Hershey Medical Center, Hershey, PA