**INTRODUCTION**

- Esophageal cancer is the 8th most common incident cancer worldwide and the 5th leading cause of cancer among patients aged 60-80 years in the United States.
- Esophagectomy, a surgical procedure, removes the majority of the esophagus and is usually performed concurrently with gastric conduit reconstruction, which is the standard of treatment for early to locally advanced esophageal cancer and end-stage benign esophageal disease.
- Over the past decade, higher hospital procedure volumes served as a marker of healthcare quality for esophagectomy. Although surgeon volume effects are unclear.

We sought to answer the question do surgeons with low esophagectomy case volumes (LVS; <7 esophagectomies/year) operating at high volume hospitals (HVH; ≥13 esophagectomies/year) exhibit patient outcomes comparable to high volume surgeons (HVH; ≥77 esophagectomies/year)?

Hypothesis: Hospital esophagectomy volume has a greater effect on incidence of mortality and postoperative complications than surgeon esophagectomy volume.

**METHODS**

1. **Primary Endpoints**
   - Primary Esophagectomy Procedure
   - Elective Admission
   - High Tide Raises All Boats: Esophagectomy Outcomes for Low Volume Surgeons in High Volume Centers

2. **Primary Endpoints**
   - High Volume Hospital (≥13 esophagectomies/year) vs Low Volume Hospital (<7 esophagectomies/year)

3. **Primary Endpoints**
   - Total esophagectomy
   - Elective Esophagectomy
   - Primary Esophagectomy in Patients aged ≥18 years N=6622

4. **Primary Endpoints**
   - Excision of the esophagus
   - Esophagectomy, otherwise specified
   - Other esophagectomy
   - Other total gastrectomy

**FIGURE 1** Inclusion criteria flowchart

High Vol Hosp (≥ 13 esophagectomies/year) vs Low Vol Hosp (< 13 esophagectomies/year)

High Vol Surg (≥ 7 esophagectomies/year) vs Low Vol Surg (< 7 esophagectomies/year)

We used generalized linear mixed modeling and adjusted for patient characteristics (sex, race, sum of Charlson comorbidities, age), year, and hospital site. Bonferroni correction was performed for multiple testing. NY and FL data were used as those states had both surgeon and hospital data.

**RESULTS**

- HVH vs LVH (N=2126)
  - Low Volume Hospital
  - High Volume Hospital
  - Age (years)
  - Race
  - Comorbidity
  - Neurologic and Prolonged Death
  - PLOS
  - Pulmonary Complications
  - Cardiac Complications
  - Gastrointestinal Complications
  - Hematologic Complications
  - Infectious Complications

**FIGURE 2** Number of high volume hospitals (HVH) and low volume hospitals (LVS) performing esophagectomies. A greater proportion (84%-89%) of hospitals in New York and Florida (2007–2013) performed ≥13 esophagectomies/year.

**FIGURE 3** Distribution of esophagectomy volume surgeons (LVS) and high esophagectomy volume surgeons (HVH) allow volume hospitals (LWH) and high volume hospitals (HVH) performing esophagectomies. ALLH, 81%-92% of surgeons were LVS. At HVH, 21%-31% of surgeons performing esophagectomies were HVH.

**TABLE 1** Clinical characteristics of patients undergoing esophagectomy allow and high volume hospitals. Patients were predominately male and white with a primary cancer diagnosis. Although patients at low volume hospitals were primarily treated by low volume surgeons (LVS) and patients at high volume hospitals were primarily treated by high volume surgeons (HVH), there was an approximate equal proportion of patients treated by LVS and HVH (48%, 52%, respectively).

<table>
<thead>
<tr>
<th></th>
<th>HVH</th>
<th>LVH</th>
</tr>
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<tbody>
<tr>
<td>Death OR</td>
<td>0.48</td>
<td>1.00</td>
</tr>
<tr>
<td>PLOS OR</td>
<td>0.76</td>
<td>0.38</td>
</tr>
<tr>
<td>Pulmonary Complications OR</td>
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</tr>
<tr>
<td>Cardiac Complications OR</td>
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<tr>
<td>Gastrointestinal Complications OR</td>
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<tr>
<td>Hematologic Complications OR</td>
<td>0.66</td>
<td>0.30</td>
</tr>
<tr>
<td>Infectious Complications OR</td>
<td>0.91</td>
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</tr>
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</table>

**CONCLUSIONS**

- Although patients at low volume hospitals were primarily treated by low volume surgeons (LVS) and patients at high volume hospitals were primarily treated by high volume surgeons (HVH), there was an approximate equal proportion of patients treated by LVS and HVH (48%, 52%, respectively).

- These results suggest that surgical hospital environment rather than individual surgeon experience has the most impact on patient outcomes.

- These results should be considered in the continued debate on allocation of healthcare resources, quality assessment and centralization of surgeries to improve outcomes after esophagectomy.

- Esophagectomy is a less commonly performed, high risk surgery and direct measurement of mortality and morbidity is not statistically reliable for policy decisions.

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**REFERENCES**