High Volume Surgeons are Associated with Lower Cost of Radical Prostatectomy in New York State

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INTRODUCTION

• Prostate cancer is associated with high healthcare expenditures and cost of care vary widely across the U.S.
• Reducing cost of prostate cancer care conserves healthcare resources
• The goals of this study are:
  1) Determine whether high-volume surgeons with more experience have lower cost surgery
  2) Uncover hospital- and patient-level characteristics associated with low-cost surgery

METHODS

• Analyzed de-identified data from SPARCS, an all-payer reporting system capturing all inpatient discharges in New York State in 2016. All patients who underwent RP were extracted
• Surgeons who performed <10 RPs per year were excluded from analysis
• Covariates included surgeon volume, years in practice, hospital location, hospital size, hospital volume, teaching status, age, race, insurance type, severity of illness, and risk of mortality
• Low-cost RP defined as < $9,236.85, high-volume surgeons > 49 RP/yr., high-volume hospital > 69 RPs/yr.
• Mann-Whitney U & Chi-square tests identified differences between high- and low-cost RP
• Generalized linear mixed model with fixed effects was performed to determine factors associated with low-cost RP. Pseudo R² statistics assess the relative contribution of surgeon-, hospital-, and patient-level variables

RESULTS

• 3,132 men underwent RP by 77 surgeons in 56 hospitals. Mean prostate volume and hospital volume were 40.7 and 55.9. Median cost of surgery & hospitalization was $12,718.93 (IQR: $6,135.37)
• Low-cost group consisted of 313 operations by 41 surgeons with median cost of $9,586.71 (IQR: $1,580.64)
• Increase in surgical volume of individual surgeon was associated with low-cost RP (OR 1.03, p<0.001). Each additional year of practice was associated with 5% increased odds of low-cost RP (OR 1.05, p=0.036)
• High-volume hospitals were less likely to have low-cost RP (OR 0.97, p<0.001). Teaching status, hospital size, hospital locations were not significant predictors
• African-American patients were less likely to have low-cost RP (OR 0.57, p=0.003). Age, insurance type, and other characteristics were not predictive of cost

Table 1. Univariate analysis of hospital-, surgeon-, and patient-level factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>OR</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital Volume ≥75 RPs</td>
<td>1.01</td>
<td>1.00–1.02</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Surgeon Volume≥49 RPs</td>
<td>1.03</td>
<td>1.01–1.05</td>
<td>0.001</td>
</tr>
<tr>
<td>Bed Size &gt;69</td>
<td>1.00</td>
<td>1.00–1.01</td>
<td>0.864</td>
</tr>
<tr>
<td>NYC Hospital</td>
<td>0.72</td>
<td>0.69–0.75</td>
<td>0.7646</td>
</tr>
<tr>
<td>Teaching Hospital ≥5</td>
<td>5.4</td>
<td>4.63–6.40</td>
<td>0.7795</td>
</tr>
<tr>
<td>Years of Experience ≥10</td>
<td>1.05</td>
<td>1.00–1.10</td>
<td>0.037</td>
</tr>
<tr>
<td>Age ≥70</td>
<td>0.79</td>
<td>0.58–1.08</td>
<td>0.135</td>
</tr>
<tr>
<td>White Race</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Black Race</td>
<td>0.57</td>
<td>0.39–0.83</td>
<td>0.003</td>
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<tr>
<td>Other Race</td>
<td>1.08</td>
<td>0.78–1.48</td>
<td>0.66</td>
</tr>
<tr>
<td>APR Severity ≥1</td>
<td>0.73</td>
<td>0.57–0.94</td>
<td>0.014</td>
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<tr>
<td>APR Mortality ≥1</td>
<td>0.41</td>
<td>0.27–0.64</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Private Insurance ≥1</td>
<td>0.80</td>
<td>0.61–1.05</td>
<td>0.110</td>
</tr>
</tbody>
</table>

Table 2. Multivariate analysis of hospital-, surgeon-, and patient-level factors as predictors of low-cost RP

DISCUSSION

• Study of RP cost in New York is important as it is a highly populated state with the 3rd highest Medicare spending per enrollee
• Our study found that surgeons & hospitals varied widely in cost, high-volume surgeons and more years in practice led to low-cost, while high-volume hospitals were less likely to be low-cost
• We identified a surgeon volume-cost relationship similar to previous studies. Increased volume likely improved clinical outcomes, with fewer complications, lower blood loss, decreased operative time
• Association between low-cost and increased practice experience can be explained by “practice-makes-perfect” hypothesis as surgeons make incremental technical improvements that reduce resource utilization
• Higher cost RP at high-volume centers may be a unique feature of New York, where most high-volume hospitals are in New York City. These institutions incur higher operating cost due to expensive land and labor
• Our study is limited by:
  • Retrospective design
  • Inability to distinguish between open and minimally invasive surgery
  • Possibility of unmeasured confounding

CONCLUSION

• High-volume surgeons in New York are more likely to have low-cost RP
• Surprisingly, centralization of prostate cancer care at high-volume New York institutions resulted in higher cost surgery

REFERENCES