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 R^2 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 surgeon 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

	High-cost (> 25th percentile)	Low-Cost (≤25th percentile)	P value
Hospital Volume ≥75%tile	1618 (69%)	540 (68.6%)	0.876
Surgeon Volume ≥75%tile	1340 (57.1%)	440 (55.9%)	0.573
NYC hospital	1285 (54.8%)	260 (33%)	<0.001
Teaching Hospital	2120 (90.4%)	721 (91.6%)	0.347
Patient Age ≥70	1888 (80.5%)	628 (79.8%)	0.700
Caucasian	1529 (65.2%)	558 (70.9%)	0.004
Private Insurance	802 (34.2%)	250 (31.8%)	0.227
APR severity ≥1	1261 (53.8%)	406 (51.6%)	0.307
APR mortality ≥1	295 (12.6%)	51 (6.5%)	<0.001
Bed Size	686.79 ± 304.22	524.91 ± 188.6	<0.001
Years in Practice	14.74 ± 7.4	16.38 ± 8.49	<0.001
Total Cost	16101.22 ± 6026.85	9353.56 ± 1268.49	<0.001

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

	OR	95% CI	P value
Hospital Volume	0.97	0.95-0.98	<0.001
Surgeon Volume	1.03	1.01-1.05	0.001
Bed Size	1.00	1.00-1.00	0.864
NYC Hospital	0.72	0.09-5.97	0.7646
Teaching Hospital	5.4	0.46-63.40	0.1795
Years of Practice Experience	1.05	1.00-1.10	0.037
Age <70	Ref.		
Age >70	0.79	0.58-1.08	0.135
White Race	Ref.		
Black Race	0.57	0.39-0.83	0.003
Other Race	1.08	0.78-1.48	0.66
APR Severity ≥1	0.73	0.57-0.94	0.014
APR Mortality ≥1	0.41	0.27-0.64	<0.001
Private Insurance	0.80	0.61-1.05	0.110

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

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