Increased Mortality in Low-Volume Hospitals Performing Revision Arthroplasty for Periprosthetic Joint Infection of the Hip and Knee

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INTRODUCTION: The relationship between hospital case volume and postoperative morbidity following revision arthroplasty for periprosthetic joint infection (PJI) has not been defined. As such, we sought to assess 90-day postoperative mortality among patients undergoing stage-one antibiotic spacer placement for PJI of the hip or knee at low-volume and high-volume hospitals.

METHODS: The Premier Healthcare Database was queried from 2015 to 2023 for adult patients undergoing stage-one antibiotic spacer placement for PJI. Using International Classification of Disease, Tenth Revision, Current Procedural Terminology codes, and hospital charge codes for antibiotics/spacers, patients undergoing stage-one arthroplasty for PJI were identified. A single volume threshold was identified via the Metropolis-Hastings algorithm using a Markov Chain Monte Carlo simulation of a restricted cubic spline (RCS) model on the odds of mortality over hospital volume to define low and high-volume. Patients who underwent surgery at high-volume hospitals were compared to those who underwent surgery at low-volume hospitals. Multivariable logistic regression was performed to assess odds of 90-day mortality while accounting for confounding factors. A p-value < 0.05 was considered significant.

RESULTS: In total, 61,527 PJI patients were used to construct a RCS which demonstrated that postoperative mortality was increased among patients who underwent surgery at low-volume hospitals performing <35 spacers annually. Mortality within 90 days of surgery was higher among the low-volume cohort (1.80% vs. 1.26%), even after accounting for confounding factors (adjusted odds ratio (aOR)=1.32; 95% Confidence Interval (CI)=1.13-1.54). Furthermore, low-volume hospitals had significantly higher rates (17.70% vs. 13.61%) and adjusted odds (aOR=1.45; 95% CI=1.37-1.52) of sepsis.

DISCUSSION AND CONCLUSION:

Patients who underwent spacer placement at a hospital performing <35 stage-one spacers annually had a >30% odds of postoperative mortality and sepsis.

Figure 1: Restricted cubic spline modeling the adjusted odds of 90-day mortality by annual hospital volume. Gray dashed lines represent the 95% confidence interval and the solid gray line represents the trend line.

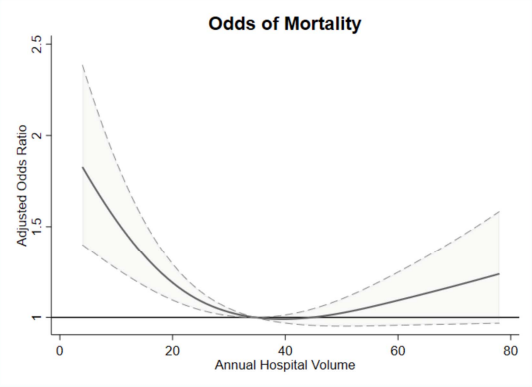

Table 1: Primary and secondary study outcomes. (aOR=adjusted odds ratio, CI=confidence interval)

	High Volume N = 18,727		Low Volume N = 36,943			Multivariate Regression		
Complication	**N**	**%**	**N**	**%**	**P-Value**	**aOR**	**95%-CI**	**P-Value**
90-day Mortality	238	1.27%	720	1.95%	<0.001	0.76	0.65-0.88	<0.001
Sepsis	2,549	13.61%	7,076	19.15%	<0.001	0.69	0.66-0.73	<0.001
Readmission	2,814	15.03%	4,971	13.46%	<0.001	1.08	1.02-1.15	0.010
Medical Complication	4,683	25.01%	10,133	27.43%	<0.001	0.88	0.84-0.92	<0.001