

# Surgeon vs. Center Volume: Who Really Affects Infection Rates in Total Hip Arthroplasty?

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## INTRODUCTION:

Total hip arthroplasty (THA) is one of the most frequently performed elective surgical procedures in the United States. Complications—particularly periprosthetic joint infection (PJI)—present significant clinical and economic challenges for the healthcare system. Previous studies have established a strong correlation between both surgeon and hospital procedural volume and complication rates in total joint arthroplasty. Specifically, high-volume surgeons and high-volume institutions consistently demonstrate lower rates of adverse events, including surgical site infections (SSI) and PJI. However, much of the existing evidence does not adequately isolate the effect of individual surgeon volume from the institutional context in which surgeries are performed. High-volume surgeons often operate within high-volume centers, making it difficult to determine whether reduced complication rates are driven more by surgeon experience or by institutional factors such as standardized protocols, optimized perioperative care, and dedicated OR teams. The present study aimed to evaluate infection outcomes following primary THA as a function of surgeon volume within the consistent setting of a single high-volume, orthopedic specialty academic medical center. By controlling for institutional environment, we sought to better understand whether low-volume surgeons benefit from the protective effect of operating within a specialized, high-volume center.

## METHODS:

We reviewed prospectively collected SSI surveillance data on all patients who underwent primary THA between January 2018 and December 2024 at a high-volume academic orthopedic hospital. Superficial SSI (SSSI) and PJI were identified and recorded using standardized criteria set forth by the National Healthcare Safety Network (NHSN). Surgeon volume was categorized based on annual case numbers: low-volume surgeons performed fewer than or equal to 50 THAs per year, high-volume surgeons performed between 50 and 250 per year, and “ultra-high” volume surgeons performed more than 250 THAs annually. Chi-square or Fisher’s exact tests were used for categorical variables, ANOVA for continuous variables, and multivariable logistic regression to control for known confounders.

## RESULTS:

A total of 31,795 primary THA were performed by 42 surgeons at a high volume academic medical center from January 2018 to December 2024. There were 10 low volume THA surgeons who performed 915 cases with an average case duration of 98.6 minutes, a 0.3% rate of PJI and a 0.1% rate of SSSI. There were 27 high volume THA surgeons who performed 21,963 cases with an average case duration of 93.0 minutes, a 0.3% rate of PJI, and a 0.2% rate of SSSI. There were 5 “ultra-high” volume THA surgeons who performed 8,917 cases with an average case duration of 79.0 minutes, a .3% rate of PJI, and a .3% rate of SSSI. There was no difference between PJI or SSSI rates between low vs. high volume, low vs. “ultra-high” volume, or high vs. “ultra-high” volume THA surgeons (PJI:  $p=0.28$ , SSSI:  $p=0.52$ ). Logistic regression identified increased body mass index (BMI) and increased procedure duration as independent risk factors for PJI ( $p=0.002$ ,  $p<0.001$ ). Regression analysis additionally identified BMI, procedure duration, and anterior approach as independent risk factors for SSSI ( $p=0.001$ ,  $p<0.001$ ,  $p<0.001$ ).

## DISCUSSION AND CONCLUSION:

Within a high-volume academic center, low PJI and SSSI rates were maintained across all surgeon volume categories, despite differences in operative duration. These findings suggest that institutional factors—such as standardized protocols, a robust infection control committee, optimized perioperative care, and dedicated OR teams—may play a more critical role in infection prevention than surgeon-specific volume.

Variable	Category	PJI (%)	SSSI (%)	Mean	SD	
Ultra-high	15 (0.2)	23 (0.3)	79.02	21.57	PJI p-value: 0.274	
	27 (0.3)	45 (0.2)	93.06	28.78		
Hip volume	Low	3 (0.3)	1 (0.1)	98.55	34.67	SSSI p-value: 0.515

Variable	Logistic Regression Predicting PJI			
	Odds Ratio	CI Lower 95%	CI Upper 95%	p-value
Age	0.984	0.965	1.005	0.130
BMI	1.055	1.019	1.091	0.002
Diabetes	1.571	0.791	3.121	0.197
Anterior Approach	0.769	0.422	1.401	0.390
Robotic/Navigation Use	0.628	0.389	1.014	0.057
Duration	1.008	1.004	1.013	0.000
Male Gender	0.783	0.491	1.251	0.306
Non Smoker	1.111	0.677	1.823	0.677
Smoker	1.334	0.504	3.536	0.562
Low Volume	0.98	0.303	3.175	0.9740
Ultra High Volume	0.817	0.45	1.481	0.505

Variable	Logistic Regression Predicting SSI			
	Odds Ratio	CI Lower 95%	CI Upper 95%	p-value
Age	1.013	0.99	1.038	0.275
BMI	1.089	1.048	1.128	0.000
Diabetes	0.807	0.319	2.042	0.651
Anterior Approach	3.858	2.312	6.438	0.000
Robotic/Navigation Use	0.675	0.414	1.098	0.113
Duration	1.01	1.004	1.015	0.001
Male Gender	0.643	0.387	1.069	0.089
Non Smoker	0.856	0.525	1.396	0.533
Smoker	0.809	0.143	2.586	0.501
Low Volume	0.837	0.088	4.702	0.658
Ultra High Volume	1.536	0.901	2.616	0.115