

The Impact of Hospital Volume on Immediate In-Hospital Outcomes Following Total Joint Arthroplasties



OAKLAND UNIVERSITY WILLIAM BEAUMONT

Tarek Almsaddi, B.S.¹, Mouhanad El-Othmani, M.D.², Abdul Zalikha, M.D.², Inaya Hajj Hussein, Ph.D.³

¹Class of 2023 M.D. Candidate, Oakland University William Beaumont School of Medicine

²Department of Orthopedics and Sports Medicine, Detroit Medical Center

³Department of Foundational Medical Studies, Oakland University William Beaumont School of Medicine

Introduction, Aims & Objectives

Total joint arthroplasties (TJA) are common and safe procedures aimed at repairing a damaged hip or knee joint. While TJA's can significantly improve quality of life by effectively reducing pain and dysfunction of the hip or knee joint from various conditions, one critical factor has been found to significantly impact the mortality rates, number of infections, rates of revision operations, and severity of complications: **volume of procedures performed by the hospital or surgeon**². The purpose of this investigation is to provide an updated analysis with respect to this volume-outcome relationship using more recent national data and determine how the outcomes have changed in low-volume **community (LVC) hospital** and high-volume **community (HVC) hospital**.

Methodology

The study is a retrospective cohort utilizing data from the National Inpatient Sample database from 2006-2016 and include patients age 40 or older receiving a primary or revision THA and TKA. The database will be used to determine the frequency of TJA performed at each hospital registered within the NIS between 2006 and 2016, and then the in-hospital postoperative outcomes will be comparatively analyzed.

Results

Patients who underwent TJA at LVC's were more likely to develop:

- a cardiac complication
- a respiratory complication
- a gastrointestinal complication
- a genitourinary complication
- a hematoma/seroma
- wound dehiscence
- a postoperative infection
- die during hospitalization

Additionally, length of stay and total charges were higher at LVC's compared to HVC's.

Table 1: Propensity score analysis of in-hospital complications of all TJA cases.

	HVC	LVC	P-Value
Any Complications	24.19%	21.50%	< 0.0001
Cardiac Complication	0.62%	0.80%	< 0.0001
Peripheral Vascular Disorder (PVD) Complication	0.11%	0.10%	0.3416
Respiratory Complication	0.16%	0.32%	< 0.0001
Gastrointestinal (GI) Complication	0.25%	0.35%	< 0.0001
Genitourinary (GU) Complication	0.49%	0.69%	< 0.0001
Hematoma/Seroma	0.56%	1.22%	< 0.0001
Wound Dehiscence	0.08%	0.12%	< 0.0001
Postoperative Infection	0.12%	0.22%	< 0.0001
Deep Vein Thrombosis (DVT)	0.33%	0.28%	0.0063
Pulmonary Embolism (PE)	0.34%	0.36%	0.1423
Postoperative Anemia	22.48%	19.15%	< 0.0001
Died During Hospitalization	0.09%	0.13%	< 0.0001

Discussion

Our study shows trends similar to the previous data, one of which is rate of post-operative infection being higher in LVC's. Our findings of longer length of stay and post-operative infection both showing prevalence in LVC's suggests that our data supports a possible association between the two factors. Previous literature also suggests that high-volume hospitals have more superior infection prevention measures than low-volume hospitals²¹. Another replicated finding is the inverse relationship between total costs and hospital volume. Our data showed that LVC's are more associated with a higher total cost, and this is attributed to greater negotiating power of HVC's because of higher numbers, greater efficiency, and accelerated care allowing for expedited discharge. These factors result in significant cost saving for the patient and the healthcare system²².

Table 2: Propensity score analysis of resource utilization of all TJA cases

	HVC	LVC	P-Value
Length of Stay (LOS)	3.19	3.66	< 0.0001
Total Charges (\$)	\$50,652	\$52,982	0.0013
Total Charges Per Day (\$)	\$18,169	\$16,443	< 0.0001

HVC's have more skilled physicians and health care professionals and more efficient processes of patient care that ultimately lead to better patient outcomes. Additionally, patients undergoing TJA at LVC's have longer length of stay, increasing potential for complications. Again, this is related to HVC's having more superior resources such as availability of special care facilities, infrastructure, specialist medicine care, physiotherapy, pain control anesthesia teams, and other resources^{23, 24}.

Conclusion

With the number of TJA's exponentially increasing year by year, it's important to recognize that there are factors affecting an institution's ability to create better outcomes for their patients. This study points out the trends of volume on in-hospital complications, and further research should aim to understand what causes institutions to see a fewer volume of cases, with the intent of minimizing complications in the growing population of patients requiring TJA.

References

ADD