National Trends in Primary and Revision THA and TKA Market Concentration at the Surgeon Level: A National Analysis From 2013-2023

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INTRODUCTION: Total hip arthroplasty (THA) and total knee arthroplasty (TKA) utilization has continued to rise in the United States. However, how operative volume is distributed across surgeons remains unclear, particularly in distinguishing primary from revision arthroplasty practice patterns. Understanding surgeon-level market structure is essential for assessing access, workforce capacity, and training needs.

METHODS: A retrospective analysis was performed using the Centers for Medicare & Medicaid Services Medicare Physician & Other Practitioners dataset from 2013–2023. Primary and revision THA and TKA procedures were identified using CPT codes. Surgeons were included for any year in which ≥11 Medicare claims were submitted for a given procedure. Surgeon-level market concentration was quantified annually using the Herfindahl-Hirschman Index (HHI). Geographic variation was assessed using state-level change in HHI (ΔHHI). Workforce entry was evaluated by identifying entrant surgeons who had performed no procedures in the prior two years. Temporal trends were analyzed with linear regression.

RESULTS SECTION: Primary THA volume increased from 166,730 to 274,801 and TKA from 390,710 to 526,893. The number of surgeons increased from 5,816 to 8,062 for THA and 10,458 to 12,089 for TKA. Surgeon-level market concentration decreased significantly for primary THA (HHI 2.69 to 2.00; $\beta = -0.064$/year; $p < 0.001$) and primary TKA (1.67 to 1.50; $\beta = -0.016$/year; $p = 0.022$), indicating decentralization. In contrast, revision THA volume declined (5,667 to 1,814) while HHI increased (42.40 to 132.78; $\beta = +8.37$/year; $p < 0.001$). Revision TKA volume remained stable with persistently elevated HHI. State-level ΔHHI demonstrated widespread decentralization for primary arthroplasty, most prominently in previously concentrated markets. Entrant surgeons contributed a stable proportion of national primary volume annually.

DISCUSSION: Primary THA and TKA have become increasingly decentralized over the past decade, with case volume distributed across a growing number of surgeons nationwide. In contrast, revision arthroplasty remains concentrated among a small subset of high-volume specialists, reflecting the technical complexity, resource requirements, and referral-based nature of these procedures. These opposing patterns suggest that while access to routine arthroplasty is expanding, access to complex revision care depends on maintaining coordinated referral pathways and supporting specialized centers. Future work should evaluate how these structural patterns influence complication rates, patient access, and training capacity across institutions.

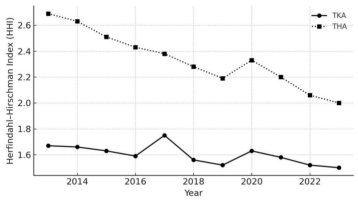
SIGNIFICANCE/CLINICAL RELEVANCE: Decentralization of primary arthroplasty expands patient access but may introduce variability in outcomes as more surgeons perform these procedures. In contrast, the increasing centralization of revision arthroplasty highlights the growing importance of regional expertise and structured pathways to ensure patients with complex failure or complication are directed to surgeons and centers equipped to manage them.

Figure 1: Temporal Trends in Surgeon-Level Concentration for Primary THA and TKA, 2013–2023

(A) Annual Herfindahl–Hirschman Index (HHI x 10,000) calculated at the surgeon level

(B) Linear regression summary for the 2013 to 2023 trend indicating statistically significant decentralization of THA and TKA case volume across surgeons nationwide.

A



B

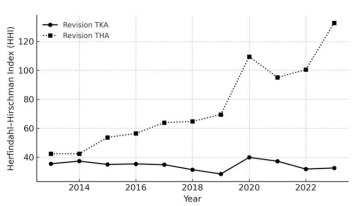
Group	β (slope per year)	p-value	R^2	Interpretation
Primary THA	−0.064	$p < 0.001$	$R^2 = 0.93$	Strong, significant decentralization
Primary TKA	−0.016	$p = 0.022$	$R^2 = 0.46$	Mild but statistically significant decentralization

Figure 2: Temporal Trends in Surgeon-Level Concentration for Revision THA and TKA, 2013–2023

(A) Annual Herfindahl–Hirschman Index (HHI x 10,000) calculated at the surgeon level

(B) Linear regression summary for the 2013 to 2023 trend indicating statistically significant concentration of THA revision and non-significant, stable, high concentration of revision TKA case volume across surgeons nationwide.

A



B

Group	β (slope per year)	p-value	R^2	Interpretation
Revision THA	+8.37	$p < 0.001$	$R^2 = 0.88$	Strong, significant increasing concentration
Revision TKA	−0.25	$p = 0.45$	$R^2 = 0.06$	No significant trend (stable high concentration)

Figure 3. Geographic Variation in the Change in Surgeon-Level Market Concentration for Primary THA, 2013–2023

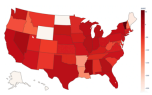


Figure 4. Geographic Variation in the Change in Surgeon-Level Market Concentration for Primary TKA, 2013–2023

Figure 5. Proportion of Primary THA and TKA Case Volume Performed by New Entrant Surgeons Over Time