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Research Article

A Comparative Analysis of Medicaid and Medicare Reimbursement Variations in Total Knee and Total Hip Arthroplasty

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Abstract

Background: Total joint arthroplasty represents a significant healthcare expenditure in the United States, with Medicare and Medicaid serving as primary payers for a substantial amount of these procedures. This study provides a comparison of Medicare and Medicaid reimbursement rates for the ten most common Total Knee Arthroplasty (TKA) and Total Hip Arthroplasty (THA) procedures across the United States to quantify reimbursement variations and examine their implications for healthcare access and equity.

Methods: This cross-sectional analysis examined 2020 Medicare and Medicaid reimbursement rates across 46 states for common total joint arthroplasty procedures. Ten of the most common TKA and THA Current Procedural Terminology (CPT) codes were identified through retrospective review of 2021 billing data from a Level I trauma center. Statistical analysis included calculation of mean reimbursement rates with 95% confidence intervals, dollar difference per Relative Value Unit (RVU) and coefficient of variation. T-tests were used to compare mean differences between Medicaid and Medicare reimbursement ($p < 0.05$). Geographic analysis was conducted by calculating Medicaid-to-Medicare reimbursement ratios for each state and visualizing results through heat mapping.

Results: Medicare demonstrated higher average reimbursement rates compared to Medicaid for most procedures ($1,435 ± $27 versus $1,235 ± $95, $p < 0.05$), representing an average difference of $199.99 favoring Medicare. Two notable exceptions were primary TKA (CPT 27447) and stage 2 revision TKA (CPT 27487), which favored Medicaid by $441.41 and $256.07, respectively. Substantial geographic variation was observed, with Medicaid's coefficient of variation (0.27) substantially exceeding Medicare's (0.06). Arkansas demonstrated the highest Medicaid-to-Medicare ratio (155% higher), while Rhode Island showed the lowest (nearly 50% lower).

Conclusion: This study found that Medicaid reimbursed approximately 86% of Medicare rates for common arthroplasty procedures, with substantial geographic variation across states. These reimbursement disparities may create barriers to healthcare access for vulnerable populations and influence physician participation in Medicaid programs, with important implications for healthcare equity in orthopedic care.

Keywords: Total Knee Arthroplasty (TKA); Total Hip Arthroplasty (THA); Relative Value Unit (RVU)

Introduction

Total joint arthroplasty represents one of the most significant healthcare expenditures in the United States, with Medicare and Medicaid serving as the primary payers for a substantial portion of these procedures. America's two largest public health insurers, Medicare (MCR) and Medicaid (MCD), are estimated to comprise over one-third of an orthopedic surgeon's practice [1]. In 2022, The Centers for Medicare and Medicaid Services (CMS) reported that MCR and MCD spending accounted for 21%

($944.3 billion) and 18% ($805.7 billion) of the National Health Expenditure, respectively [5]. Total joint arthroplasty stands as the single largest expenditure paid by Medicare, with nearly one in six Americans aged 65 and older requiring such procedures and approximately 1.4 million combined total knee and total hip arthroplasties performed annually in the United States [1-15]. The American Academy of Orthopaedic Surgeons (AAOS) 2023 census projects this number will double over the next 25 years, as the growing demand for total joint arthroplasty outpaces workforce expansion [2,12].

Current literature demonstrates significant disparities in reimbursement patterns between public and private insurers for orthopedic procedures. Previous studies have shown that Medicaid generally reimburses at lower rates compared to Medicare for most medical procedures, though notable exceptions exist in specific geographic regions and procedure types [4]. Recent research by Transtrum, et al., found that Medicaid provided higher reimbursements compared to Medicare in 60% of the ten most common orthopedic trauma procedures across the United States [14]. While Medicare operates under a standardized federal fee schedule, Medicaid's decentralized structure allows individual states to establish their own reimbursement rates, leading to substantial geographic variation. Although Medicaid is largely dependent on individual state policies rather than a universally federally funded payment schedule, Medicare's impact sets a precedent for physician reimbursement across all payer sources [5].

Despite the critical importance of understanding reimbursement patterns for total joint arthroplasty procedures, comprehensive national analyses comparing Medicare and Medicaid rates across all US states remain limited. Furthermore, the geographic implications of these reimbursement disparities on healthcare access and equity in orthopedic care have not been thoroughly examined. This study addresses these gaps by providing a systematic comparison of Medicare and Medicaid reimbursement rates for the ten most common Total Knee Arthroplasty (TKA) and Total Hip Arthroplasty (THA) Current Procedural Terminology (CPT) codes across the United States. Our analysis aims to quantify reimbursement variations and provide insights into health access and equity implications in orthopedic arthroplasty care.

Methodology

Study Design

This cross-sectional analysis examined 2020 Medicare and Medicaid reimbursement rates for common total joint arthroplasty procedures across the United States.

Data Sources and Collection

Medicare Physician Fee Schedules (MPFS) for 2020 were obtained from the Centers for Medicare and Medicaid Services' PFS Look-up Tool16, whereas corresponding Medicaid reimbursement data were gathered on a state-by-state basis from publicly posted fee schedules. Four states were excluded from the analysis: Delaware, Pennsylvania, Tennessee and Vermont due to unavailable or unpublished fee schedules (total of 46 participating states) [7].

Procedure Selection

A retrospective review of 2021 billing data from a Level I trauma center was conducted to strictly identify ten of the most common total knee arthroplasty and total hip arthroplasty CPT codes for analysis. The selected procedures included both primary and revision arthroplasty codes representing the breadth of total joint procedures performed in clinical practice.

Statistical Analysis

Reimbursement rates for each CPT code were obtained for both Medicare and Medicaid across all included states. Statistical analysis was performed using Microsoft Excel [Version 16.100.2 (25082415)]. For each procedure, the following metrics were calculated: Mean reimbursement rates with 95% confidence intervals, Dollar difference per Relative Value Unit (RVU), Coefficient of Variation (CV) to assess reimbursement variability. Statistical significance was assessed using a t-test to compare mean dollar differences between Medicaid and Medicare reimbursement for each CPT code with significance set at $p < 0.05$. Geographic analysis was conducted by calculating the Medicaid-to-Medicare reimbursement ratio for each state and visualizing the results through heat mapping. Each data point represents the average Medicaid-to-Medicare reimbursement ratio for a given participating state, calculated across 10 CPT codes (yielding a total of 460 total data points). California included three zero-imputed values for the following unpublished CPT codes: 27138, 27446 and 27486.

Results

Overall Reimbursement Comparison

Medicare procedures demonstrated higher average reimbursement rates compared to Medicaid across most analyzed procedures. Medicare reimbursement averaged $1,435 ± $27 compared to $1,235 ± $95 for Medicaid, representing an average difference of $199.99 in favor of Medicare. All observed differences were statistically significant ($p < 0.05$ for all comparisons).

Procedure-Specific Analysis

Medicare reimbursement was higher for all common arthroplasty procedures except for two notable exceptions: Primary TKA (CPT 27447) and Stage 2 revision TKA, all components (CPT 27487). These procedures demonstrated dollar differences favoring Medicaid of $441.41 ($11.27 per RVU) and $256.07 ($5.03 per RVU), respectively.

Detailed reimbursement analysis for each procedure is presented in Table 1. For example, Primary THA (CPT 27130) showed a mean Medicaid reimbursement of $1,209 (95% CI ± $98) compared to Medicare reimbursement of $1,377 (95% CI ± $26), resulting in a statistically significant dollar difference of $167.59 per RVU in favor of Medicare ($p < 0.001$).

Geographic Variation Analysis

Substantial geographic variation was observed in reimbursement ratios across states. The average Medicaid coefficient of variation was 0.27, substantially higher than the Medicare coefficient of variation of 0.06, indicating greater variability in Medicaid reimbursement rates across states.

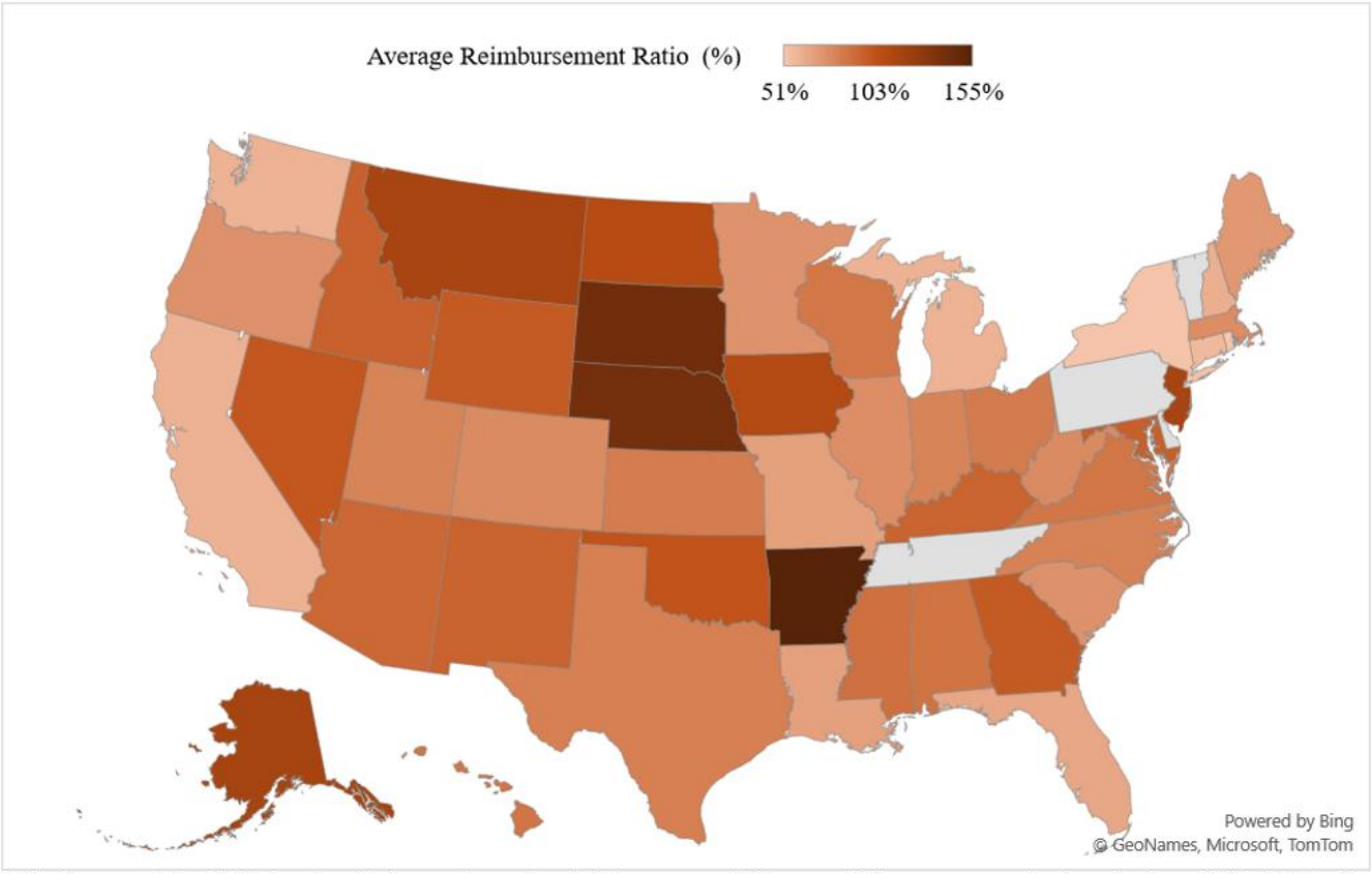
Regional analysis revealed significant outliers in both directions. Arkansas demonstrated the highest Medicaid-to-Medicare ratio, with Medicaid reimbursing at an average rate 155% higher than Medicare. Conversely, Rhode Island showed the lowest ratio, with Medicaid reimbursing nearly 50% lower than Medicare rates. South Dakota and Nebraska also demonstrated favorable Medicaid-to-Medicare ratios ranging between 140-155%.

Fig. 1 presents the geographic distribution of these reimbursement ratio differences across the United States, clearly illustrating the substantial state-to-state variation in reimbursement patterns.

		Medicaid		Medicare		Dollar Difference (MCD:MCR)		
Procedure	CPT code	Value ($) ± 95% CI	CV	Mean ± 95% CI	CV	Value ($)	[per RVU]	p-value
Primary THA	27130	1,209 ± 98	0.28	1,377 ± 26	0.06	-167.59	[-4.27]	< 0.001
Stage 1 revision THA	27091	1,248 ± 112	0.31	1,621 ± 30	0.06	-373.71	[-8.09]	< 0.001
Stage 2 revision THA, both components	27134	1,606 ± 122	0.26	1,946 ± 37	0.07	-340.22	[-6.14]	< 0.001
Stage 2 revision THA, cup component	27137	1,250 ± 93	0.26	1,495 ± 28	0.06	-245.28	[-5.76]	< 0.001
Stage 2 revision THA, stem component	27138	1,256 ± 109	0.30	1,554 ± 29	0.06	-298.02	[-6.73]	< 0.001
Primary UKA	27446	967 ± 95	0.34	1,375 ± 26	0.06	-408.05	[-12.18]	< 0.001
Primary TKA	27447	1,274 ± 118	0.32	832 ± 15	0.06	441.41	[11.27]	< 0.001
Stage 1 revision TKA	27488	937 ± 71	0.26	1,144 ± 21	0.06	-207.81	[-5.99]	< 0.001
Poly swap or single component revision TKA	27486	1,130 ± 101	0.31	1,787 ± 33	0.06	-656.70	[-16.14]	< 0.001
Stage 2 revision TKA, all components	27487	1,474 ± 122	0.29	1,218 ± 23	0.06	256.07	[5.03]	< 0.001
Average		1,235 ± 95	0.27	1,435 ± 27	0.06	-199.99	[-5.10]	< 0.001

Values are expressed as means. CI: Confidence Interval; CV: Coefficient of Variability; CPT: Current Procedural Terminology; RVU: Relative Value Unit; MCD: Medicaid; MCR: Medicare; TKA: Total Knee Arthroplasty; THA: Total Hip Arthroplasty.

Table 1: Average RVU Values and Dollar Difference per RVU in MCD vs MCR Reimbursement Rates for Common TKA and THA Procedures.



This figure excludes CMS data from Delaware, Pennsylvania, Tennessee, and Vermont. CPT, current procedural terminology; MCD, Medicaid; MCR, Medicare; TKA, total knee arthroplasty; THA, total hip arthroplasty.

Figure 1: Geographic distribution heat map of the MCD-to-MCR reimbursement ratio percent differences for common TKA and THA CPT codes.

Discussion

Our analysis revealed that for common TKA and THA codes billed nationwide, Medicaid reimburses on average 86% of Medicare rates, closely aligning with the 81.9% ratio observed in common general orthopedic procedures [4]. This finding has significant implications for healthcare access, as the substantial reimbursement gap may influence physician participation in Medicaid programs and subsequently affect patient access to specialized orthopedic care.

The geographic variance in reimbursement ratios, visualized in Fig. 1, highlights the profound impact of decentralized fee schedule policies and underscores the importance of geographic location as a determining factor in healthcare reimbursement. The substantial increase in Medicaid reimbursement ratios observed in South Dakota, Nebraska and Arkansas (ranging between 140-155%) demonstrates that state-level policy decisions can significantly influence reimbursement equity.

Notably, primary TKA (CPT 27447) and stage 2 revision TKA, all components (CPT 27487) demonstrated dollar differences favoring Medicaid, which contrasts with the overall trend. This finding aligns with recent research by Transtrum, et al., who found that Medicaid provided higher reimbursements compared to Medicare in 60% of the ten most common orthopedic trauma procedures across the United States [14].

The cost-cutting trends implemented by Medicare in response to increasing arthroplasty procedure volumes may be overly aggressive, particularly considering the projected growth in revision procedures [1]. Kurtz, et al., projected that between 2005 and 2030, the number of total hip and total knee revisions performed in the United States will grow by 137% and 601%, respectively [11]. Current Medicare reimbursements for revision procedures are estimated to have a 32.5 to 50% deficit in adjusted surgical time compensation [9,13].

The January 1, 2018 removal of primary TKA from the Inpatient-Only (IPO) list by CMS fundamentally changed the landscape of total joint arthroplasty. This policy shift incorporated outpatient TKA within Medicare and Medicaid coverage, leading to a dramatic increase in outpatient procedures from 451 in 2015 to 19,169 in 20208. Simultaneously, a higher percentage of patients with severe systemic disease underwent outpatient TKA, placing additional burden on healthcare providers [8,10].

The Resource-Based Relative Value Scale (RBRVS) utilized by CMS consists of three standardized criteria: physician work, practice expense and professional liability insurance [3]. However, this system may not adequately account for the complex preoperative planning required for high-risk patients. Medicaid beneficiaries often carry more comorbidities and are disproportionately Hispanic or Black compared to the average US population. Policymakers should consider these inequalities to avoid reinforcing racial and geographic disparities in healthcare access [6,10].

If orthopedic surgeons choose to opt out of Medicare participation due to declining reimbursement rates, limited access to quality healthcare can be expected within the United States' aging and indigent populations. This potential scenario raises serious concerns about healthcare equity and access to specialized orthopedic care [15-17].

Study Limitations

This analysis has several limitations that should be considered when interpreting results. First, the study utilized a single year of data (2020), which may not capture temporal trends or policy changes. Second, the analysis focused specifically on reimbursement rates without considering other factors that may influence surgical decision-making, such as surgical technique variations or actual surgical time requirements. Third, four states were excluded due to data availability limitations.

Conclusion

This study demonstrates substantial variance in Medicaid reimbursement rates for arthroplasty procedures across the United States and reveals significant discrepancies between Medicaid and Medicare reimbursements. These geographic variations and reimbursement disparities provide important insights into potential social determinants of health and treatment quality in orthopedic arthroplasty. The findings suggest that current reimbursement policies may inadvertently create barriers to healthcare access, particularly for vulnerable populations served by Medicaid programs.

Future research should explore longitudinal trends in reimbursement patterns and examine the relationship between reimbursement rates and patient outcomes. Additionally, studies incorporating factors such as surgical technique variations and actual procedural time requirements would provide more comprehensive insights into the adequacy of current reimbursement structures.

Conflict of Interest

The authors declare no conflict of interest.

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