

Texas Geographic Trends in Medicare Reimbursement Rates for Primary and Revision Total Knee Arthroplasty: A 20-Year Analysis

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Objective: The study analyzed Medicare reimbursement trends for primary and revision total knee arthroplasties (TKAs) in Texas's Medicare Administrative Contractor (MAC), a conservative region.

Design: A retrospective review of the Physician Fee Schedule from the Centers for Medicare & Medicaid Services (CMS) between 2000 and 2019

Setting: Eight specific localities within the Texas MAC.

Main Outcomes Measurement: The average facility price (FP) for primary and revision TKAs was calculated and adjusted for inflation. Linear regression and standard deviation of four components (primary and revision TKA FPs, and their adjusted counterparts) were computed. The mean FP for each locality was determined and compared to the median rent for the associated county.

Results: Findings showed steep decreases in reimbursement for all values, except for the average for non-adjusted revision TKA FPs (2.44%). The steepest decline was adjusted primary TKA FP at a downward rate of 42.8% and the reimbursement was incongruent with the cost of living in these areas.

Conclusion: Findings underscore significant reductions in all areas, except non-adjusted revision TKA FPs, and emphasize that reimbursement is not congruent with the cost of living. The results demonstrate the indiscriminate reduction in reimbursement rate within a traditionally fiscally conservative area regardless of cost of living and open the door for further analysis of the effect of geographic practice cost indices on Medicare reimbursement.

Keywords: Texas, Medicare, TKA, THA, Total Joints, Arthroplasty

Level of Evidence: III, retrospective comparative study.

INTRODUCTION

Total knee arthroplasty (TKA), or knee replacement surgery, remains a vital procedure in treating debilitating knee arthritis, representing almost 40% of joint arthroplasties performed in the US in 2021 (Singh & Lewallen, 2014). As the incidence of TKA is projected to rise due to an aging population and increasing obesity rates, proficiency

in medical coding and billing for this procedure is paramount to guarantee comprehensive documentation and accurate reimbursements (Rosas, Sabharwal, & McAnany, 2017).

It is crucial to understand the assorted coding terminologies used for TKA, particularly physician fees, Medicare Administrative Contractor (MAC) locality, Healthcare Common Procedure Coding System (HCPCS) codes, Categories I-III of Current Procedural Terminology (CPT) codes, and modifiers to have proper, adequate reimbursements for procedures. Medicare calculates a national average payment rate for TKA based on the assigned Diagnosis Related Group (DRG) code. However, the final payment can fluctuate depending on the facility price (Patil et al., 2015). Accurate and up-to-date knowledge of these coding systems is necessary for medical professionals and coding staff to comply with regulatory mandates and maximize payment rates. Compliance with these systems entails satisfying Medicare coverage criteria, correctly documenting pre- and post-operative procedures, maintaining accuracy, International Classification of Diseases, Tenth Revision, (ICD-10) and CPT codes, and adhering to billing and coding audits (Rosas et al., 2017).

Monitoring the geographical trends in Medicare reimbursement rates for TKA is critical for facilitating access to care and promoting quality

outcomes for patients, given the projected increase in demand for TKA (Slover et al., 2014). The period from 2000 to 2020 marked a significant shift in the US healthcare policy, specifically regarding Medicare, catalyzed by the Affordable Care Act (ACA) of 2010 (Wilensky, 2020). The ACA introduced substantial changes in financing, benefits, and Medicare reimbursement rates with the intention to enhance access to preventive care, lower healthcare costs overall, and raise the quality of care. It added coverage for numerous preventative care services, eliminated copayments and deductibles, and implemented payment reforms such as new payment and service delivery models to encourage high-quality, cost-effective care. The impact extended to anti-fraud measures aimed at reducing fraud, waste, and abuse within Medicare (Wilensky, 2020). Today, Medicare provides coverage to over 60 million Americans, including seniors, individuals with disabilities, and those with end-stage renal disease (Kurtz et al., 2019). As healthcare costs persistently rise, discussions regarding optimal ways to fund and structure Medicare continue, especially considering its substantial portion of the federal budget and its influence on healthcare providers, insurance companies, and beneficiaries.

Texas is one of the largest states in the US and has a diverse population with varying healthcare needs (Fowler, Netherton, & Griffin, 2018). Despite the increasing demand for TKA, little is known about the geographic trends in Medicare reimbursement rates for primary and revision TKA in Texas (Fowler et al., 2018). This study aims to fill this gap by analyzing region-specific Medicare reimbursement

rates for primary and revision TKA in Texas from 2000 to 2020. By identifying geographic trends in reimbursement rates, this study can provide valuable insights into the factors that may be driving variation in TKA costs and outcomes in Texas, and inform efforts to promote access to high-quality, cost-effective care for patients with knee arthritis.

METHODS

Data Collection

To determine reimbursement values for both primary and revision total knee arthroplasties, the searchable Physician Fee Schedule (PFS) was accessed via the Centers for Medicare and Medicaid Services official website.⁸ The PFS database was reviewed to determine the facility price (FP) for primary and revision total knee arthroplasties. Procedures are categorized by HCPCS codes with 27447 and 27486 representing total knee arthroplasties and revision/replacement total knee arthroplasties, respectively. Utilizing these specific HCPCS codes for the procedures, the search was limited to areas within Texas. There are eight different MAC localities in Texas; Austin, Beaumont, Brazoria, Dallas, Fort Worth, Galveston, Houston, and the “Rest of Texas”. The American Community Survey Data five-year estimates for 2020 were accessed to determine the median rent for each county associated with seven of the eight MAC localities: Travis, Jefferson, Brazoria, Dallas, Tarrant, Galveston, and Harris.⁹ The “Rest of Texas” MAC locality was omitted because it encompassed 247 separate counties.

Inflation Adjustment

After FPs for each MAC locality from 2000 to 2020 were recorded, the average of the MAC localities was calculated and adjusted for inflation. Each value was corrected from January 1 of their respective years to January 1, 2022. The United States (US) Bureau for Labor Statistics (BLS) Consumer Price Index (CPI) inflation calculator was used to determine the inflation for each value.¹⁰ For the duplicate years, inflation was based on the first day of the specified time period. Adjusted values were recorded alongside the average absolute values of the FPs for primary and revision total knee arthroplasties for each year, including duplicates.

Medicare PFS Discrepancies

There are four instances of duplications in the PFS database. The Patients and Providers Act of 2008 caused the initial rate of Medicare PFS (-10.6%) to update by 0.5%, from July 1, 2008 and onwards. Therefore, 2008 is represented by 2008A (January 1, 2008 to June 30, 2008) and 2008B (July 1, 2008 to December 31, 2008). Preservation of Access to Care for Medicare Beneficiaries and Pension Relief Act of 2010 provided a 2.2% update for Medicare PFS that was effective on June 1, 2010 and represented by the year 2010B. The year 2010A reflects practice expense and malpractice relative value unit (RVU) corrections and the effects of the Affordable Care Act that was signed into law in March 2010. Similarly, in 2012, Medicare PFS was impacted by the legislation. The year 2012A Medicare PFS rates were based on statutory criteria while 2012B was impacted by the Middle-Class Tax Relief and Job Creation Act of 2012 (MCTRJCA).

Finally, 2015A (January 1, 2015 to March 31, 2015) Medicare PFS rate update was 0% due to the Protecting Access to Medicare Act. The conversion factor for 2015B (April 1, 2015 to December 31, 2015) decreased from \$35.7547 during 2015A to \$28.1872. All data from 2000 to 2019, including duplicate years, were included in the data analysis.

Statistical Analysis

Following data collection, the average and associated standard deviation for all years were calculated for the absolute and adjusted values of primary and revision TKA (Figure 1). The average reimbursement for all years for each MAC locality was calculated and compared to the median rent for each associated county (Figure 3). Using Microsoft Sheets software, linear regression and standard deviation were calculated for the dataset. The slope of the trendline created by the linear regression was used to determine the reimbursement rate across the 20-year time span for each of the four categories. All p-values less than 0.05 were considered statistically significant.

RESULTS

Facility Price Analysis

Analysis of FP from 2000 to 2020 showed a decrease in reimbursement for the average non-adjusted primary TKA FP (-7.63%), adjusted TKA FP (-42.2%), and adjusted revision TKA FP (-27.4%) (Figure 1). The mean for the non-adjusted average primary TKA FP was \$1466.52±75.80. The average of adjusted primary TKA FP and revision TKA FP were considerably higher at \$1946.70±325.72 and \$1835.82±228.56 respectively

(Figure 2). The non-adjusted average revision TKA FP was the only value to demonstrate a modest upward reimbursement at 2.56%, with an average reimbursement of $\$1390.59 \pm 48.29$. Although the rate of reimbursement increased for non-adjusted revision TKA FP, the absolute value for FP reimbursement in 2000 was more than in 2020 at $\$1454.90$ compared to $\$1432.64$ respectively. The absolute value of non-adjusted primary or revision TKA never surpassed the value of adjusted primary or revision TKAs. The maximum reimbursement for primary TKA FP for any MAC locality during any given year was $\$1719.78$ in Houston in 2001. The maximum reimbursement for primary TKA FP for any MAC locality during any given year was $\$1559.56$ in Houston in 2001. Using Houston data from 2020, there is a negative $\$288.81$ difference between the maximum value for primary TKA. Despite an increase in the rate, there is a negative $\$72.81$ difference between the maximum value for revision TKA for 2001 to 2020.

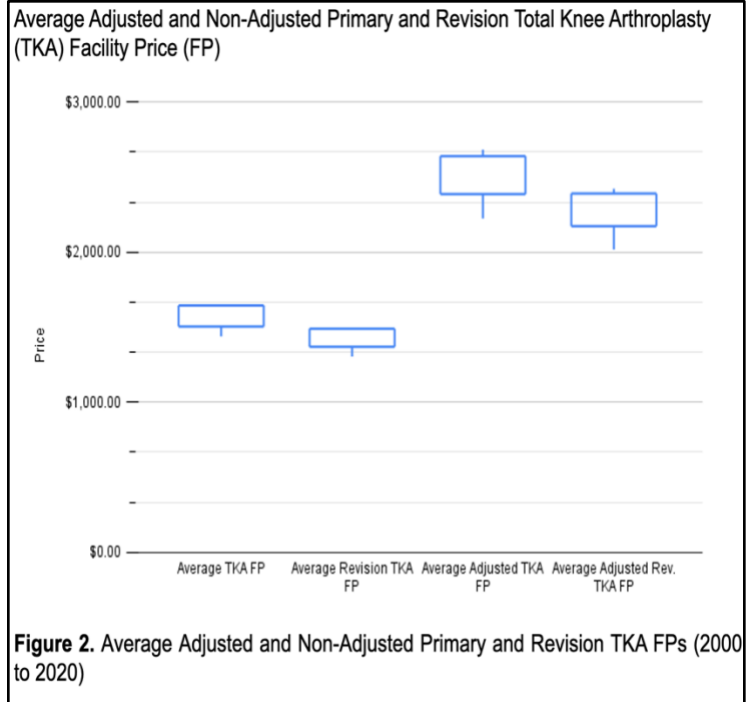


Figure 2. Average Adjusted and Non-Adjusted Primary and Revision TKA FPs (2000 to 2020)

Regional Facility Price Analysis

The mean for the eight MAC localities for primary TKA FP from 2000 to 2020 ranged from $\$1409.17$ seen in “Rest of Texas” to $\$1510.66$ in Houston (Figure 3). For revision TKA FP, this price dropped to $\$1337.07$ in “Rest of Texas” and $\$1433.67$ in Houston. The average cost of living from 2000 to 2020 for each MAC locality was not calculated because the “Rest of Texas” included 247 separate counties across Texas. Using the American Community Survey Data five-year estimates for 2020, the MAC locality associated with the county with the highest cost of living was Austin (Travis County) with a median rent cost of $\$1348 \pm 9$. The MAC locality associated with the county with the lowest cost of living was Beaumont (Jefferson County) with a median rent cost of $\$869 \pm 19$. Although Houston had the highest reimbursement average, the median rent cost fell in the middle of the spread at $\$1115 \pm 6$. The value for primary TKA FP and revision TKA FP each had weak correlation with

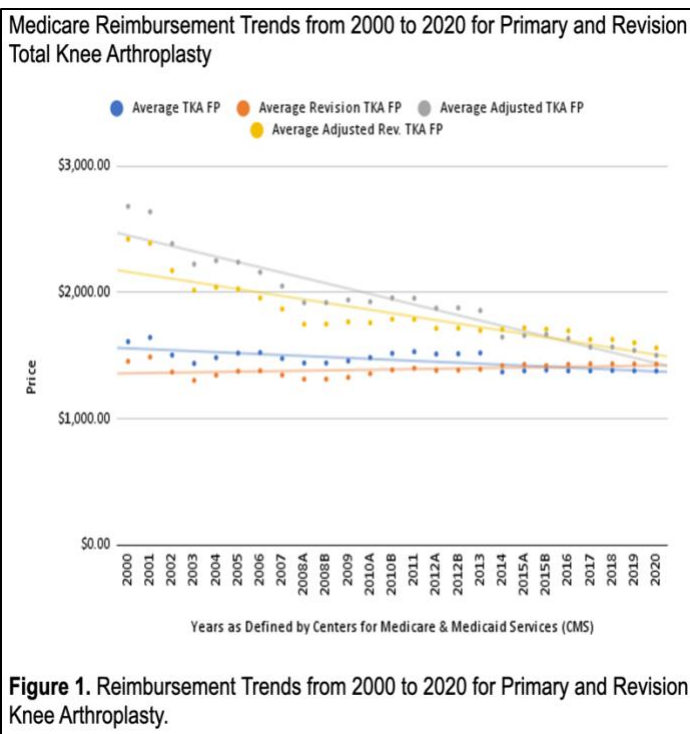
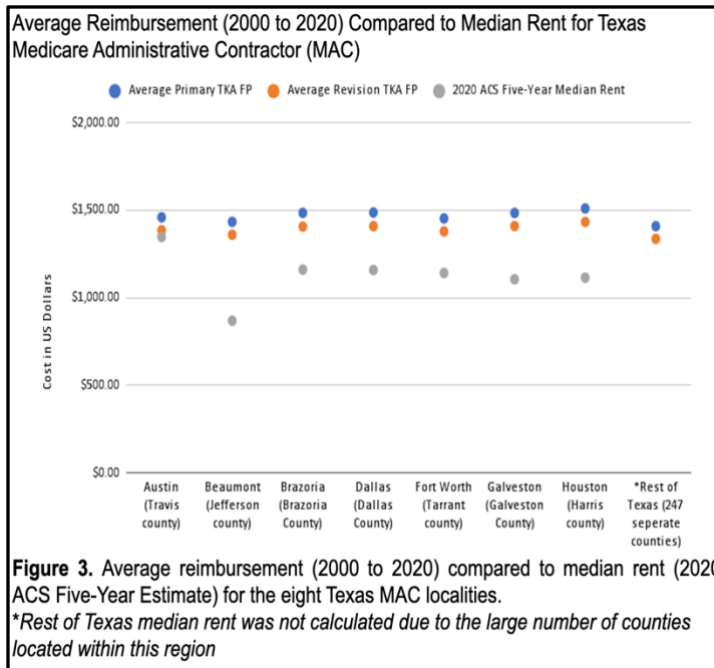


Figure 1. Reimbursement Trends from 2000 to 2020 for Primary and Revision Knee Arthroplasty.

increasing ACS 5-year median rent across the MAC localities (primary: $r^2=0.11$, $p=.0021$; revision: $r^2=0.11$, $p=.0005$).



DISCUSSION

This study aimed to explore reimbursement rates for TKA and the factors influencing physician fee schedules (PFS) within the fiscally conservative state of Texas. The results indicate that non-adjusted revision TKA FPs were the only value to show an upward trend in reimbursement rates. In contrast, primary TKAs and all adjusted values showed decreased reimbursement rates. The downward movement of reimbursement rates indicates that the reimbursement rates for TKA have not kept up with inflation. The non-adjusted average FP for primary TKAs was more significant in 2000 than for the adjusted average FP for primary TKA in 2019. The discrepancy in reimbursement indicates that in 2019 surgeons earned proportionally less for both primary and revision TKAs than in 2000. Although no previous study explores total and revision TKA

specific to Texas MAC localities, the findings of this study are consistent with earlier analyses of other procedures. There are downward trends in reimbursement for total hip arthroplasties (THA), common plastics procedures, otolaryngology, and shoulder and elbow surgeries.¹¹⁻¹⁴

This study showed downward trends in reimbursement and raised the question of what factors affect reimbursement rates. Medicare reimbursement reflects changes made to the PFS that are updated each year due to adjustments in medical practice, the relative value of service, and the statute implemented by legislation.^{15,16} The statute requires that RVUs account for practice expense (PE) and malpractice (MP) expense.¹⁷ Adjustments are made to payments under PFS to account for the cost of service in different MAC localities. Under the Social Security Act, CMS uses three geographic practice cost indices (GPCI) to determine physician payments. Work GPCI, MP GPCI, and PE GPCI are arguably affected by geographic location and impact adjustment of the PFS. Work GPCI accounts for the cost of physician labor and considers locality cost relative to the national average. In an analysis of possible changes to work GPCI, the US Governmental Accountability Office (GAO) sought to develop a model that showed increased work GPCI for physicians who earned more.^{18,19} The presumption was that physicians who made more had a higher practice cost and required adequate compensation.²⁰ These trends are consistent with geographic wage variation for non-physician healthcare workers and salaried physicians whose wage is affected by local salary scales.²¹ Arguments

against adjustment for geographic locality defend the belief that the work is the same regardless of location and that physicians deserve equal compensation. The geographic area also affects MP premiums due to state-to-state variations in liability costs, such as tort laws that govern medical malpractice and malpractice insurance.²² PE GPCI accounts for direct and indirect clinical practice costs, including administration costs, personnel wages, rent, and equipment. Therefore, geographic consideration is required when analyzing reimbursement trends.

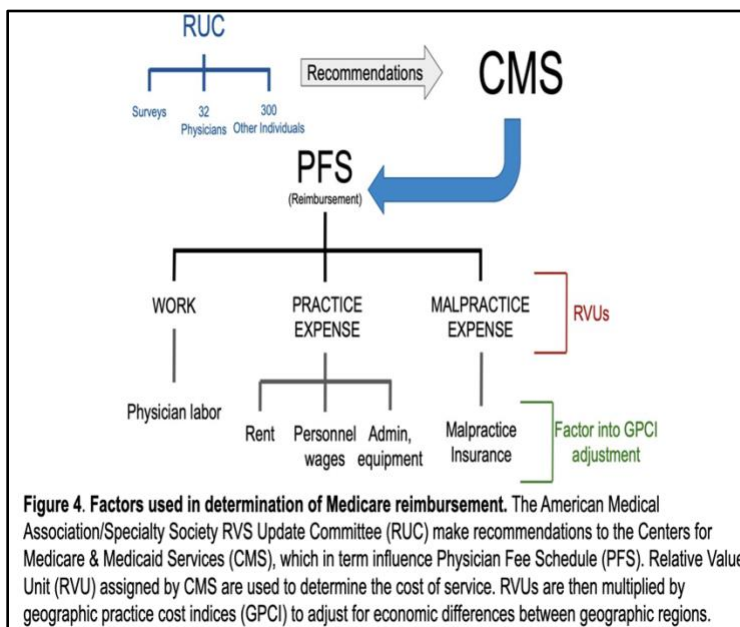
Policymakers established that geographic location affects medical practice costs, and reimbursement rates should reflect fair compensation nationwide. Areas with a lower cost of living, less taxation, and more amenities would thus receive lower reimbursement based on these ideals.²² Based on these principles, Austin would have a higher reimbursement rate within Texas localities than the “Rest of Texas,” primarily composed of smaller towns. In 2019, looking at two of the largest cities in Texas, Austin and Houston, the median rent in Travis County (locality 31) was \$1,346, and the median rent in Harris County (locality 18) was \$1,114.²² However, Travis County and Harris County reimbursement rates were \$1,382.14 and \$1,419.88, respectively, indicating that reimbursement was inconsistent with the cost of living. Additionally, San Antonio is a large metropolitan area but is considered part of the “Rest of Texas” (locality 99), which includes small towns with populations <4,000. For instance, San Antonio and Karnes City are a part of locality 99. However, the average rent in San Antonio in 2019 was \$1,029, while the average rent

for Karnes City in the same year was \$825.²² The weak correlation between reimbursement for both primary and revision TKAs in MAC localities based upon increased median rent also solidifies this point, demonstrating reimbursement has little association with cost-of-living. These discrepancies in compensation indicate a problem with physicians’ compensation and call into question the reliability of adjustments based on geographic location. More appropriate geographic distribution can be modeled after the Texas Comptroller Economic Regions and Metropolitan Statistical Areas (MSAs), which divides Texas into 12 areas, each containing at least one MSA that represents a significant economic hub.²³

One of the more concerning results of the study showed that the non-adjusted average FP for primary TKAs was greater in 2000 than the adjusted average FP for primary TKA in 2019. The average rent in Texas in 2019 was \$1,091 compared to the average in 2000, which was \$574.^{22,24} Despite an apparent increase in the cost of living, there was an insufficient increase in compensation for primary and revision TKA and other procedures. The data raises the question: if there is a precedent that geographic adjustments account for differences in cost of living as reflected in the three GPICs used to modify RVUs, why is this not reflected in reimbursement trends?

Understanding the factors that go into the development of the PFS is complex and multifactorial (Figure 4). The American Medical Association/Specialty Society RVS Update Committee (RUC) is a team of specialists composed

of medical professionals and other healthcare-adjacent individuals that impact reimbursement rates.²⁵ Thirty-two volunteer physicians and over 300 other personnel contribute to RUC. The group provides recommendations about reimbursement to CMS, which has the final determination for payments under the Medicare program.^{25,26} RUC utilizes surveys from front-line physicians to inform recommendations. For a procedure performed and coded over 1 million times annually, the minimum number of respondents from surveyed physicians is 75. For perspective, to recommend the reimbursement rate for a Medicare wellness examination, the RUC in 2010 was only required to survey 0.036% of primary care physicians.^{24,25} RUC comprises physicians from each major subspecialty and primary care field.²⁶



However, there are too few physicians to represent the breadth of geographic locations within the US. There is very little data on the RUC in general; a PubMed search of “American Medical Association/Specialty Society RVS Update

Committee (RUC)” and “Specialty Society RVS Update Committee (RUC)” yielded four results from 1993 to the present. Based on these observations, the RUC is one area of reimbursement that must be explored in the future. Important topics to consider are the geographic makeup of the physicians on the committee, the diversity of the RUC, the efficacy of the group at raising and improving reimbursement rates, and how receptive CMS is to the recommendations of the RUC.

This study does possess some limitations, including a primary focus on Texas, thus limiting its generalizability to the reimbursement rates and practices across other states in the U.S. Due to potential variations in fiscal policies and healthcare settings, findings from Texas may not accurately depict the broader national context. Additionally, the study is reliant on the publicly available data on the PFS and reimbursement rates, potentially overlooking nuances in the determination of such rates, such as private agreements between physicians and insurance providers. Furthermore, the study is unable to account for the full range of variables affecting geographic adjustments, which includes, but is not limited to, local salary scales, state-to-state variations in liability costs, taxation, and availability of amenities. These factors can vastly differ from region to region and may not always correlate with the compensation received by physicians.

CONCLUSION

Undeniably, there are problems with Medicare. This study utilized data from Texas MAC localities to illustrate the holes in the system and demonstrate a significant need to explore the efficacy

of RUC recommendations to Medicare. Multiple studies have shown the declining reimbursement rates, but few tackle the underlying cause of the downward decline. Future studies will require an in-depth analysis of the historical impact of RUC on Medicare and an analysis of individual characteristics within RUC.

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