Arthroplasty Today 29 (2024) 101416

Contents lists available at ScienceDirect

Arthroplasty Today

journal homepage: http://www.arthroplastytoday.org/

Original Research

Establishing a Per-Hour Rate for Early-Career Adult Reconstruction Surgeons Performing Medicare Primary Total Joint Arthroplasty

Evan Catton, MD[a, *], Alan Puddy, MD[b], Vineet Tyagi, MD[c], Gregory M. Kurkis, MD[d], David N. Shau, MD, MBA[b]

[a] University of Texas Health Science Center at Tyler, Tyler, TX, USA
[b] Hip & Knee Surgery, Texas Hip and Knee Center, Fort Worth, TX, USA
[c] Hip & Knee Surgery, Atlantic Health, Bridgewater, NJ, USA
[d] Hip & Knee Surgery, OrthoCarolina, Huntersville, NC, USA

A R T I C L E I N F O

Article history:
Received 2 October 2023
Received in revised form
6 March 2024
Accepted 28 April 2024

Keywords:
Total joint arthroplasty
Primary total joint arthroplasty
Per-hour rate
Early-career
Medicare

A B S T R A C T

Background: There is a paucity of data regarding compensation for early-career adult reconstruction surgeons. This study aims to quantify the time throughout the full episode of care for a Medicare primary total hip/knee arthroplasty and convert to per-hour pay for early-career arthroplasty surgeons at various geographic locations and practice settings. Using Center for Medicare and Medicaid Services data, this study also compares the compensation of early-career vs established total joint arthroplasty (TJA) surgeons.

Methods: Between January 2022 and January 2023, 3 early-career surgeons in 3 different locations collected prospective data on time spent in patient care during the global period following primary TJAs (pTJAs). A weighted average time spent per pTJA during global period was calculated with the 2024 work relative value unit and conversion factor to establish a per-hour rate. This rate was compared to the compensation rates of other healthcare-related fields and established TJA surgeons using Relative Value Scale Update Committee (RUC) values.

Results: A total of 334 pTJAs (148 hips and 186 knees) were performed among 3 surgeons, and per-hour rates of \$87.62 and \$87.70 were found, respectively. These are less than hospital/healthcare system/health insurance/med tech CEOs, lawyers, dentists, and travel nurses. Early-career TJA surgeons were found to take 7.98%-8.68% longer than RUC standard times for a TJA episode of care.

Conclusions: This study quantifies the per-hour compensation of early-career arthroplasty surgeons, who earn lower compensation rates to travel nurses and take longer than Center for Medicare and Medicaid Services RUC times for pTJAs. Given the increasing demand for pTJAs, decreasing reimbursement rates, and concern over burnout, access to quality pTJA care for patients is concerning.

Introduction

Over the past 3 decades, the Center for Medicare and Medicaid Services (CMS) has been broadly shaping the field of physician reimbursement through proposed financial cuts. These cuts are accomplished in several ways such as decreasing the work relative value units (wRVUs) associated with a medical procedure, changing the corresponding conversion factor (CF), or outright lowering the total reimbursement on the whole. Dating back to 1992, CMS has employed these methods to steadily lower medical reimbursement, and while the entirety of medicine has been affected, orthopaedics has felt these cuts more than many other specialties [1–12].

From 2000-2015, total reimbursement rates decreased by an average of 29%, and orthopaedic surgeon price per wRVU decreased by an average of 39% [2]. Total joint surgeons have been disproportionately affected in this same time period, with a decrease of 39% and 45% in their reimbursement and wRVUs/procedure, respectively [2]. Breaking these observations down further, not all procedures were affected evenly. Primary total hip arthroplasty (THA) experienced a reimbursement decrease of 37.1% from 2000-

* Corresponding author. Graduate Medical Education, 11937 US Highway 271, Tyler, TX 75708, USA.
E-mail address: Evan.Catton@outlook.com

https://doi.org/10.1016/j.artd.2024.101416

2019 with an annual average decrease of 1.855% [4]. Conversely, over the same period, primary total knee arthroplasty (TKA) saw a 40.6% overall and 2.03% annual decrease in Medicare reimbursement [4]. By implementing these reductions, Medicare has reduced its spending on elective primary total joint arthroplasties (TJAs) by more than $1 billion annually [3].

The aforementioned trends can be expected to continue with an additional 3.37% global reduction in Medicare reimbursement for 2024, with 2% global cuts occurring just the prior year. Long-standing orthopaedic practices with established patient populations and referral networks with favorable payer mixes may be able to absorb these cuts. However, early-career orthopaedic surgeons may not have that same ability since they tend to accept challenging arthroplasty cases from a poor payer mix, have increased administrative tasks, suboptimal workflow/support staff, less predictive schedules/block time, and an overall less efficient practice.

To date, many studies have reported on the overall history of Medicare reimbursement in orthopaedics [1–12], with fewer having attempted to quantify the time spent during the full episode of care for a Medicare TJA patient [13,14]. To our knowledge, no study has correlated those values with a relatable per-hour income rate for early-career TJA surgeons. This study aims to prospectively quantify the time required for early-career TJA surgeons, at various different geographical locations, to care for Medicare primary TJA patients and convert that time into a per-hour pay rate using publicly available CMS reimbursement data.

Material and methods

Three early-career, fellowship-trained adult reconstruction orthopaedic surgeons within their first 2 years of practice were surveyed regarding their caseload and time spent during an episode of care for patients undergoing primary THAs and TKAs. The 3 surgeons practice in 3 different states (Texas, New Jersey, and North Carolina) and in unique demographic populations. Each surgeon is in a different type of employment model, including employment by a nonhospital subspecialty-based group, employment in a hospital-based practice, and a partnership model with a large orthopaedic private practice group.

The patient care timeline, or episode of care, starts from the initial preoperative evaluation in the clinic and goes through the end of the global period (90 days). This study is institutional review board-exempt, as no human subjects or patient identifying information were collected and evaluated. Self-reported time data were collected prospectively for 12 months (January 2022 through January 2023) for all 3 surgeons and sorted into an Excel document from the time surveys. Surveys were routinely sent by the primary author to the participating surgeons on a weekly basis, so they could be completed in real time as much as possible.

The patient care tasks throughout an episode of care consisted of 5 main time domains: preoperative, surgical, admission, postoperative, and miscellaneous. These domains were then broken out into subcategories, as seen in Table 1. The descriptions of the subcategories can be found in Appendix Table 3. The time was collected within clinic visits using the EPIC Electronic Medical Record to document when the patient was seen and when the visit was closed. Time within the hospital was collected using the EPIC Electronic Medical Record to denote when the patient arrived and was seen in preoperative, then eventually wheeled back to the operating room. All other time domains not captured via EPIC were recorded using a clock. When referring to the preoperative H&P time domain, this includes the time spent taking a full and detailed history and physical examination performed by the surgeon for patients whose procedure was scheduled outside of the global period.

In order to create a true representation of time spent in care, a weighted average time was calculated. This average time (weighted based on percentage of sum total of primary TJAs performed by each surgeon) time spent per THA or TKA episode-of care was created based on the captured number of cases between the 3 surgeons. Using the physician fee schedule search tool for Current Procedural Terminology codes 27130 and 27447 (primary THA and TKA) and selecting the national payment amount, we gathered the wRVU, CF, and facility price of 2022-24 to establish the physician payment amount and then converted 2022/23 values to 2024 US dollars using the Bureau of Labor Statistics Consumer Price Index Inflation calculator. The hourly income was calculated using the current wRVU (19.6) and CF (32.7442), as specified by CMS. The specific formula employed was (wRVU*CF)/(W. avg. time in minutes/60 minutes).

Publicly available information from sources such as Medical Group Management Association, the Bureau of Labor Statistics career search tool, and US News and World Report/Becker Spine Review was used to establish a means of comparison for the per-hour rate found in this study. The comparative professions chosen include lawyers, travel nurses, nurse practitioners, physician assistants, pharmacists, C-suite execs (hospital system/hospital/health insurance/medical tech), dentists, and biotech engineers. In professions in which the hours per week worked are either

Table 1
Breakdown of time collection domains.

Preoperative period	Surgical period	Admission period (if applicable)	Postoperative period	Miscellaneous (if applicable)
Preoperative H&P visit with surgeon	Preoperative holding visit	Rounding time	Postoperative visit #1	Phone/electronic communications
Preoperative H&P note writing	Preoperative note writing	Progress note writing/orders	Postoperative visit #2	Board requirements
Preoperative XR/XR review, templating, and surgical planning	Wheels-in, postanesthesia	Discharge	Postoperative visit #3	
Preoperative med review/rec/orders	Total skin-to-skin time		Postoperative paperwork (RTW/FMLA/handicap placard/PT orders/meds)	
Medical clearance/lab review	Family discussion			
Vendor discussion	Op-note writing			
Preoperative phone call	Immediate postoperative			
Multidisciplinary care coord				
OR equipment/staffing orders				
Patient equipment/DME orders				

XR, X-ray; OR, operating room; DME, durable medical equipment; H&P, history and physical; RTW, return to work; FMLA, family medical leave act; PT, physical therapy.

nonstandardized or unable to be determined, such as the executive roles, a conservative estimate of 40 hours per week for 48 weeks per year was used to calculate the per-hour income.

Results

Surgeons 1, 2, and 3 performed 49, 18, and 81 THAs and 75, 15, and 96 TKAs, respectively, over the collected time period. Their total time spent in each segment of the episode of care can be found in Appendix Tables 1 and 2. The weighted average amount of time spent during the episode of care of a THA and TKA was 439.48 minutes and 439.09 minutes, respectively. The hourly rate for early-career TJA physicians performing Medicare THAs was found to be $87.70/hour, while the rate for TKAs was calculated at $87.62/hour. These hourly rates were found to be less than those of of health insurance CEOs, hospital system CEOs, medical technology CEOs, lawyers, and dentists. Moreover, this calculated per-hour income was also less than that of advertised travel nurse per-hour income at $87.97/hour (Figs. 1 and 2) [15].

When expanding this comparison to the established Relative Value Scale Update Committee (RUC) expected times for THA/TKA of 407/404 minutes per episode of care, early-career TJA surgeons lagged 7.98%-8.68% behind these times [14]. Recalculating per-hour income for the RUC standard TJA surgeon using the current wRVU/CF and the aforementioned formula, early-career TJA surgeons average 7.38% and 7.99% less per-hour than established TJA surgeons for THAs and TKAs, respectively (Figs. 3 and 4).

Discussion

This study found that the time required for an early-career TJA surgeon to care for a Medicare THA or TKA patient was 439.48 minutes or 439.09 minutes, respectively. These times equated to per-hour rates of $87.70 and $87.62 in 2024 USD. These compensation rates are lower than those of lawyers, dentists, hospital CEOs, and advertised travel nurse pay ($87.97) [15].

Moreover, this rate was calculated from a conservative time estimate that did not include any time pertaining to associated emergency department visits/readmission of the patients throughout the global period. Literature has shown that several aspects of work during the global period such as electronic communications and unplanned patient encounters, in addition to the typical 3 postoperative visits, contribute significantly to the overall workload of surgeons [13,14].

This study also revealed that the 3 surgeons, who have the aforementioned distinct practice models and patient populations, demonstrated very little variability in the time required to care for Medicare THA patients, having a total care time range of 432 minutes to 453 minutes. The same held true for the TKA patients as well, with a corresponding range of 437 minutes to 443 minutes. This data shows that the episode-of-care times for early-career TJA surgeons should be broadly similar across different geographical localities/practice structures. Furthermore, the 3 surgeons were only 7.98%-8.68% behind the RUC expected standards within their first 2 years of practice, demonstrating that they are not an anomaly when compared to the field as a whole.

When examining the case numbers of the 3 surgeons, it can also be seen that even though their times are relatively similar for primary TKA and THA, their Medicare case volumes exhibit some variation. This variation is explained when examining the exact type of practice each surgeon operates within. Surgeons 1 and 3 operate in large metroplexes that afford them the ability to have larger TJA volumes immediately following fellowship. Moreover, surgeon 1 is part of a large arthroplasty group that only evaluates hip and knee conditions, while surgeon 3 is part of a large multisubspecialty group that accepts both general as well as arthroplasty cases. Conversely, surgeon 2 practices in a more rural setting within a practice that has a significant focus on general orthopaedic fracture care alongside a newer and growing arthroplasty emphasis. These various types of practices are indicative of the totality of offering within the modern job landscape of early-career arthroplasty surgeons just finishing fellowship. Case volumes aside, reimbursement concerns persist regardless of the number of cases performed, and for early-career surgeons, this may dissuade them from taking on the risk of building a new TJA practice in the first place.

Early- to late-career orthopaedic surgeons all have a vested interest in defending patient access to quality arthroplasty care. With the number of primary THAs and TKAs per year expected to rise by 71% and 85% to 635,000 and 1.26 million by 2030, the future access to

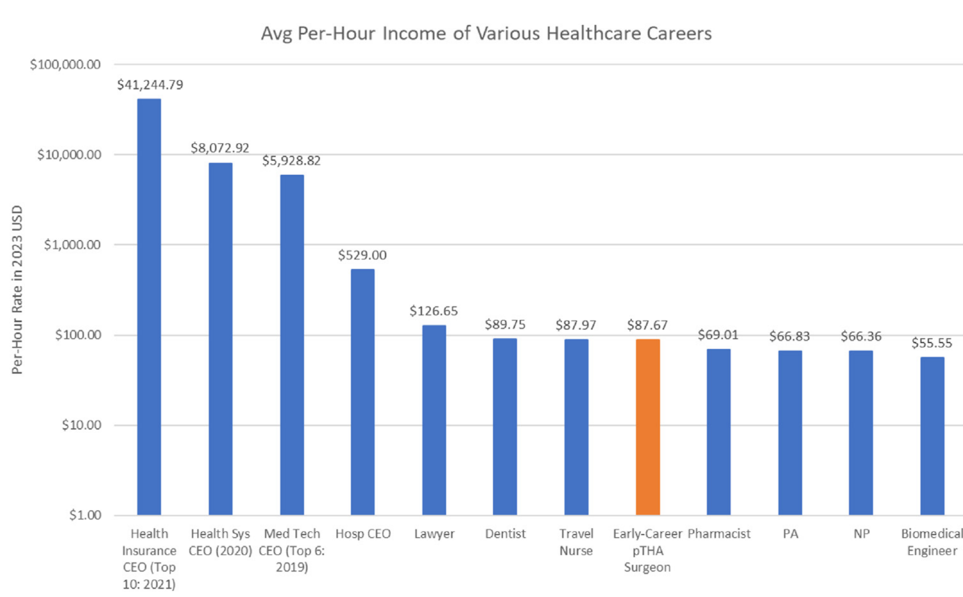

Figure 1. Average per-hour pTHA income comparison to other healthcare industry professions. pTHA, primary total hip arthroplasty.

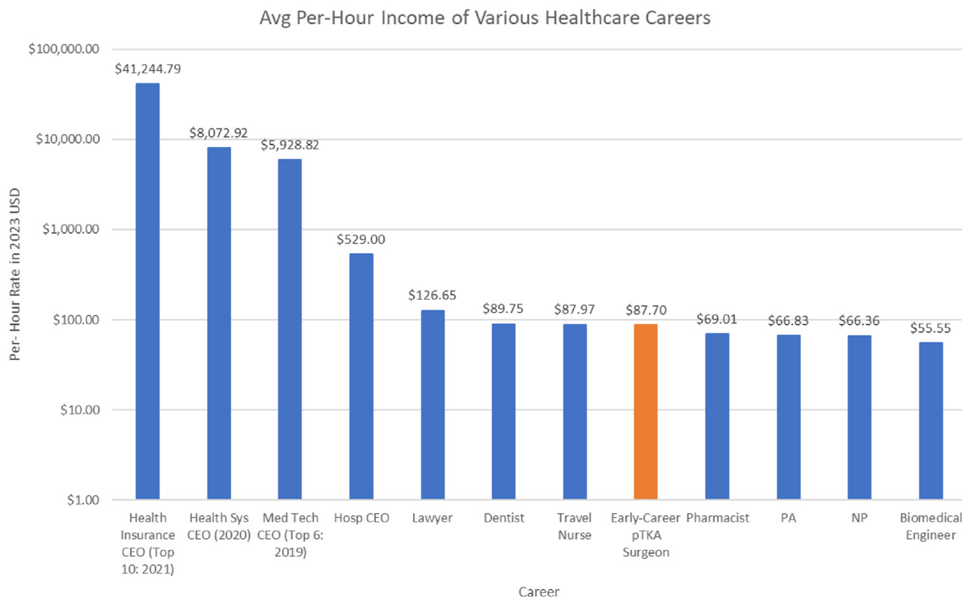

Figure 2. Average per-hour pTKA income comparison to other healthcare industry professions. pTKA, primary total knee arthroplasty.

these procedures is concerning [16]. Given that orthopaedic physicians already report a high rate of burnout, this is a troubling forecast for the field's ability to keep up with future joint care needs [17].

In 2022, *Alvarez et al.* reported that 0% of Medicare patients were able to get an appointment for either THA or TKA without a primary care provider referral, and only 55% were able to get an appointment even if they did have a referral. This was in stark contrast to privately insured patients, who could receive an appointment 86.3% of the time without any referral whatsoever [18]. Moreover, the proportion of individuals in the United States aged 65 or greater, or those eligible for Medicare and in need of joint replacement, is expected to rise to 19.7% by the year 2030 [4]. This downstream increase in demand for these procedures will worsen access for all patients even more, especially Medicare patients.

Continued cuts may impact care further if fewer orthopaedic surgeons are trained to perform arthroplasty cases, which are often performed by orthopaedic surgeons who have undergone adult reconstruction fellowship, which comes with a 1-year opportunity cost but no guarantee to improved payor mix, preferential clinical cases, or improved income [19–22]. As of 2020, the only fellowship within the field of orthopaedics that has a positive impact on the break-even point of debt vs income is spine surgery. Adult reconstruction is net neutral compared to forgoing fellowship, and all other orthopaedic fellowships are net negative [23]. Furthermore, this study was conducted prior to the additional Medicare cuts. It can be assumed that, with the new CMS cuts, TJA fellowships will now also have a net-negative impact on the break-even point of early orthopaedic surgeons.

Given all that has been detailed above, we can expect a backlog of TJA care similar to that which patients in countries such as Canada and England have already experienced [24–26]. As *Atrey et al.* have shown in a study of 111,359 primary THA patients in

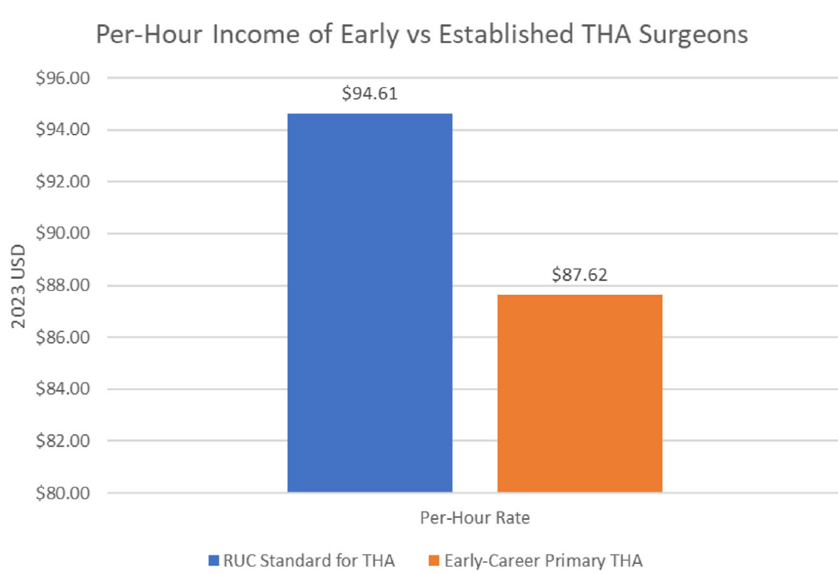

Figure 3. Comparison of per-hour income between established and early-career THA surgeons.

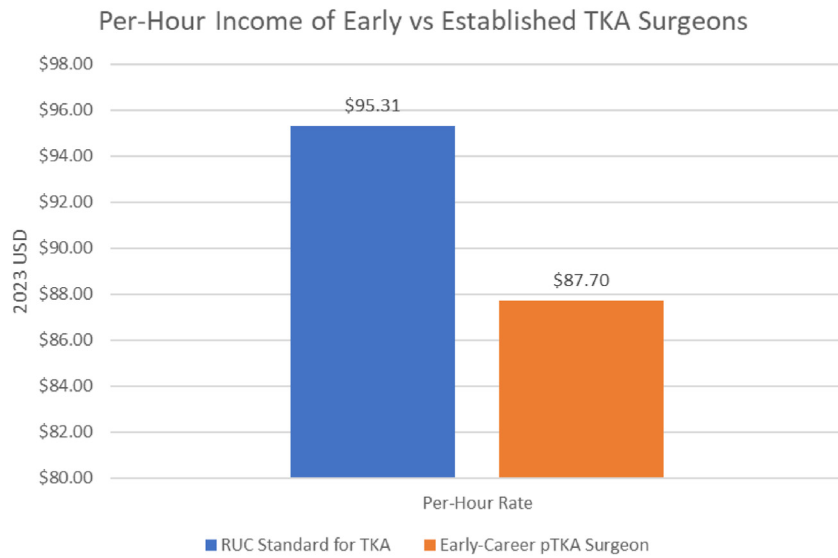

Figure 4. Comparison of per-hour income between established and early-career TKA surgeons.

Ontario, CA, the single payer system resulted in a "double hit" to patients of lower socioeconomic status, where these patients both experienced 39% less THAs performed and worse outcomes following their primary THA [24].

Early-career orthopaedic surgeons have unique stressors that contribute additional time to their overall workload early in their careers. These stressors can come in the form of board certification activities and less ancillary staff for assistance with patient care. This study found that early-career TJA surgeons make, on average, 7.38%-7.99% less per hour for primary THA and TKA, respectively, than their established peers. Further reimbursement cuts may worsen these figures and shift job satisfaction rates depending on payer mixes, caseloads, and fee schedules, thus impacting talent acquisition.

Limitations of this study are that the data were self-reported and limited to 3 early-career surgeons. However, the time spent on tasks throughout the episode of care was captured via prospective survey collections, and this study provides real-world time spent on primary TJA care regardless of geographic location or type of practice. Moreover, no patient data were collected, so patient-specific factors leading to increased visit times or care coordination were not documented, possibly deflating the overall time spent per global period. Despite these limitations, we feel our findings contribute to the literature by identifying a concerning impact of CMS payment reduction on early-career arthroplasty surgeons by quantifying the time spent and per-hour reimbursement and providing another lens on how these cuts may impact care. Our hope is that capturing this real-world experience and relaying it in a relatable manner used by other professional fields will enlighten the orthopaedic community and beyond on the true impact this has on individual practicing physicians, especially those just starting their careers [27].

Conclusions

CMS payment reductions for primary TJA have been distressing to all orthopaedic surgeons [1–4,6,7,9–12,28]. This study, however, details its true impact on per-hour compensation, a metric easily relatable and directly correlated to time spent in care. Moreover, this study highlights the discrepancies between the experienced work of early-career TJA surgeons and their established counterparts.

Given the fact that CMS has been steadily lowering the compensation per primary TJA, it can be assumed that early-career orthopaedic surgeons will be earning less than travel nurses on a per-hour basis as early as next year. This expectation assumes that CMS does not alter the existing pay schedule for this year as they have done in the past. If existing and future orthopaedic residents are faced with these growing financial barriers with regard to pursuing adult reconstruction fellowship, it can be expected that an increasing amount will forgo this extra training in favor of better financial outlooks [23].

These cuts and financial disincentives have already been shown to have severe implications for current patient access [4,6,7,18,24–26]. Given the expected severe increase in demand, a decline in available adult reconstruction surgeons poses an even real concern for future patient access [16,17]. We hope this study allows our orthopaedic leaders to cite compensation figures in a manner readily adopted by other professional fields [27]. Further studies are warranted to assess how the future landscape of orthopaedic Medicare reimbursement evolves and how this may disproportionately impact early-career surgeons. Given the rapidly changing societal and political opinions regarding the American healthcare system and its reimbursement model as a whole, acts or laws passed on Capitol Hill may entirely change the conversation, prompting a total reevaluation.

Conflicts of interest

The authors declare there are no conflicts of interest.

For full disclosure statements refer to https://doi.org/10.1016/j.artd.2024.101416.

CRediT authorship contribution statement

Evan Catton: Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Alan Puddy:** Writing – review & editing, Validation, Supervision, Methodology, Investigation, Data curation. **Vineet Tyagi:** Validation, Methodology, Investigation, Data curation. **Gregory M. Kurkis:** Validation, Methodology, Investigation, Data curation. **David N. Shau:** Writing – review & editing, Supervision, Resources, Methodology, Investigation, Data curation, Conceptualization.

References

[1] Carter CR, Bhat SB, Clement ME, Krieg JC. Medicare reimbursement and orthopedic surgery: past, present, and future. Curr Rev Musculoskelet Med 2017;10:224–32. https://doi.org/10.1007/s12178-017-9406-7.
[2] Walker R, Morrison Z, Campbell M. Trends in orthopedic surgery reimbursement from 2000 to 2015. Orthopedics 2020;43:187–90. https://doi.org/10.3928/01477447-20200213-05.
[3] Blackburn CW, Du JY, Marcus RE. Medicare payments to hospitals and physicians for total hip and knee arthroplasty declined from 2009 to 2019. J Arthroplasty 2023;38:419–23. https://doi.org/10.1016/j.arth.2022.10.002.
[4] Mayfield CK, Haglin JM, Levine B, Della Valle C, Lieberman JR, Heckmann N. Medicare reimbursement for hip and knee arthroplasty from 2000 to 2019: an unsustainable trend. J Arthroplasty 2020;35:1174–8. https://doi.org/10.1016/j.arth.2019.12.008.
[5] Simcox T, Safi S, Becker J, Kreinces J, Wilson A. Are orthopedic hand surgeons undercompensated for time spent in the operating room? A study of relative value units. Hand (N Y) 2022;18:861–7. https://doi.org/10.1177/15589447211064361.
[6] McIntyre LF, Beach WS, Stiefel E, Pearson SE. The near-term ramifications of long-term trends in orthopedic surgical reimbursement. J Arthroplasty 2021;36:3378–80. https://doi.org/10.1016/j.arth.2021.05.016.
[7] Heckmann ND, Mayfield CK, Chung BC, Levine BR, Della Valle CJ, Lieberman JR. Medicare cuts to hip and knee arthroplasty surgeon fees in 2021: will access to care be jeopardized? J Arthroplasty 2021;36:791–4. https://doi.org/10.1016/j.arth.2021.01.003.
[8] Simcox T, Kreinces J, Tarazona D, Zouzias I, Grossman M. Current relative value unit scale does not appropriately compensate for longer orthopedic sports surgeries. Arthrosc Sports Med Rehabil 2021;3:e1913–20. https://doi.org/10.1016/j.asmr.2021.09.009.
[9] Patel A, Oladipo VA, Kerzner B, McGlothlin JD, Levine BR. A retrospective review of relative value units in revision total knee arthroplasty: a dichotomy between surgical complexity and reimbursement. J Arthroplasty 2022;37:S44–9. https://doi.org/10.1016/j.arth.2022.02.033.
[10] Patel A, Oladipo V, Kerzner B, McGlothlin JD, Levine BR. A retrospective review of reimbursement in revision total hip arthroplasty: a disparity between case complexity and RVU compensation. J Arthroplasty 2022;37:S807–13. https://doi.org/10.1016/j.arth.2022.03.025.
[11] Hariri S, Bozic KJ, Lavernia C, Prestipino A, Rubash HE. Medicare physician reimbursement: past, present, and future. J Bone Joint Surg Am 2007;89:2536–46. https://doi.org/10.2106/JBJS.F.00697.
[12] Lopez CD, Boddapati V, Neuwirth AL, Shah RP, Cooper HJ, Geller JA. Hospital and surgeon Medicare reimbursement trends for total joint arthroplasty. Arthroplast Today 2020;6:437–44. https://doi.org/10.1016/j.artd.2020.04.013.
[13] Kheir M, Rondon AJ, Bonaddio V, Tan TL, Wang C, Purtill JJ, et al. Perioperative telephone encounters should Be included in the relative value scale update committee review of time spent on total hip and knee arthroplasty. J Arthroplasty 2019;34:1563–9. https://doi.org/10.1016/j.arth.2019.05.010.
[14] Halawi MJ, Mirza M, Osman N, Cote MP, Kerr JM, Huddleston JI. Quantifying surgeon work in total hip and knee arthroplasty: where do we stand today? J Arthroplasty 2020;35:1170–3. https://doi.org/10.1016/j.arth.2019.12.006.
[15] Smith-Kimble C. How much do travel nurses make? Nurse Journal. Nursejournal.org; 2022. https://nursejournal.org/careers/travel-nurse/salary/. [Accessed 28 February 2023].
[16] Sloan M, Premkumar A, Sheth NP. Projected volume of primary total joint arthroplasty in the U.S., 2014 to 2030. J Bone Joint Surg Am 2018;100:1455–60. https://doi.org/10.2106/JBJS.17.01617.
[17] American Academy of Orthopaedic Surgeons. Fact sheet: orthopaedic surgeons will need to double total joint arthroplasty caseload to meet demand by 2050. https://aaos-annualmeeting-presskit.org/2023/downloads/research-news/AAOS-2023-Annual-Meeting-Media-Fact-Sheet-Orthopaedic-Surgeon-Workforce.pdf; 2023. [Accessed 28 February 2023].
[18] Alvarez PM, McKeon JF, Spitzer AI, Krueger CA, Pigott M, Li M, et al. Socioeconomic factors affecting outcomes in total knee and hip arthroplasty: a systematic review on healthcare disparities. Arthroplasty 2022;4:36. https://doi.org/10.1186/s42836-022-00137-4.
[19] Miettinen HJA, Mäkirinne-Kallio N, Kröger H, Miettinen SSA. Health-related quality of life after hip and knee arthroplasty operations. Scand J Surg 2021;110:427–33. https://doi.org/10.1177/1457496920952232.
[20] Norman-Taylor FH, Palmer CR, Villar RN. Quality-of-life improvement compared after hip and knee replacement. J Bone Joint Surg Br 1996;78:74–7.
[21] Ethgen O, Bruyère O, Richy F, Dardennes C, Reginster JY. Health-related quality of life in total hip and total knee arthroplasty. A qualitative and systematic review of the literature. J Bone Joint Surg Am 2004;86:963–74. https://doi.org/10.2106/00004623-200405000-00012.
[22] Learmonth ID, Young C, Rorabeck C. The operation of the century: total hip replacement. Lancet 2007;370:1508–19. https://doi.org/10.1016/S0140-6736(07)60457-7.
[23] Mead M, Atkinson T, Srivastava A, Walter N. The return on investment of orthopaedic fellowship training: a ten-year update. J Am Acad Orthop Surg 2020;28:e524–31. https://doi.org/10.5435/JAAOS-D-19-00276.
[24] Atrey A, Pincus D, Khoshbin A, Haddad FS, Ward S, Aktar S, et al. Access to hip arthroplasty and rates of complications in different socioeconomic groups: a review of 111,000 patients in a universal healthcare system. Bone Joint J 2022;104-B:589–97. https://doi.org/10.1302/0301-620X.104B5.BJJ-2021-1520.R2.
[25] Judge A, Welton NJ, Sandhu J, Ben-Shlomo Y. Equity in access to total joint replacement of the hip and knee in England: cross sectional study. BMJ 2010;341:c4092. https://doi.org/10.1136/bmj.c4092.
[26] McLaughlin J, Elsey J, Kipping R, Owen-Smith A, Judge A, McLeod H. Access to hip and knee arthroplasty in England: commissioners' policies for body mass index and smoking status and implications for integrated care systems. BMC Health Serv Res 2023;23:77. https://doi.org/10.1186/s12913-022-08999-9.
[27] Hadfield GK. The price of law: how the market for lawyers distorts the justice system. Mich Law Rev 2000;98:953. https://doi.org/10.2307/1290336.
[28] Sodhi N, Dalton SE, Garbarino LJ, Gold PA, Piuzzi NS, Newman JM, et al. Not all primary total hip arthroplasties are equal—so is there a difference in reimbursement? Ann Transl Med 2019;7:74. https://doi.org/10.21037/atm.2018.08.14.

Appendix Table 1
Surgeon THA average time capture.

	Surgeon 1	Surgeon 2	Surgeon 3
Preoperative H&P	33	45	27
Preoperative H&P note writing	9	12	10
Preoperative XR review/templating/surgical planning/prior Auth if needed	17	14	15
Preoperative med review/rec/orders	11	10	10
Medical clearance/lab review	7	8	5
Patient equipment/DME orders	2	2	2
OR equipment/staffing coord	4	3	5
Multidisciplinary care coord	10	10	10
Vendor case discussion	5	5	6
Preoperative phone call	8	5	6
Total preoperative time	106	114	96
Preoperative holding visit	9	10	10
Preoperative note writing	7	6	10
Wheels-in, anesthesia, set-up	23	22	25
Total skin-to-skin time	118	127	121
Family discussion	8	7	10
Op-note	13	15	14
Immediate postoperative (orders, postoperative check, XR review)	10	11	12
Total perioperative time	188	198	202
Rounding	11	15	10
Progress note/orders	7	9	7
Discharge orders/summary	10	14	13
Total - admission time	28	38	30
Postoperative visit #1	23	30	25
Postoperative visit #2	18	20	15
Postoperative visit #3	16	20	15
Postoperative paperwork (RTW/FMLA/handicap/PT order/meds)	17	15	13
Total postoperative time	74	85	68
Phone/electronic communications	27	13	35
Board requirements	9	5	10
Total add time	36	18	45
Number of MC cases	49	18	81
Average total time per THA	432	453	441
Average compensation per pTHA	641.79	641.79	641.79
Average per-hour income	89.14	85.00	87.32

Appendix Table 2
Surgeon TKA average time capture.

	Surgeon 1	Surgeon 2	Surgeon 3
Preoperative H&P	33	40	27
Preoperative H&P note writing	9	12	10
Preoperative XR review/templating/surgical planning/prior Auth if needed	17	14	15
Preoperative med review/rec/orders	11	10	10
Medical clearance/lab review	7	8	5
Patient equipment/DME orders	2	2	2
OR equipment/staffing coord	4	3	5
Multidisciplinary care team coord	10	10	10
Vendor case discussion	5	5	5
Preoperative phone call	8	5	6
Total preoperative time	106	109	95
Preoperative holding visit	9	10	10
Preoperative note writing	7	6	10
Wheels-in, anesthesia, set-up	27	21	23
Total skin-to-skin time	124	123	120
Family discussion	8	7	10
Op-note	12	15	14
Immediate postoperative (orders, postoperative check, XR review)	10	11	12
Total perioperative time	197	193	199
Rounding	11	15	10
Progress note/orders	7	9	7
Discharge orders/summary	10	14	13
Total - admission time	28	38	30
Postoperative visit #1	23	30	25
Postoperative visit #2	18	20	15
Postoperative visit #3	16	20	15
Postoperative paperwork (RTW/FMLA/handicap/PT ord/meds)	17	15	13
Total postoperative time	74	85	68
Phone/electronic communications	27	13	35
Board requirements	9	5	10
Total add time	36	18	45
Number of MC cases	75	15	96
Average total time per TKA	441	443	437
Average compensation per pTKA	641.79	641.79	641.79
Average per-hour income	87.32	86.92	88.11

Appendix Table 3
Explanations.

- Preoperative holding visit: This time includes discussion of the procedure, site-marking, consent review, and final preoperative holding exam.
- Preoperative note writing: This includes updating the H&P and surgical templating.
- Wheels-in, postanesthesia: This includes patient positioning, scrubbing, draping, and time out leading up to the procedure.
- Op-note writing: This includes writing of the brief op-note and op-note.
- Immediate postoperative: This includes postoperative XR review, postoperative orders, and postoperative exam (if applicable).
- Rounding Time: This includes time spent on prerounding (vitals/labs/note review) including any exams when rounding on the patient themselves.
- Discharge: This includes med rec and DC orders/instructions/summary note.
- Postoperative visit #1: This includes XRs/imaging studies, note writing, patient visit/exam, PT review, and Q/A.
- Postoperative visit #2: This includes XRs/imaging studies, note writing, patient visit/exam, PT review, and Q/A.
- Postoperative visit #3: This includes XRs/imaging studies, note writing, patient visit/exam, PT review, and Q/A.
- Postoperative paperwork: (RTW/FMLA/handicap/physical therapy orders/meds).
- Phone/electronic communications: This includes patient/surgeon calls, triage nurse calls, MyChart/EMR communication, and any form of communication regarding the care of the patient, other than the preoperative phone call with the patient/family, in this case.
- Board requirements: This pertains to ABOS board requirements and may not be applicable to every surgeon.