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State Variation in Medicaid Reimbursements for Orthopaedic Surgery

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Investigation performed at the Departments of Orthopedic Surgery and Surgery, Washington University School of Medicine, St. Louis, Missouri, and the Department of Health Policy and Management, CUNY School of Public Health, New York, NY

Background: Medicaid reimbursements are determined by each state and are subject to variability. We sought to quantify this variation for commonly performed inpatient orthopaedic procedures.

Methods: The 10 most commonly performed inpatient orthopaedic procedures, as ranked by the Healthcare Cost and Utilization Project (HCUP) National Inpatient Sample, were identified for study. Medicaid reimbursement amounts for those procedures were benchmarked to state Medicare reimbursement amounts in 3 ways: (1) ratio, (2) dollar difference, and (3) dollar difference divided by the relative value unit (RVU) amount. Variability was quantified by determining the range and coefficient of variation for those reimbursement amounts.

Results: The range of variability of Medicaid reimbursements among states exceeded \$1,500 for all 10 procedures. The coefficients of variation ranged from 0.32 (hip hemiarthroplasty) to 0.57 (posterior or posterolateral lumbar interbody arthrodesis) (a higher coefficient indicates greater variability), compared with 0.07 for Medicare reimbursements for all 10 procedures. Adjusted as a dollar difference between Medicaid and Medicare per RVU, the median values ranged from $-\$8/\text{RVU}$ (total knee arthroplasty) to $-\$17/\text{RVU}$ (open reduction and internal fixation of the femur).

Conclusions: Variability of Medicaid reimbursement for inpatient orthopaedic procedures among states is substantial. This variation becomes especially remarkable given recent policy shifts toward focusing reimbursements on value.

Medicaid reimbursements to physicians, although typically lower than those from Medicare or commercial insurance¹, are administered on a state level and are subject to variability. Although some state-level variation is expected because of differences in population, policies, historic policy, and labor costs, the magnitude of these variations may lead to disparities among states in quality and access to care. In 2015, Medicaid reimbursement for procedures performed by general surgeons deviated from Medicare by over \$1,000 in both positive and negative directions². In a health-care environment increasingly geared toward rewarding value, reimbursement should reflect how states value physicians' work. The magnitude of these variations suggests that states value physicians' work differently. The implications of these variations may be reflected in the unwillingness of physicians (especially surgeons) to accept new Medicaid patients. As recently as 2012, 30% of all physicians (and 40% of

orthopaedic surgeons) were unwilling to see new Medicaid patients³.

Prior qualitative studies have indicated that the most cited reason for physicians to not participate in Medicaid was inadequate reimbursement⁴, with frustration among the orthopaedic community in caring for a "challenging, high-risk, and under-insured population while also assuming additional liability without adequate compensation."⁵ The shortage of orthopaedic surgeons participating in Medicaid may have dire implications on community health^{6,7} and may increase socioeconomic disparities in delivery of orthopaedic care⁸⁻¹⁰. Thus, increases in provider reimbursement are often discussed as a potential policy lever to increase access to care for patients with Medicaid¹¹⁻¹³. Indeed, the American Medical Association and the American Academy of Orthopaedic Surgeons support equity in Medicaid and Medicare payments for providers^{14,15}. Given the potential influence of reimbursement on the

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willingness of orthopaedic surgeons to care for Medicaid patients, the goal of our research was to empirically evaluate the magnitude of variation in Medicaid reimbursement.

Materials and Methods

Procedure Selection

We selected the 10 most commonly performed inpatient orthopaedic procedures in the United States for inclusion in this study, based on total number of discharges listed in the musculoskeletal category from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) National Inpatient Sample¹⁶. We used data from 2013, the most recent year available at the time of our query (conducted on May 31, 2016). We categorized the procedures into those that were trauma-related (open reduction and internal fixation of the femur, open reduction and internal fixation of the tibia, and hip hemiarthroplasty) and non-trauma-related (total knee arthroplasty, total hip arthroplasty, posterior or posterolateral interbody lumbar arthrodesis, posterior lumbar arthrodesis, lumbar laminectomy, lumbar laminotomy, and anterior cervical discectomy and fusion). The corresponding Current Procedural Terminology, Fourth Edition (CPT-4) procedure code for each International Classification of Diseases, Ninth Revision (ICD-9) procedure code was matched by an attending orthopaedic surgeon to assign the appropriate Medicaid fee to each procedure (see Appendix).

Fee Schedules for Physician Reimbursement

Medicaid fee schedules were acquired for 2011 to 2013 and for 2016 from state Medicaid web sites or through public information requests. Kansas and Tennessee were excluded from this study because their Medicaid programs do not include a fee-for-service reimbursement structure. Early implementation of the U.S. Affordable Care Act's Medicaid expansion occurred in 2013 in 4 of the 48 states included in our analysis.

Medicare reimbursements for each procedure in each state (varying by each year's Geographic Practice Cost Index) over the same years were obtained from the Centers for Medicare & Medicaid Services (CMS) Medicare Physician Fee Schedule Carrier Specific File¹⁷. Regions were separated by their Medicare Administrative Contractor, which roughly matched state lines. When there was >1 Medicare Administrative Contractor for a state, the single Medicare Administrative Contractor representing the rest of the state was used². Reimbursements listed for the primary provider without modification codes and for non-facility physician work were recorded.

Adjusting for Cost of Living

To better understand the descriptive variability of Medicaid reimbursements, we also adjusted the values for differences in cost of living between states. We multiplied the listed reimbursements by the Medicare Wage Index¹⁸, which is used by CMS to

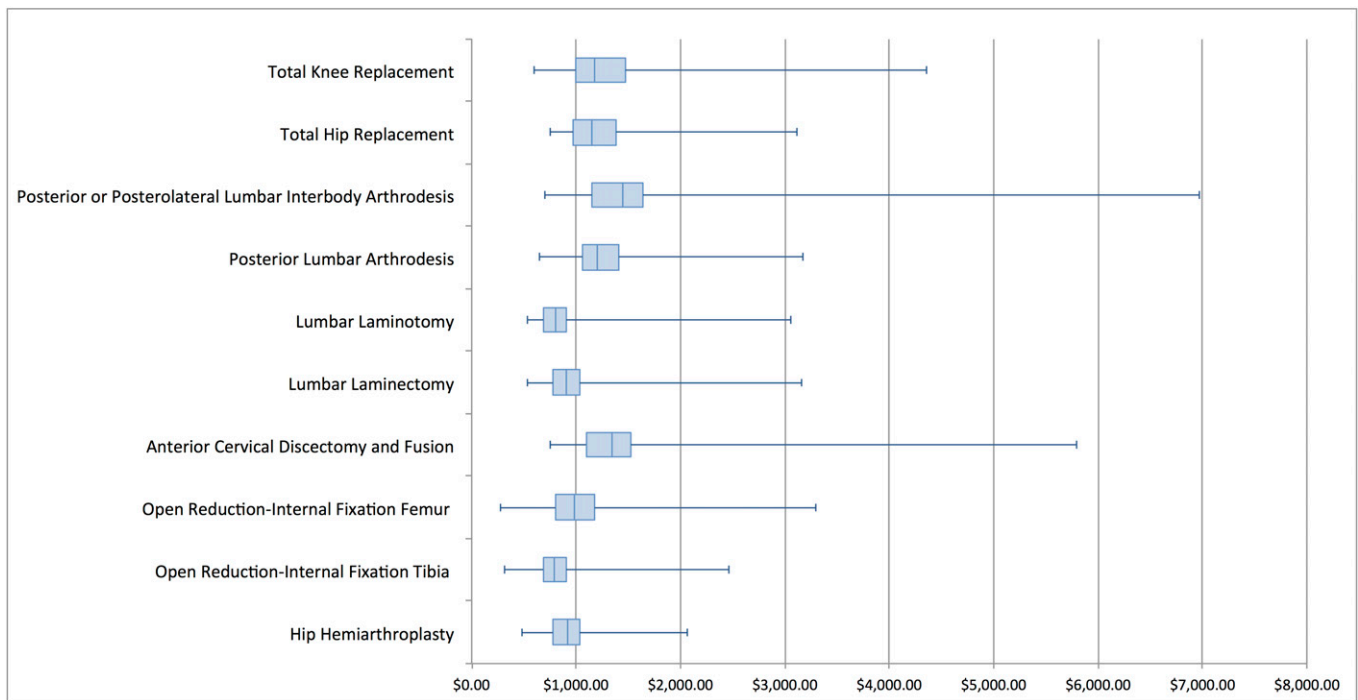


Fig. 1
Variation in state Medicaid reimbursements for common orthopaedic procedures. Box-and-whisker plots display the distribution of Medicaid reimbursement amounts for the 10 procedures in dollars. Whiskers represent the range of values, and the box represents the range between the first and third quartiles. The line within the box represents the median.

TABLE I Medicaid Reimbursement, Medicare Wage Index-Adjusted Medicaid Reimbursement, and Medicare Reimbursement Across All States

| Descriptor | Value (\$) | | Coefficient of Variation |
|--|-------------|------------------------|--------------------------|
| | Mean* | Median† | |
| Medicaid reimbursement | | | |
| Total knee arthroplasty | 1,335 ± 615 | 1,177 (604 to 4,361) | 0.46 |
| Total hip arthroplasty | 1,252 ± 452 | 1,149 (757 to 3,114) | 0.36 |
| Posterior or posterolateral lumbar interbody arthrodesis | 1,569 ± 900 | 1,449 (696 to 6,972) | 0.57 |
| Posterior lumbar arthrodesis | 1,304 ± 462 | 1,199 (645 to 3,176) | 0.35 |
| Lumbar laminotomy | 894 ± 430 | 809 (538 to 3,060) | 0.48 |
| Lumbar laminectomy | 1,002 ± 448 | 913 (538 to 3,160) | 0.45 |
| Anterior cervical decompression and fusion | 1,477 ± 762 | 1,342 (753 to 5,793) | 0.52 |
| Open reduction and internal fixation of the femur | 1,079 ± 468 | 984 (272 to 3,295) | 0.43 |
| Open reduction and internal fixation of the tibia | 835 ± 331 | 792 (314 to 2,463) | 0.40 |
| Hip hemiarthroplasty | 952 ± 307 | 914 (483 to 2,070) | 0.32 |
| Medicare Wage Index-adjusted Medicaid reimbursement | | | |
| Total knee arthroplasty | 1,240 ± 641 | 1,053 (631 to 3,994) | 0.52 |
| Total hip arthroplasty | 1,163 ± 501 | 1,003 (631 to 3,117) | 0.43 |
| Posterior or posterolateral lumbar interbody arthrodesis | 1,459 ± 902 | 1,260 (609 to 6,387) | 0.62 |
| Posterior lumbar arthrodesis | 1,215 ± 539 | 1,033 (695 to 3,402) | 0.44 |
| Lumbar laminotomy | 831 ± 438 | 705 (425 to 2,803) | 0.53 |
| Lumbar laminectomy | 928 ± 458 | 818 (485 to 2,894) | 0.49 |
| Anterior cervical decompression and fusion | 1,370 ± 768 | 1,170 (617 to 5,306) | 0.56 |
| Open reduction and internal fixation of the femur | 1,001 ± 507 | 866 (293 to 3,018) | 0.51 |
| Open reduction and internal fixation of the tibia | 775 ± 363 | 689 (338 to 2,256) | 0.47 |
| Hip hemiarthroplasty | 885 ± 362 | 811 (504 to 2,441) | 0.41 |
| Medicare reimbursement | | | |
| Total knee arthroplasty | 1,373 ± 90 | 1,357 (1,260 to 1,784) | 0.70 |
| Total hip arthroplasty | 1,373 ± 90 | 1,358 (1,260 to 1,785) | 0.70 |
| Posterior or posterolateral lumbar interbody arthrodesis | 1,882 ± 133 | 1,871 (1,687 to 2,415) | 0.70 |
| Posterior lumbar arthrodesis | 1,613 ± 112 | 1,604 (1,453 to 2,071) | 0.70 |
| Lumbar laminotomy | 981 ± 69 | 976 (880 to 1,245) | 0.70 |
| Lumbar laminectomy | 1,118 ± 79 | 1,113 (1,002 to 1,422) | 0.70 |
| Anterior cervical decompression and fusion | 1,738 ± 126 | 1,729 (1,548 to 2,218) | 0.70 |
| Open reduction and internal fixation of the femur | 1,353 ± 89 | 1,336 (1,242 to 1,749) | 0.70 |
| Open reduction and internal fixation of the tibia | 1,009 ± 66 | 996 (926 to 1,303) | 0.70 |
| Hip hemiarthroplasty | 1,146 ± 75 | 1,132 (1,052 to 1,482) | 0.70 |

*The values are given as the mean and the standard deviation. †The values are given as the median, with the range in parentheses.

vary Medicare reimbursements, to calculate a Medicare Wage Index-adjusted Medicaid reimbursement (see Appendix).

Benchmarking Numbers

To facilitate the comparison of Medicaid reimbursements, we benchmarked them against Medicare in the same state for each procedure and each year. We expressed these comparisons as the ratio of Medicaid-to-Medicare reimbursement; the dollar difference between Medicaid and Medicare reimbursement; and the dollar difference divided by the physician work relative value units (RVUs) for each procedure. The latter was used to acknowledge variability in complexity of orthopaedic

procedures and associated physician effort. The 2016 RVUs were obtained from the AAPC (American Academy of Professional Coders)¹⁹.

Quantification of Variation in Medicaid Reimbursements

The range of state-level variation in Medicaid reimbursement and Medicare Wage Index-adjusted Medicaid reimbursements for each procedure was described, as well as the coefficient of variation (standard deviation divided by mean), which facilitates state-level comparison of variation for procedures with largely different mean reimbursement levels²⁰. The range and coefficient of variation were also

TABLE II Dollar Difference Between Medicaid and Medicare Reimbursements and Difference Between Medicaid and Medicare per Physician Work RVU

| Descriptor | Value (\$) | | Coefficient of Variation |
|--|----------------|---------------------------|--------------------------|
| | Mean* | Median† | |
| Dollar difference between Medicaid and Medicare | | | |
| Total knee arthroplasty | -38 ± 607 | -170 (-892 to 2,923) | -15.9 |
| Total hip arthroplasty | -121 ± 442 | -186 (-676 to 1,677) | -3.66 |
| Posterior or posterolateral lumbar interbody arthrodesis | -313 ± 878 | -413 (-1,182 to 4,983) | -2.81 |
| Posterior lumbar arthrodesis | -309 ± 447 | -376 (-1,124 to 1,473) | -1.45 |
| Lumbar laminotomy | -87 ± 427 | -178 (-562 to 2,021) | -4.91 |
| Lumbar laminectomy | -116 ± 448 | -217 (-633 to 1,975) | -3.84 |
| Anterior cervical discectomy and fusion | -262 ± 752 | -360 (-1,035 to 3,949) | -2.87 |
| Open reduction and internal fixation of the femur | -273 ± 456 | -325 (-1,206 to 1,878) | -1.67 |
| Open reduction and internal fixation of the tibia | -174 ± 320 | -234 (-789 to 1,405) | -1.84 |
| Hip hemiarthroplasty | -194 ± 296 | -223 (-769 to 869) | -1.53 |
| Dollar difference per RVU | | | |
| Total knee arthroplasty | -1.84 ± 29.28 | -8.18 (-43.05 to 141.09) | -15.9 |
| Total hip arthroplasty | -5.83 ± 21.32 | -9.00 (-32.62 to 80.93) | -3.66 |
| Posterior or posterolateral lumbar interbody arthrodesis | -11.26 ± 31.63 | -14.90 (-42.60 to 179.57) | -2.81 |
| Posterior lumbar arthrodesis | -13.12 ± 19.01 | -16.00 (-47.78 to 62.62) | -1.45 |
| Lumbar laminotomy | -6.60 ± 32.39 | -13.50 (-42.61 to 153.33) | -4.91 |
| Lumbar laminectomy | -7.58 ± 29.12 | -14.11 (-41.18 to 128.51) | -3.84 |
| Anterior cervical decompression and fusion | -10.47 ± 30.08 | -14.40 (-41.41 to 157.95) | -2.87 |
| Open reduction and internal fixation of the femur | -13.92 ± 23.22 | -16.54 (-61.37 to 95.56) | -1.67 |
| Open reduction and internal fixation of the tibia | -12.03 ± 22.14 | -16.18 (-54.64 to 97.24) | -1.84 |
| Hip hemiarthroplasty | -11.65 ± 17.78 | -13.39 (-46.22 to 52.25) | -1.53 |

*The values are given as the mean and the standard deviation. †The values are given as the median, with the range in parentheses.

calculated for the Medicaid-to-Medicare ratio and reimbursement difference per work RVUs.

Results

State-Level Variation in Medicaid Reimbursement

Range of Reimbursement

The range of reimbursement exceeded \$1,500 for all procedures studied (Fig. 1 and Table I). The widest range in state-level Medicaid reimbursement was for posterior or posterolateral lumbar interbody arthrodesis (range, \$6,276 [696 in Ohio to \$6,972 in Delaware).

Coefficient of Variation

The coefficient of variation reflects the state-level variation in reimbursement and is used to facilitate comparison among procedures. A larger absolute value indicates more variation. The highest coefficients of variation were for posterior or posterolateral lumbar interbody arthrodesis (0.57), anterior cervical discectomy and fusion (0.52), and lumbar laminotomy (0.48). The lowest coefficients of variation were for hip hemiarthroplasty (0.32), posterior lumbar arthrodesis (0.35), and total hip arthroplasty (0.36). After adjusting for the Medicare Wage Index, the largest coefficients of variation were for posterior or

posterolateral lumbar interbody arthrodesis (0.62), anterior cervical discectomy and fusion (0.56), and lumbar laminotomy (0.53). The lowest coefficients of variation for Medicare Wage Index-adjusted Medicaid reimbursements were for hip hemiarthroplasty (0.41), total hip arthroplasty (0.43), and posterior lumbar arthrodesis (0.44). These values contrast with a very low variability in Medicare reimbursements, in which each of the 10 procedures had a coefficient of variation of 0.70 (Table I).

Differences Between Medicaid and Medicare Reimbursements

In 32 states, Medicaid reimbursement was lower than Medicare reimbursement for all procedures studied. In 4 states (Delaware, Alaska, Montana, and North Dakota), Medicaid paid more for all 10 procedures (see Appendix).

Dollar Difference

The biggest negative difference between Medicaid and Medicare reimbursements was in New Jersey for open reduction and internal fixation of the femur, in which the Medicaid reimbursement was \$272 compared with the Medicare reimbursement of \$1,478. The biggest positive difference was in Delaware for posterior or posterolateral lumbar interbody arthrodesis, in which the Medicaid reimbursement (\$6,972) was \$4,983 more than the

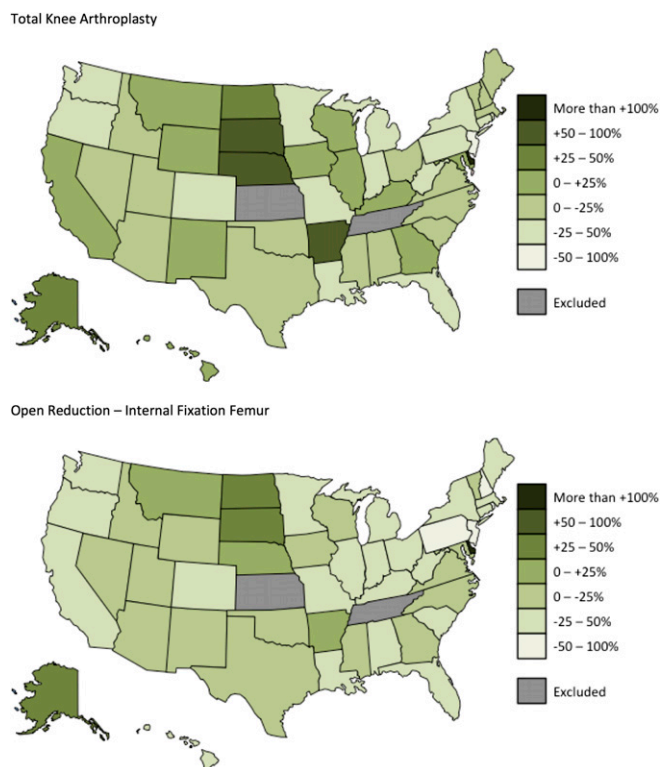


Fig. 2
Variation in Medicaid dollar differences. Shown are 2 heat maps representing the variation in ratio of Medicaid to Medicare reimbursements, calculated as a percentage, for both total knee arthroplasty and open reduction and internal fixation of the femur.

Medicare reimbursement (\$1,989) (Table II). Examples of the state-level variation in dollar differences between Medicaid and Medicare reimbursement for total knee arthroplasty and open reduction and internal fixation of the femur are shown in Figure 2.

The coefficient of variation in the dollar difference was greatest (highest absolute value) for total knee arthroplasty (-15.9), lumbar laminotomy (-4.9), and lumbar laminectomy (-3.8). It was lowest for posterior lumbar arthrodesis (-1.4), hip hemiarthroplasty (-1.5), and open reduction and internal fixation of the femur (-1.7) (Table II).

Dollar Difference Divided by RVUs

When dividing the dollar difference by the work RVUs of each procedure, the median difference/RVU was highest for open reduction and internal fixation of the femur ($-\$17/\text{RVU}$), open reduction and internal fixation of the tibia ($-\$16/\text{RVU}$), and posterior lumbar arthrodesis ($-\$16/\text{RVU}$). It was lowest for total knee arthroplasty ($-\$8/\text{RVU}$) and total hip arthroplasty ($-\$9/\text{RVU}$) (Table II).

Discussion

There is substantial state-level variation in Medicaid reimbursements for orthopaedic procedures. Although some variation is expected because of economic factors and individual state administration of the Medicaid programs, the magnitude of

variation in our study is remarkable. Coefficients of variation for Medicaid physician reimbursement among the procedures studied ranged from 0.32 to 0.57, and from 0.41 to 0.62 after adjusting for cost of living. These are notably larger than the coefficient of variation (0.19) reported by Padegimas et al. for Medicare hospital reimbursement for total joint arthroplasty²¹. We cannot directly compare our findings with theirs, because they studied variation in hospital reimbursement. However, for context, the coefficients of variation for Medicaid physician reimbursement in our study were 0.36 for total hip arthroplasty and 0.46 for total knee arthroplasty. The tremendous variation in Medicaid payments is concerning because it is contrary to the recent emphasis on value in health care. The discrepancy in Medicaid reimbursement between New Jersey and Delaware is a telling example. In these bordering states with similar practice costs (according to the CMS 2016 Geographic Practice Cost Index), the mean Medicaid reimbursement for the 10 procedures studied was \$699 in New Jersey and \$3,746 in Delaware. Although this example demonstrates one extreme, it is difficult to reconcile that orthopaedic surgeons are being reimbursed such widely disparate amounts for the same amount of physician work purely based on state borders.

There were limitations to our analysis. We chose to study a sample of 10 inpatient orthopaedic procedures, which may have limited the generalizability of our findings to other orthopaedic procedures and practice settings (most notably, outpatient or ambulatory surgical procedures). Although it would have been ideal to evaluate the association between Medicaid physician reimbursement and procedure utilization, there are too many unmeasurable economic, demographic, and health policy factors that would ultimately confound such an analysis. The largest limitation of our study was in the individuality of each state's Medicaid program. Beyond variability in fee schedules, there are administrative differences that may influence physicians' ability to deliver care (for example, length of time or extent of documentation required to receive reimbursement). Additionally, we were unable to account for any discrepancies between reimbursement under fee-for-service Medicaid plans (as listed publicly) and privately administered Medicaid managed care plans; to our knowledge, fee schedules in managed care plans are privately negotiated, are not publicly available, and can substantially vary. Managed care plans can reduce provider reimbursements (relative to fee-for-service plans) for procedures such as angioplasty to achieve cost savings²²⁻²⁴. Conversely, these plans have been noted to reimburse 0% to 12% higher than fee-for-service plans in 15 of 20 states studied. Beyond this, we cannot account for supplemental and incentive payments within individual state Medicaid programs not reflected in the published fee schedules.

The wide variability in reimbursements across states for the same procedures should be noted. These sometimes tenfold differences make it unclear whether reimbursement reliably reflects the work performed by the orthopaedic surgeon. In assessing Medicaid fee schedules compared with Medicare fee schedules and interpreting these results in the context of payment policy, we are assuming that Medicare's valuation of

reimbursement is appropriate; this assumption is widely held (and has been incorporated into cost-effectiveness analyses), but may not be correct. Compared with advocating for parity between Medicare and Medicaid fee schedules, a more beneficial strategy may be to decrease the state-to-state variation among Medicaid reimbursement rates. Economic principles will necessitate a range of variation due to geographic variation in cost of living and labor costs, but the wide range seen in our study is notable. However, as a state-federal program implemented at the state level, there are many reasons for variable state-level spending on Medicaid programs that go far beyond physician reimbursement and health-care system considerations. State-level and temporal variation in revenues to pay for public programs, variation in demand for services, variation in health-care markets, health policy choices, and political considerations all contribute to the variability in Medicaid expenditures in each state²⁵. The actual amount of Medicaid reimbursement, its standing relative to Medicare, and the wide range among states may create disincentives for physicians that pervasively influence decision-making, both for individual patients (i.e., indications for surgery) and their practices (i.e., whether to see Medicaid patients). Additionally, private insurance fee schedules (which are proprietary and highly variable) may influence physician decision-making.

However, because the effect of fee schedule modifications on physician willingness to treat Medicaid patients remains unknown, health policy intended to improve access to specialty care should not solely focus on physician reimbursement. More detailed investigation into other barriers that patients encounter when attempting to access orthopaedic care is needed to enable equitable access. In addition, our analysis indicated that although most state Medicaid programs reimbursed the procedures studied at rates lower than Medicare, Alaska,

Delaware, Montana, and North Dakota reimbursed all 10 procedures at higher rates. Further research could be useful in identifying what factors differentiate those state Medicaid programs, including political factors, such as dominant political parties in each of the 3 state governmental branches; expansion of Medicaid programs after the U.S. Affordable Care Act (specifically adjustments in enrollment criteria and supplementary funding); or demographic factors such as population density or socioeconomic variability.

Appendix

eA Tables showing the 2016 Medicaid reimbursements and Medicare Wage Index-adjusted Medicaid reimbursements for the 10 most common inpatient orthopaedic procedures are available with the online version of this article as a data supplement at [jbjs.org \(http://links.lww.com/JBJS/E557\)](http://links.lww.com/JBJS/E557). ■

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