



Original Research

Highlights of the 2022 American Joint Replacement Registry Annual Report

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ABSTRACT

The 2022 American Joint Replacement Registry Annual Report includes data from over 2.8 million hip and knee procedures from over 1,250 institutions that encompass all 50 states and the District of Columbia. This represents a cumulative registered procedural volume growth of 14% compared to the previous year, making the American Joint Replacement Registry the largest arthroplasty registry by volume in the world.

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American Joint Replacement Registry 2022 executive summary

The 2022 American Joint Replacement Registry (AJRR) *annual report* includes data from over 2.8 million hip and knee procedures from over 1250 institutions encompassing all 50 states and the district of Columbia. This represents a cumulative registered procedural volume growth of 14% compared to the previous year, making the AJRR the largest arthroplasty registry by volume in the world.

As much of the procedural information from the AJRR has come from hospital-based sources, ambulatory surgery centers (ASCs) have traditionally not been strongly represented. Recognizing that ASCs are particularly important within arthroplasty, where increasing numbers of outpatient procedures are being performed, the American Association of Orthopaedic Surgeons (AAOS) has focused on developing initiatives to better serve these sites. These include actively recruiting, educating, and engaging ASCs, and providing ASCs and private practices greater accessibility to data quality, analysis, and benchmarking. The AAOS has also partnered with the Ambulatory Surgery Center Association to implement a pilot program providing a framework to enable data submission

from ASCs with lower volume and limited technical capabilities. These efforts have paid dividends, as evidenced by the increase in cases submitted to the AJRR by ASCs between 2012 (n = 5) and 2021 (n = 22,427); this is a 57% increase in submitted procedures by ASCs since the publication of the 2021 AJRR annual report.

The AAOS Registry program continues to enhance tracking and outcome monitoring with RegistryInsights, which allows participating institutions and surgeons access to their own real-time dashboards to compare their metrics to AJRR national benchmarks. In addition, custom capabilities allow for data reuse for internal performance measures or benchmarks.

Finally, publications and presentations based on AJRR data continue to be an important focus of the registry. In the past year alone, AJRR data in presentations have won awards, including the 2022 AAOS Best Poster Award, and the 2022 AAHKS James A. Rand, MD Young Investigators Award. Recently published topics have included AJRR data representativeness, revision risk factors, trends in implant design and utilization, racial disparities, infection, periprosthetic fractures in THA and the use of dual mobility articulations.

2022 AJRR annual report highlights

The 2022 AJRR annual report contains 2,550,532 valid primary and revision hip and knee arthroplasty cases submitted from 2012-2021. The majority of submitted cases were either primary

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TKA (53.8%) or primary THA (37.3%) procedures. By gender, female patients represented 58.5% of all procedures, while male patients represented 41.1%. The average age of a TKA patient was 67.2 years old, while the average THA patient was 65.7 years old. Although race was unreported in almost 15% of submitted cases; among reported cases White patients comprised the majority (75.6%). Black or African American patients comprised 5.7% of cases, Asian patients 1.2%, American Indian 0.7%, Native Hawaiian or other Pacific Islander 0.1%, and 2 or more reported races 1.2%. For those AJRR surgeons exclusively performing either elective TKA or THA in 2021, the mean procedure count was 35.5 and 27.4, respectively. Furthermore, the case per surgeon median is lower for both TKA and THA, indicating a higher frequency of lower volume surgeons represented in the registry. This procedure distribution is consistent with prior studies of TKA and THA in the United States [1].

Several trends that were identified in prior AJRR annual reports were sustained this past year

- The postoperative length of stay for both TKA (1.3 days) and THA (1.4 days) procedures has continued to decrease significantly, with a difference of more than 1 day when comparing 2012-2021 data.
- The use of general anesthesia has also continued to decline, with a decrease of 33% in TKA when compared to 2017. While spinal anesthesia has remained relatively steady, the use of general or spinal anesthesia combined with regional anesthesia has more than doubled in frequency since 2017 in both TKA and THA.

Trends in primary THA

- Ceramic head usage has continued to increase, with a corresponding and statistically significant decrease in cobalt chromium usage ($P < .0001$). This is likely explained by concerns over trunnion and taper corrosion, which are more commonly seen with cobalt chromium heads. Less than 13% of elective primary THA utilized a metal-on-polyethylene articulation in 2021.
- While ceramic-on-polyethylene remains the dominant bearing couple choice in elective primary THA, its usage decreased slightly to 62.6%, while the use of dual mobility constructs has continued to increase to 13.4%. This contrasts with revision THA, where the use of dual mobility constructs appears to have leveled off.
- Although hemiarthroplasty remains the most common treatment choice for femoral neck fractures, THA continues to increase in popularity, with 26.8% of patients receiving a THA for a femoral neck fracture in 2021.
- Cemented femoral component fixation is also gradually growing in popularity for both elective primary THA and arthroplasty for femoral neck fractures, with utilization in primary elective THA increasing by over 75% since 2013. In 2021, almost 5% of femoral stems were cemented, which represents the highest percentage since the inception of the AJRR. Yet this remains lower than that seen in international registries, including the National Joint Registry (32.3%), the Australian Orthopedic Association National Joint Replacement Registry (39.2%), and the Swedish Arthroplasty Register (50%) [2-4].

Trends in primary TKA

- The use of cruciate-retaining designs continues to increase, while posterior-stabilized implants have declined in popularity. This trend likely reflects the finding of a significantly reduced

cumulative percent revision of cruciate-retaining designs when compared to posterior stabilized designs after adjusting for age and sex in patients greater than 65 years of age as reported to either the AJRR or The Centers for Medicare and Medicaid Services. Interestingly, there was also a decline in the usage of ultracongruent designs for the first time since the AJRR began collecting this data in 2012.

- While cemented TKA remains the leading form of fixation, cementless fixation is gaining prevalence, with 18.8% of primary TKA utilizing cementless fixation in 2021. Cementless fixation was found to be associated with a significantly decreased cumulative percent revision compared to cemented fixation in males less than 65 years of age in the AJRR database ($P < .0070$). There was a similar trend toward cementless fixation having a decreased cumulative percent revision in men aged 65 and older, although this did not reach statistical significance. This represents a change from the prior 2020 annual report, where this difference was statistically significant.
- The use of conventional polyethylene continues to decline, and while the use of highly cross-linked polyethylene has stabilized, the use of antioxidant polyethylene is on the rise.
- The use of partial knee arthroplasty has remained relatively stable over the past few years, with medial or lateral unicompartamental knee arthroplasty representing 4.2% of all primary knee arthroplasty cases and patellofemoral arthroplasty representing 0.3%.

Finally, the goal of each AJRR annual report is to utilize the submitted data to perform enhanced analytics and better understand national trends. For the first time this year, patient-reported outcome measures were able to be evaluated after age-stratification. Interestingly, patients older than 75 years of age showed less improvement compared to younger patients after both THA and TKA. This was most notable on the Patient-Reported Outcomes Measurement Information System-10 quality of life assessment tool. Trends in the utilization of technology for both TKA and THA procedures were also examined for the first time in the 2022 annual report. In TKA, the use of robotics has increased over 6-fold since 2017, up to 11.6% of procedures, while the use of computer navigation has remained relatively stable at 3.1%. In the same time frame, the use of robotics in THA has more than doubled to over 5% of procedures, while the use of computer navigation has increased by more than 80%-3.8%. Previously published systematic reviews and meta-analyses have shown significantly improved radiographic alignment and equivalent, but not significantly improved patient-reported outcome measures, with robotic-assisted TKA/THA in comparison to conventional TKA/THA, although further long-term, high-quality prospective studies are needed [5-8].

Now in its 10th year, the AJRR continues to play a vital role in data collection and reporting for hip and knee arthroplasty throughout the United States. As the registry grows in adoption, establishes strategic partnerships, and improves the sophistication of its reporting, the AJRR's impact on quality improvement, device surveillance and patient care is expected to increase. Wide-scale participation is critical to maximize the benefits of the AJRR. To review and download the most recent data in the full report, visit <https://connect.registryapps.net/2022-ajrr-annual-report>.

Conflicts of interest

V. Hegde is a paid consultant for Globus Medical, received fellowship support from Smith & Nephew and OMeGA Medical Grants, and is a board member for AAHKS Research Committee.

J. B. Stambough received royalties from Signature Orthopaedics, is a paid consultant for and received other financial or material

support from Smith & Nephew, and is in Journal of Arthroplasty, Editorial Board, American Association of Hip & Knee Surgeons (AAHKS), Education Committee AJRR, Steering Committee.

B. R. Levine is a paid consultant for Link, Exactech, Zimmer-Biomet, Smith & Nephew; received research support from Zimmer-Biomet as a principal investigator; received royalties and financial or material support from Human Kinetics, Slack Inc., and Wolters Kluwer; is in medical/orthopedic publications editorial/governing board: JOA, AT (deputy editor), orthopedics; is a board member for a society for AAOS—EBQV committee; MAOA—Education committee.

B. D. Springer received royalties from Stryker and Osteor-emedies, is a paid consultant for Stryker, Convatec, and is a board member in International Orthopaedic Education Network and AAHKS.

For full disclosure statements refer to <https://doi.org/10.1016/j.artd.2023.101137>.

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