Overview of the American Joint Replacement Registry and the 2020 Annual Report

www.aaos.org/registries/ajrr
Our Speakers Today

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Disclosures: James Huddleston III, MD, FAAOS

- AAOS: Board or committee member
- American Association of Hip and Knee Surgeons: Board or committee member
- Journal of Arthroplasty: Editorial or governing board
- Knee Society: Board or committee member
- No financial conflicts of interest relevant to this presentation
Disclosures: James Browne, MD, FAAOS

- AAOS: Member of AJRR Steering Committee
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- Southern Orthopaedic Association: Board or committee member
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At the Core of Academy Strategy

Registry Effort Goals

✓ Collect unique clinical information demonstrating real-world practice
✓ Enable performance measurement by physicians for physicians
✓ Facilitate national registry-driven quality improvement programs
✓ Support novel scientific research
AAOS Family of Registries

AAOS Board of Directors

Registry Oversight Committee

Collaborative Registries
- Collaborative Registry with AANS & AAOS American Spine Registry (ASR)
  - Cervical Degenerative Spine
  - Lumbar Degenerative Spine
- American Joint Replacement Registry (AJRR)
  - Hip Arthroplasty
  - Knee Arthroplasty
  - Hip Fracture*

Musculoskeletal Tumor Registry (MsTR)
- Orthopaedic Sarcoma

AAOS Registries
- Shoulder & Elbow Registry (SER)
  - Shoulder Arthroplasty
  - Rotator Cuff Repair
  - Elbow Arthroplasty
  - Proximal Humerus*
- Fracture & Trauma Registry (FTR)
  - Hip Fracture*
  - Ankle Fracture*
  - Distal Radius Fracture*
  - Distal Femur Fracture*
  - Proximal Humerus*

*Modules in development
Participation Across the Registries

Over 1,600 participating sites contracted and 12,500 registered surgeons across all 50 states.

Data representing over 2,300,000 procedures capturing approximately 40% of all US TJA volume annually.
American Joint Replacement Registry
AJRR Steering Committee

- **Bryan D. Springer, MD, FAAOS** – Chair
  OrthoCarolina
- **James I. Huddleston, III, MD, FAAOS** – Vice Chair
  Stanford University
- **Scott M. Sporer, MD, FAAOS** – Secretary
  Rush
- **James A. Browne, MD, FAAOS**
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- **Antonia Chen, MD, MBA, FAAOS**
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- **James D. Slover, MD, FAAOS, MS**
  NYU Langone Health
- **Jeffrey B. Stambough, MD, FAAOS**
  University of Arkansas
AJRR Data Element Overview

Two Modules: Hip Arthroplasty & Knee Arthroplasty

Procedure

Patient
- Name, Date of Birth, SSN
- Diagnosis (ICD-9/10, CPT)
- Gender
- Race/Ethnicity
- Height + Weight/BMI
- Payer Status

Site of Service
- Name and Address (TIN, NPI)

Surgeon
- Name (NPI)
- Trainee

Procedure
- Type (ICD-9/10, CPT)
- Date of Surgery, Length of Stay
- Surgical Approach
- Surgical Technique
- Laterality
- Implants (Manufacturer, Lot #)
- Anesthesia

Comorbidities and Complications
- Comorbidities (ICD-9/10, CPT)
- CJR Risk Variables
- Height + Weight/Body Mass Index
- Length of Stay
- American Society of Anesthesiologists Score
- Charlson Index
- Operative and Post-operative Complications

Patient-reported Outcomes

Recommended:
- PROMIS-10 Global
- VR-12
- HOOS Jr. /KOOS, Jr.

Also Accepted:
- SF-36 v1
- HOOS/ KOOS
- Oxford Hip and Knee Scores
- Knee Society Knee Scoring System
- Harris Hip Score
- WOMAC (Modified via HOOS and KOOS)
- SF-12, EQ-5D, WOMAC (only accepting final scores)

This page is a summary of the AJRR data elements and is not all inclusive.
Integration of Medicare Data

- Access to **Medicare claims** inclusive of inpatient (148 data elements), outpatient (122 data elements) & National Death Index
- Linked by full identifiers for longitudinal tracking
- 2012-2019 Medicare data for all patients represented in Registry
  - Medicare files
  - National Death Index
  - National Inpatient Sample (NIS) integrated as reference data for representative analyses
  - NPPES dataset incorporated for NPI validation
- Access to custom reports that compare their site to the national Annual Report analyses, show migration trends, etc.
AAOS has partnered with technology vendors to facilitate the data submission process.

- Re-use data that already exists in medical record, practice management and PRO systems.
- Direct data submission and management can be handled by a technology provider with sites able to fix rejected files.
Qualified Clinical Data Registry

- AAOS maintains a QCDR designation
- Specialty society driven participation in the Merit-incentive Based Payment System (MIPS)
- QCDR provides participants access to Promoting Interoperability (PI) and Quality Payment Program (QPP) credit
- Additional opportunities for alternative reporting for the bundled payment through BPCI-A episodes
Participation in the American Academy of Orthopaedic Surgeons (AAOS) Registry Program offers a wide variety of data reuse opportunities including requirements for quality initiatives and state collaboratives.

- AAOS RegistryInsights® Platform Standard Reports and personalized dashboards
- AAOS RegistryInsights National Benchmarks
- Accreditation Association for Ambulatory Health Care (AAAHC) Advanced Orthopaedic Certification
- Aetna Institutes of Quality (IOQ) Orthopaedic Surgery
- American Board of Neurological Surgery (ABNS) Continuous Certification (CC)
- American Board of Orthopaedic Surgeons (ABOS) Maintenance of Certification (MOC) Program
- BlueCross BlueShield Blue Distinction Specialty Care
- Blue Shield of California waiver of prior authorization
- Bree Collaborative
- CMS Merit-based Incentive Payment System (MIPS) Promoting Interoperability (PI) and Quality Payment Program (QPP)
- Centers for Medicare & Medicaid Services (CMS) Bundled Payments for Care Improvement Advanced (BPCI-A)
- CMS Comprehensive Care for Joint Replacement (CJR) Model
- Cigna Surgical Treatment Support Program
- DNV GL Orthopaedic Center of Excellence
- The Alliance QualityPath
- The Joint Commission Advanced for Total Hip & Knee Replacement Certification
- The Joint Commission Advanced Certification in Spine Surgery (ACSS)
Three Ways to Access Data

- Custom Reports
- RegistryInsights® Dashboards
- Registry Analytics Institute®
Custom reports created by our analytics team to help understand and package your site data in an actionable format.

Custom reports can include site specific metrics and shape continuous improvements to the canned dashboards provided.

Aggregated reports for every metric across all data submitted including procedural, post-operative and PROMs data can be provided at your site level.
On-demand practice specific dashboards

Compare your practice to national performance benchmarks

Unlimited surgeon accounts with access to system, site, and surgeon level dashboards
Surgeon Dashboards

**Authorized Surgeon Users**

- View their procedural, post-operative and PROM data
- National benchmarks for comparison measures
- Request custom reports
- Submit data for quality initiatives (e.g., ABOS MOC, QPP, BPCI-A)
PROM Management
The goal of the AAOS Registry Analytics Institute is to provide a resource to the scientific community to further understand and improve orthopaedic and musculoskeletal care by making data available to examine outcomes related to orthopaedics.

- The Institute provides clinicians and clinician-scientists the opportunity to submit proposals for analytic insight that are contained within its various registries.
- Selected awardees receive statistical support, data analyses, and potential monetary support.

To learn more: [www.aaos.org/registryanalyticsinstitute](http://www.aaos.org/registryanalyticsinstitute)
Why Do Sites Participate?

- Compare your practice to national performance benchmarks
- Access to on-demand practice specific quality reports and dashboards
- Facilitate tracking and monitoring of longitudinal patient outcomes

Facilitate site, practice-specific, payer-incentivized performance improvement programs such as Blue Distinction & Centers of Excellence

Qualify for national distinction programs such as the Joint Commission Advanced Certification & AAAHC

Use for reporting to quality improvement programs such as MIPS, BPCI-A, ABOS MOC & ABNS CC

Early access to surveillance alerts for poorly performing implants

Improve the value of care delivered to Patients
2020 AJRR Annual Report
Introduction & Highlights
2020 AJRR Annual Report

- Summary Statistics
  - Procedure, institution, and patient distributions
- Data Completeness
- Hip Arthroplasty
- Knee Arthroplasty
- Revision Procedures
- Implant Utilization and Survivorship
- Patient Reported Outcome Measures (PROMs)

Data submitted to AJRR across all 50 states and the District of Columbia

Supplementary datasets utilized where appropriate for descriptive and longitudinal analysis

- Medicare inpatient and outpatient claims data
- American Hospital Association (AHA) survey data
Figure 2.25: Elective Primary Total Hip Arthroplasty Stem/Shell Component Combinations by Year, 2012-2019 (N=482,808)
Revision Procedures

Figure 3.24: Distribution of Diagnosis Associated with All Knee Revisions, 2012-2019 (N=64,791)

- Infection & Inflammatory Reaction (n=16,087) - 24.8%
- Mechanical Loosening (n=15,664) - 24.2%
- Other Mechanical Complications (n=13,423) - 20.7%
- Instability (n=8,331) - 12.9%
- Pain (n=3,643) - 5.6%
- Other (n=2,917) - 4.5%
- Wear or Osteolysis (n=2,151) - 3.3%
- Fracture (n=1,556) - 2.4%
- Stiffness (n=596) - 0.9%
- Hematoma/Wound Complication (n=423) - 0.7%

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Figure 3.12: Cumulative Percent Revision for Cemented Versus Cementless Fixation for a Primary Total Knee Arthroplasty for Males <65 Years of Age Diagnosed with Primary Osteoarthritis as Submitted Only to AJRR, 2012-2019

<table>
<thead>
<tr>
<th>Time to Revision (months)</th>
<th>0-12</th>
<th>13-24</th>
<th>25-36</th>
<th>37-48</th>
<th>49-60</th>
<th>61-72</th>
<th>73-84</th>
<th>85-96</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cementless</td>
<td>2,287</td>
<td>2,070</td>
<td>1,884</td>
<td>1,468</td>
<td>781</td>
<td>513</td>
<td>283</td>
<td>116</td>
<td>9,402</td>
</tr>
<tr>
<td>Cemented</td>
<td>12,386</td>
<td>15,043</td>
<td>18,628</td>
<td>17,685</td>
<td>14,801</td>
<td>10,633</td>
<td>6,132</td>
<td>2,751</td>
<td>98,059</td>
</tr>
<tr>
<td>Hybrid</td>
<td>406</td>
<td>610</td>
<td>726</td>
<td>731</td>
<td>549</td>
<td>593</td>
<td>354</td>
<td>137</td>
<td>4,106</td>
</tr>
<tr>
<td>Total</td>
<td>15,079</td>
<td>17,723</td>
<td>21,238</td>
<td>19,884</td>
<td>16,131</td>
<td>11,739</td>
<td>6,769</td>
<td>3,004</td>
<td>111,567</td>
</tr>
</tbody>
</table>

Age Adjusted Hazard Ratio (95% CI)
Cementless vs. Cemented: 0.782 (0.641, 0.954) p=0.0152
Hybrid vs. Cemented: 0.802 (0.627, 1.041) p=0.0978
# Patient Reported Outcome Measures

Table 2.5/2.6: Change Between Preoperative and 1-Year Postoperative PROM Scores After Elective Primary Hip Arthroplasty and Knee Arthroplasty, 2012-2019

<table>
<thead>
<tr>
<th>Patient-Reported Outcome Measure (PROM)</th>
<th>PROM Component</th>
<th>Patients with Preoperative Score</th>
<th>Patients with Linked Postoperative Score</th>
<th>Response Rate, Percentage of Patients Who Completed a Preoperative and 1-Year Score</th>
<th>Patients with Meaningful Improvement*</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOOS, JR. (Hip disability and Osteoarthritis Outcome Score)</td>
<td>Score</td>
<td>24,749</td>
<td>5,769</td>
<td>23.3%</td>
<td>92.5%</td>
</tr>
<tr>
<td>PROMIS-10 (Patient-Reported Outcomes Measurement Information System 10)</td>
<td>Mental T</td>
<td>16,525</td>
<td>3,978</td>
<td>24.1%</td>
<td>38.6%</td>
</tr>
<tr>
<td></td>
<td>Physical T</td>
<td>16,525</td>
<td>3,978</td>
<td>24.1%</td>
<td>67.5%</td>
</tr>
<tr>
<td>VR-12 (The Veterans RAND 12 Item Health Survey)</td>
<td>Mental Health Component</td>
<td>11,898</td>
<td>3,265</td>
<td>27.4%</td>
<td>40.0%</td>
</tr>
<tr>
<td></td>
<td>Physical Health Component</td>
<td>11,754</td>
<td>3,271</td>
<td>27.8%</td>
<td>80.5%</td>
</tr>
</tbody>
</table>

*Meaningful improvement was calculated by minimal clinical important difference (MCID). MCID was determined to be a positive change score of half the pooled standard deviation.*

Table 2.5/2.6: Change Between Preoperative and 1-Year Postoperative PROM Scores After Elective Primary Hip Arthroplasty and Knee Arthroplasty, 2012-2019

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<th>Patients with Meaningful Improvement*</th>
</tr>
</thead>
<tbody>
<tr>
<td>KOOS, JR. (Knee Injury and Osteoarthritis Outcome Score, Junior)</td>
<td>Score</td>
<td>41,976</td>
<td>10,290</td>
<td>24.5%</td>
<td>88.0%</td>
</tr>
<tr>
<td>PROMIS-10 (Patient-Reported Outcomes Measurement Information System 10)</td>
<td>Mental T</td>
<td>29,164</td>
<td>7,421</td>
<td>25.5%</td>
<td>32.7%</td>
</tr>
<tr>
<td></td>
<td>Physical T</td>
<td>29,164</td>
<td>7,421</td>
<td>25.5%</td>
<td>67.5%</td>
</tr>
<tr>
<td>VR-12 (The Veterans RAND 12 Item Health Survey)</td>
<td>Mental Health Component</td>
<td>18,219</td>
<td>5,058</td>
<td>27.8%</td>
<td>33.9%</td>
</tr>
<tr>
<td></td>
<td>Physical Health Component</td>
<td>18,016</td>
<td>5,065</td>
<td>28.1%</td>
<td>75.0%</td>
</tr>
</tbody>
</table>

*Meaningful improvement was calculated by minimal clinical important difference (MCID). MCID was determined to be a positive change score of half the pooled standard deviation.*

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2019 AJRR Annual Report Supplement

• AJRR Representativeness Analysis compared to NIS Data for THA and TKA
  • Procedure volume
  • Patient Demographics
  • Geographic representation

• Device Specific Cumulative Percent Revision Curves
  • Most commonly used Hip and Knee constructs

AJRR Representativeness (NIS Comparison)
Device-Specific Cumulative Percent Revision Curves

Figure 3.16: Five Most Commonly Used Constructs: Cruciate Retaining Fixed Bearing Tibial Baseplate Designs for Primary Total Knee Arthroplasty in Patients ≥65 Years of Age for All Causes for Revision, 2012-2018

![Graph showing cumulative percent revision curves for various device groups.](image)

<table>
<thead>
<tr>
<th>Group Name</th>
<th>Total</th>
<th>Failure Events</th>
<th>Not Failed</th>
<th>Competing Events (Death)</th>
<th>Percent Without Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanguard/Maxim CR</td>
<td>19,106</td>
<td>169</td>
<td>18,690</td>
<td>247</td>
<td>99.1%</td>
</tr>
<tr>
<td>Triathlon CR</td>
<td>37,356</td>
<td>287</td>
<td>36,657</td>
<td>412</td>
<td>99.2%</td>
</tr>
<tr>
<td>PFC Sigma CR</td>
<td>13,845</td>
<td>110</td>
<td>13,492</td>
<td>243</td>
<td>99.2%</td>
</tr>
<tr>
<td>Persona CR</td>
<td>23,788</td>
<td>160</td>
<td>23,440</td>
<td>188</td>
<td>99.3%</td>
</tr>
<tr>
<td>Attune CR</td>
<td>12,826</td>
<td>82</td>
<td>12,661</td>
<td>83</td>
<td>99.4%</td>
</tr>
<tr>
<td>Total</td>
<td>106,921</td>
<td>808</td>
<td>104,940</td>
<td>1,173</td>
<td>99.2%</td>
</tr>
</tbody>
</table>

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Contact the AAOS Registry Program

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Registry Analytics Institute: RegistryAnalyticsInstitute@aaos.org

Phone: (847) 292-0530

Business Hours: Monday through Friday, 8 a.m. to 4 p.m. Central Time
Improving orthopaedic care through data.

Questions?
RegistryInfo@aaos.org
www.aaos.org/registries
Webinar Recordings

• Recordings and slide decks from past webinars can be found on this page of the AAOS website.

• If you would like to view a recording of a webinar held before October 2020, please visit learn.aaos.org.
Reference Slides
Participation Fee

• Single institution, 1-year licensing fee $3,750
• $750 1x configuration fee
• Includes Access to:
  ✓ AAOS RegistryInsights® Platform standard reports and personalized dashboards
  ✓ AAOS RegistryInsights national benchmarks
  ✓ PRO Platform for survey collection
  ✓ Ongoing support
  ✓ Inclusion in User Group Network (Unet)