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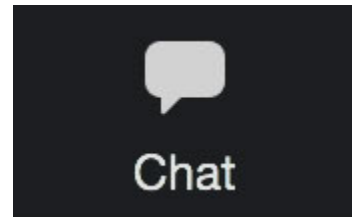
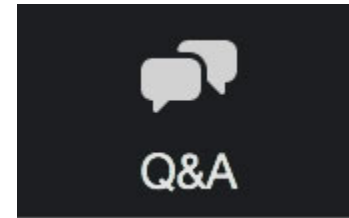
**The webinar will begin at:
8:00 PM ET, 7:00 PM CT, 6:00 PM MT, 5:00 PM PT**

Webinar will be recorded.

We look forward to your participation!

Main Controls

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About This Webinar

Live Stream

WEBINAR: COMPLEX CASES IN HIP PRESERVATION: NAVIGATING THE SPECTRUM

AAOS
WEBINARS

DESCRIPTION LEARNING OBJECTIVES DISCLOSURES

Femoroacetabular impingement (FAI) syndrome and hip instability/dysplasia have er understanding of hip pathology has spurred a concomitant increase in surgical proce orthopedic surgery. This webinar will discuss multiple complex cases in hip preservat management of a variety of hip conditions, including FAI syndrome and hip instabilit

[Download presentation slides](#)

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Program Evaluation

After the event, go back to learn.aaos.org



Don't forget to tell us how we did!

American Joint Replacement Registry: Introduction and Highlights

www.aaos.org/registries/ajrr

Our Speakers Today

- **James A. Browne, MD, FAAOS**
 - University of Virginia
 - AJRR Publications Subcommittee Chair; AJRR Annual Report Editor
- **James I. Huddleston, III, MD, FAAOS**
 - Stanford University
 - AJRR Steering Committee Chair

Disclosures: James A. Browne, MD, FAAOS

No financial conflicts of interest relevant to this presentation

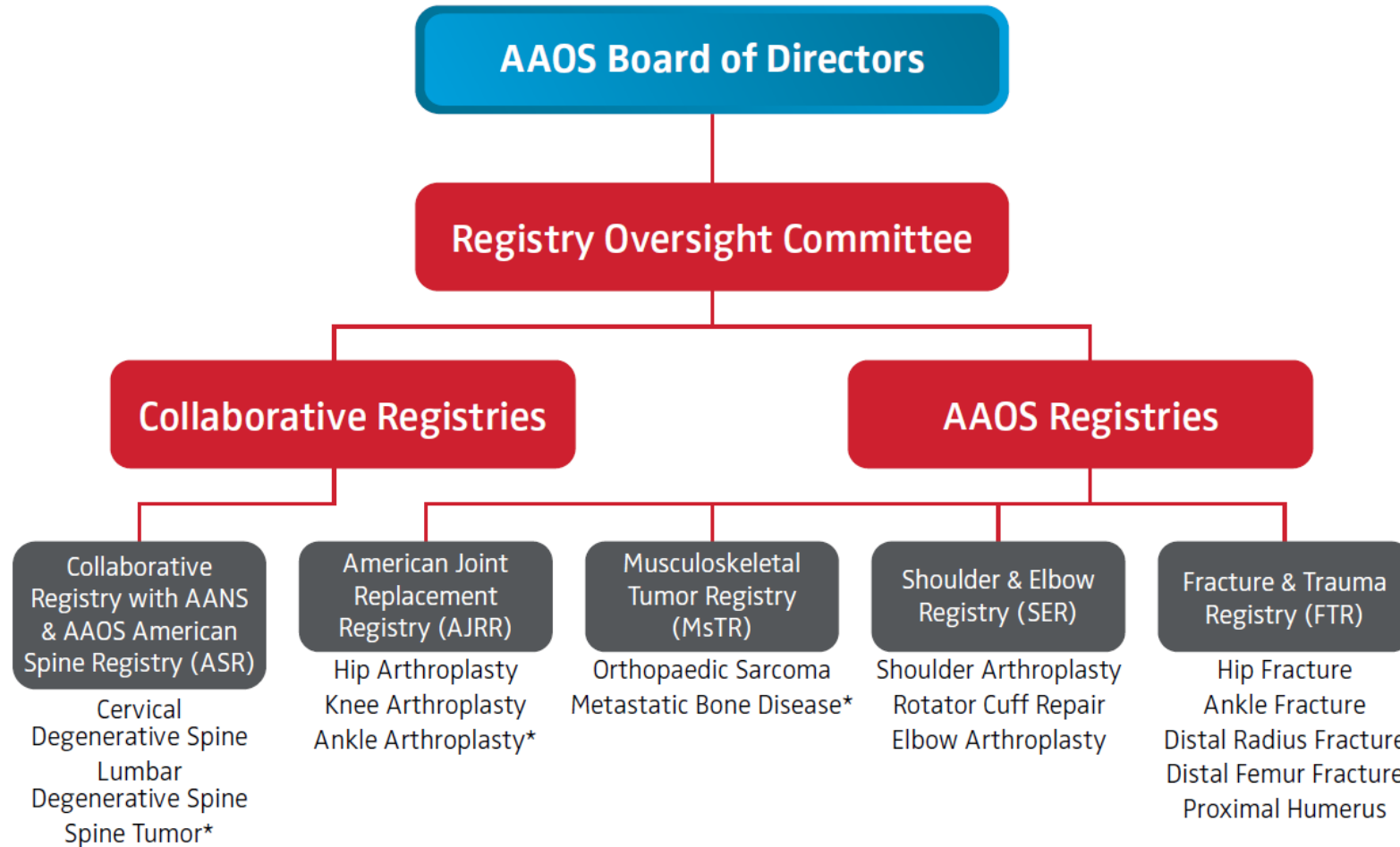
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Disclosures: James I. Huddleston, III, MD, FAAOS

No financial conflicts of interest relevant to this presentation

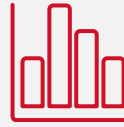
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AAOS Family of Registries



*Modules in development

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



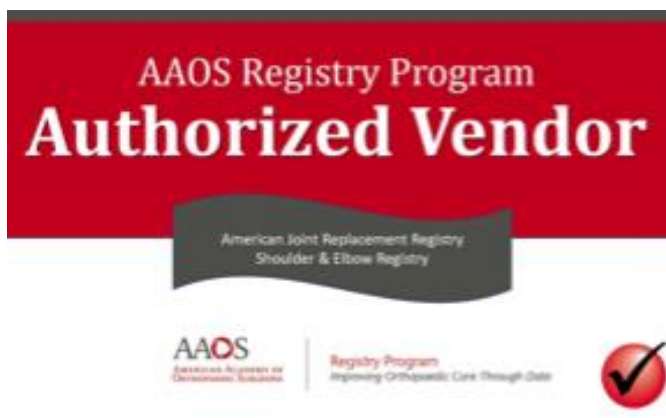
Improve the **value of care** delivered to Patients

Data Reuse Opportunities

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.

The Ability to Reuse Registry Data to enable performance measurement as well as facilitate national registry-driven quality improvement programs has been a focus of the Registry over the past few years. Now, AJRR data can be reused toward:

- The Joint Commission (TJC) Advanced Certification for Total Hip and Total Knee Replacement
- American Board of Orthopaedic Surgery (ABOS) Maintenance of Certification (MOC) program for Part II Self-Assessment Examination (SAE) credit
- Centers for Medicare & Medicaid Services (CMS) Inpatient Quality Reporting Program (IQR) THA/TKA Patient-Reported Outcome Performance Measure (PRO-PM)
- CMS Comprehensive Care for Joint Replacement (CJR) Model
- CMS Merit-based Incentive Payment System (MIPS) Promoting Interoperability (PI) and Quality Payment Program (QPP)
- Accreditation Association for Ambulatory HealthCare (AAAHC) Advanced Orthopaedic Certification
- Aetna Institutes of Quality (IOQ) Orthopaedic Surgery
- BlueCross BlueShield Blue Distinction Specialty Care
- Blue Shield of California waiver of prior authorization for their patients' hip or knee replacement procedures
- Bree Collaborative
- Cigna Pathwell Bone & Joint SM
- Det Norske Veritas & Germanischer Lloyd (DNV GL) Orthopaedic Center of Excellence
- The Alliance QualityPath



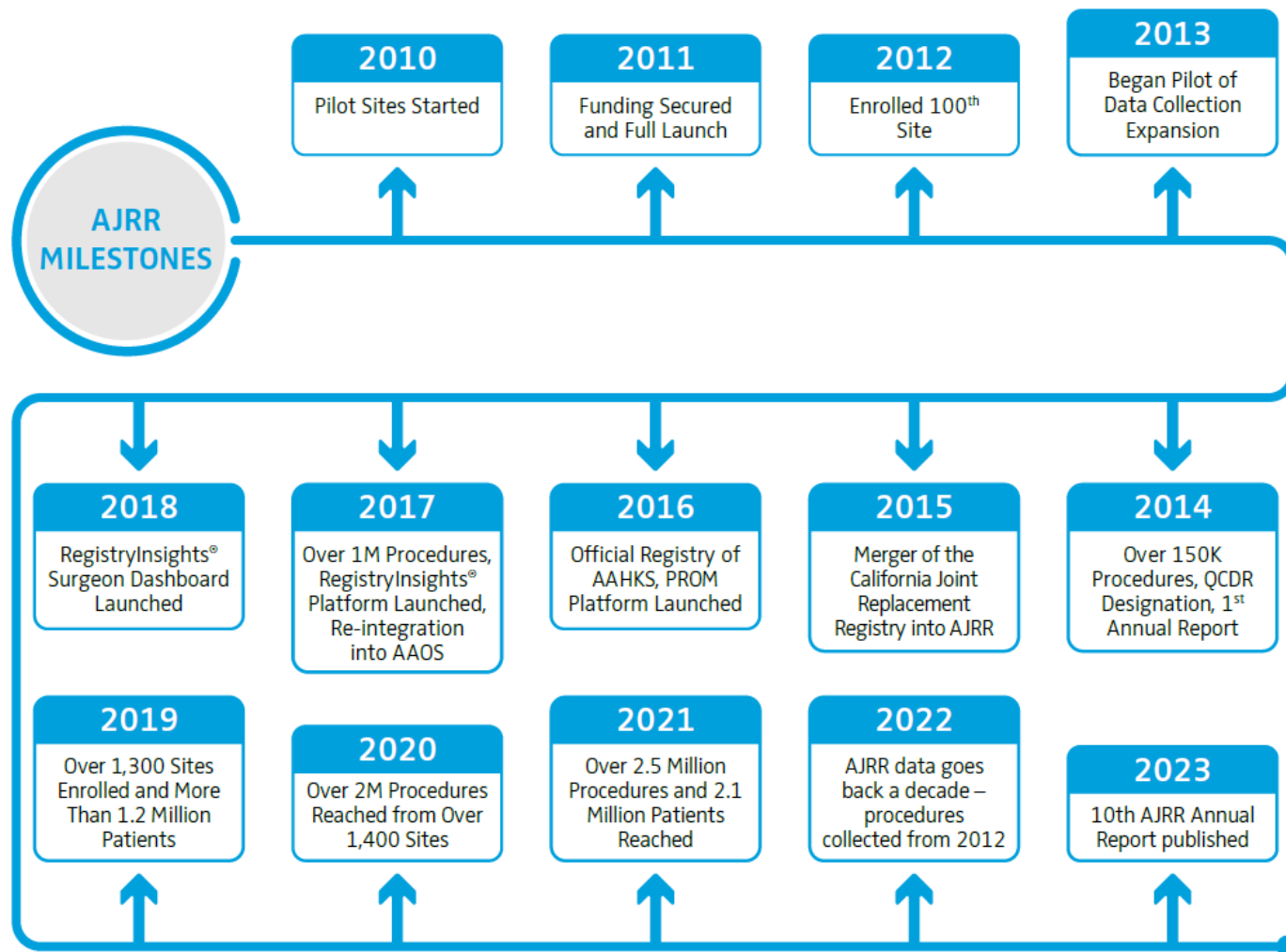
Decrease Data Collection Burden

- 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

American Joint Replacement Registry



About AJRR



AJRR Steering Committee

- **James I. Huddleston, III, MD, FAAOS – Chair**
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OrthoCarolina
- **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)

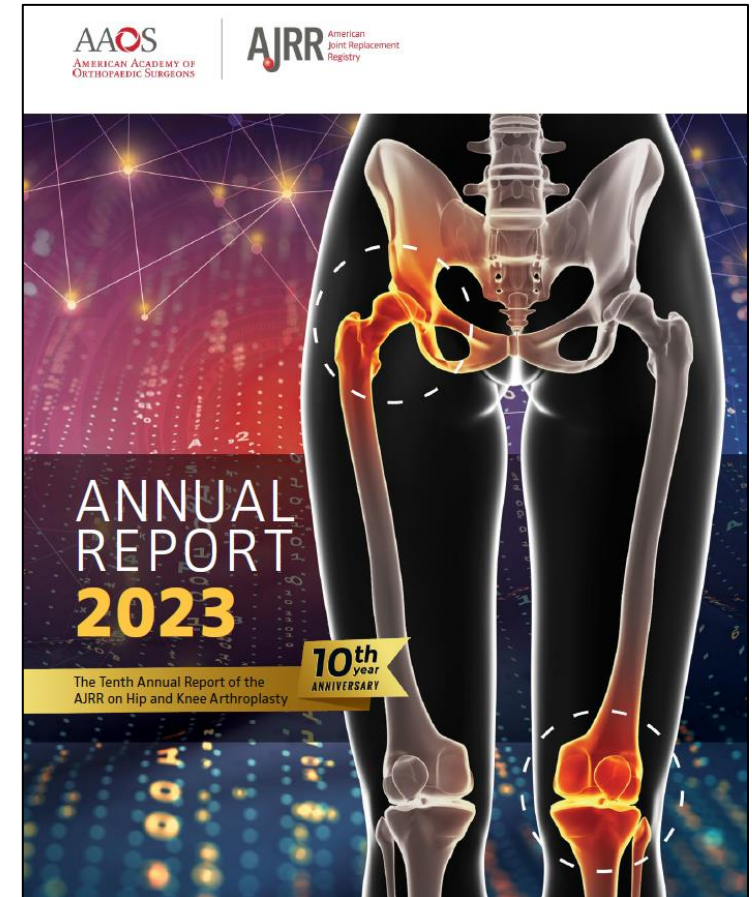
Integration of Medicare Data

- Access to **Medicare claims** linked by full identifiers for longitudinal tracking
- Follow outcomes of AJRR patients occurring at non-AJRR participating institutions
- 2012-2022 Medicare data for all patients represented in Registry
 - Inpatient fee for service
 - Outpatient fee for service
 - Medicare Advantage (2015-2020)



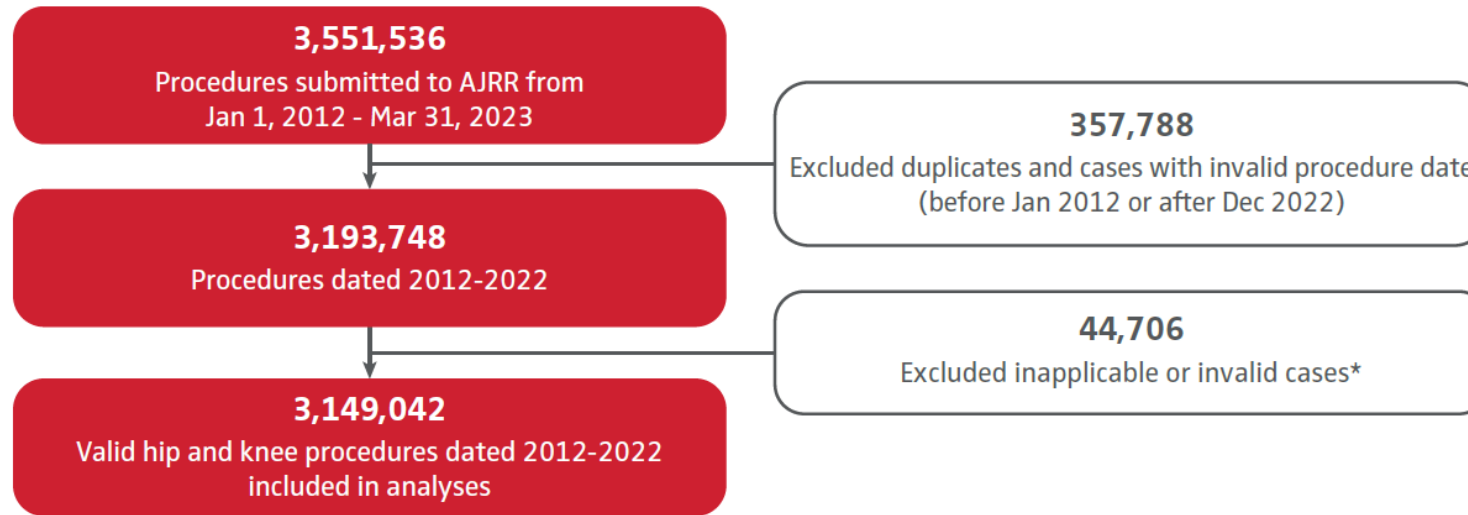
2023 AJRR Annual Report

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



Download the 2023 Annual Report and Annual Report Supplement: www.aaos.org/registries/publications

AJRR Annual Report Overview



**Invalid data=joint procedures not in the hip or knee, procedure codes outside of approved AJRR data specifications, and hemiarthroplasty procedures without a diagnosis of femoral neck fracture.*

- Data submitted to AJRR across all 50 states and the District of Columbia
- Supplementary Medicare and American Hospital Association datasets utilized where appropriate for descriptive and longitudinal analysis

AJRR Data Completeness

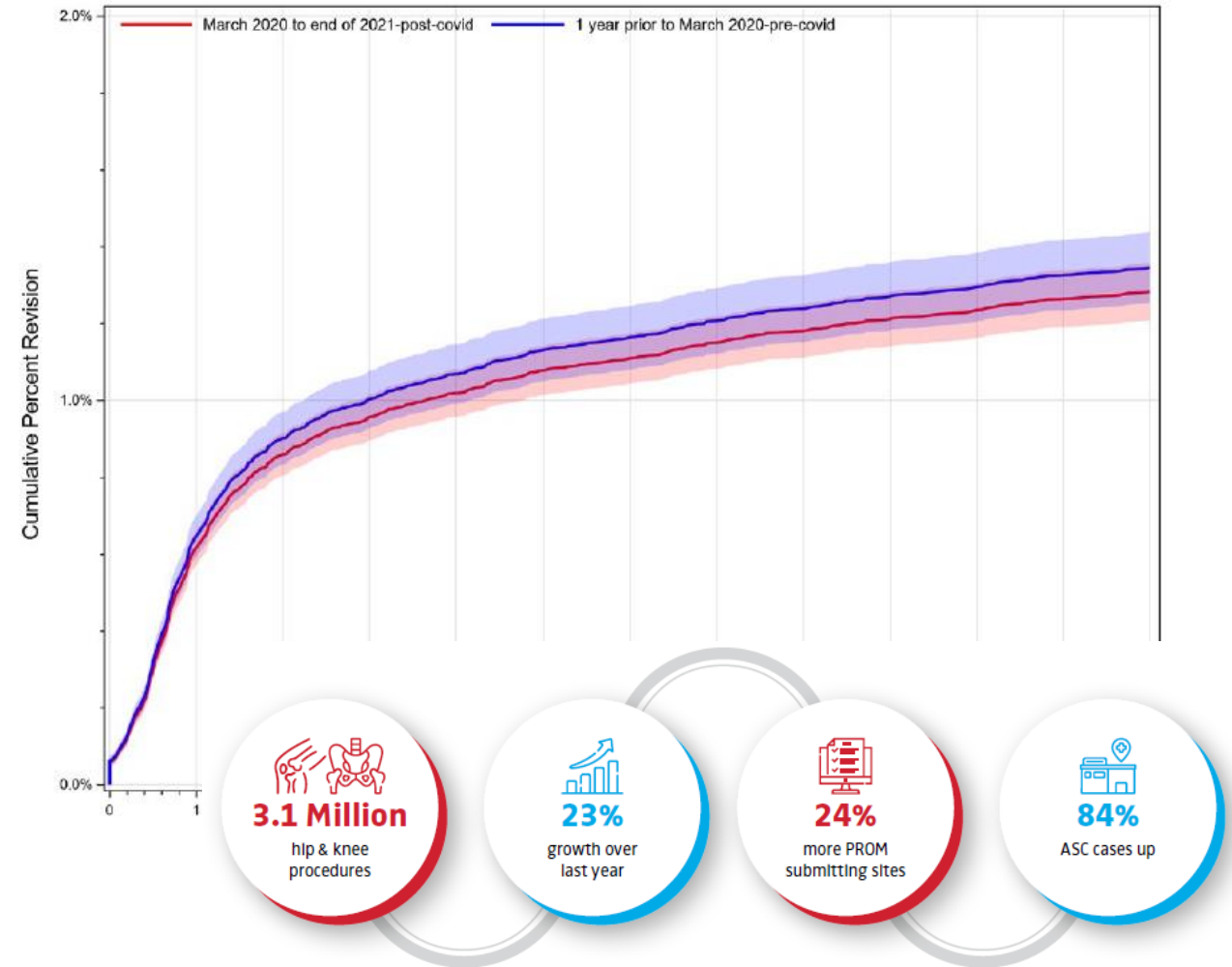
Table 1.1 Completeness of AJRR Data Elements, 2012-2022

Specifications Version	Element	% Reported	% NR	% Invalid
AJRR Data 2012 - 2023Q1 (N=3,312,884)				
All Versions	Surgeon Information	97.3	0	2.73
	Principal Procedure Code	99.9	0	0.1
	Principal Diagnosis Code	95.4	0	4.63
	First Implant Catalog # Listed	92.4	0	7.58
	First Implant Lot # Listed	89.9	0	10.12
	Incision Start Time (Procedure Start Time)	73.7	25.28	1.02
	Skin Closure Time (Procedure End Time)	74.2	24.81	0.98
	Ethnicity	84.1	15.86	<0.1
	Race	85.8	14.16	0.04
	Date of Birth	100.0	0	0
	Sex	99.7	0.35	0
	City	94.7	5.32	0
	State	93.7	6.3	0
Zip Code	96.1	0	3.94	
AJRR Data 2012 - 2022Q1 Using 2017 or Newer Specifications (N=2,013,727)				
2017-2021 Versions	Comorbidity - at least one code reported	65.4	0	34.63
	Body Mass Index (BMI)	90.3	0	9.71
	Discharge Disposition Code	94.0	4.94	1.04
	Admission Date	98.4	1.56	0
	Discharge Date	98.5	1.52	0
	Length of Stay	98.4	0	1.59
	Surgical Approach (Hip/Knee)	10.2	82.96	6.83
	Computer Navigation	32.5	66.9	0.64
	Robotic Assisted	40.2	59.68	0.15
	Anesthesia Type	67.1	27.49	5.39
	Periarticular Injection	23.7	74.69	1.6
	ASA Classification	47.3	52.3	0.44

Procedure Submission & COVID-19 Impact Summary

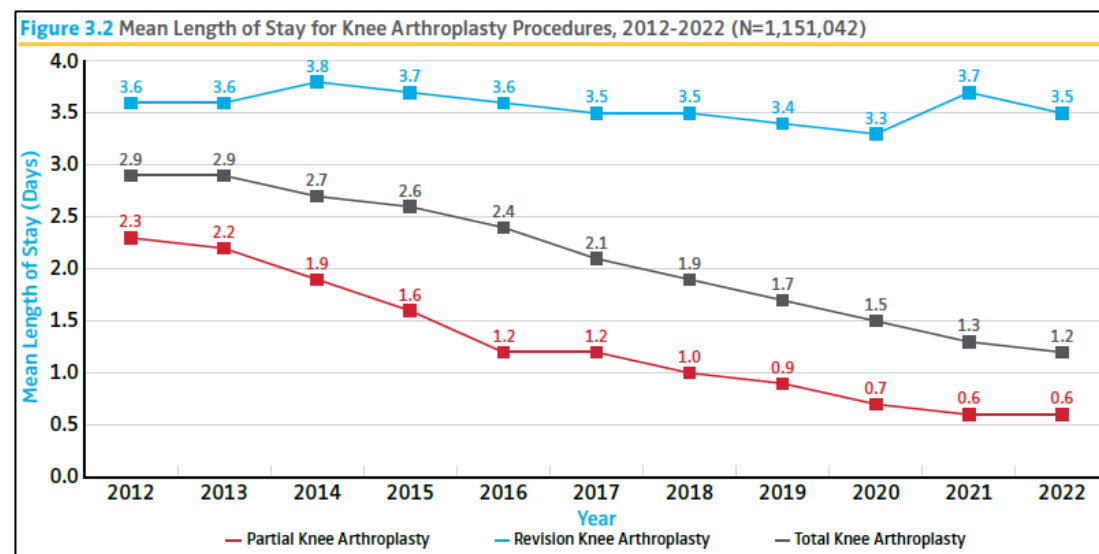
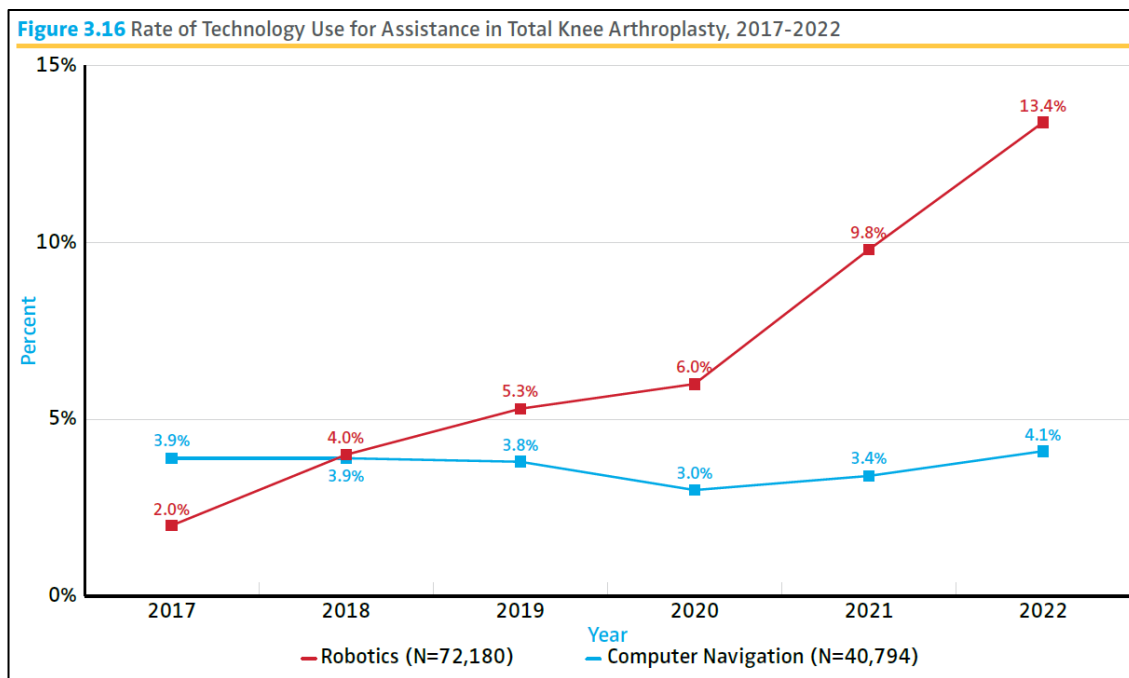
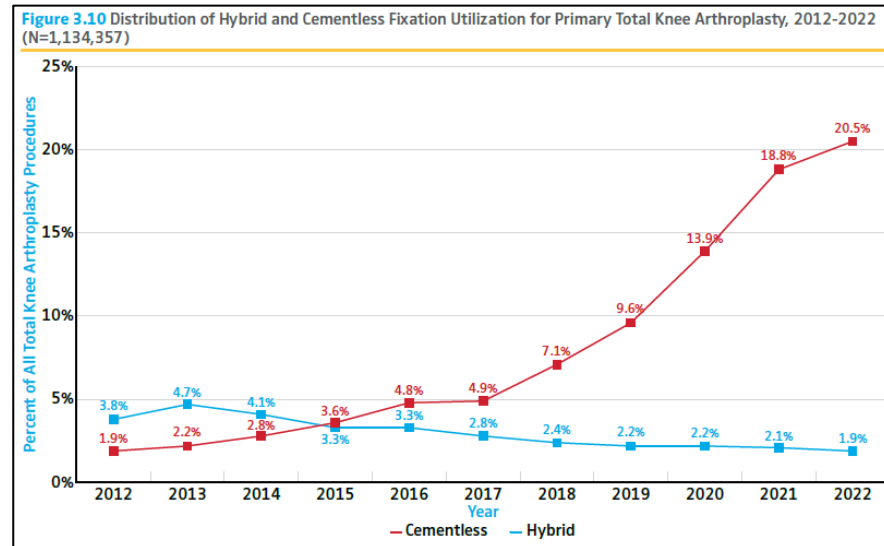
- 1,364 institutions across 50 states
- ASC submitted procedure volume grew 84% since 2022
- Despite the lasting impact of the COVID-19 pandemic, the 2023 Annual Report had an overall cumulative procedural volume growth of 23% compared to the 2022 report.

Figure 1.2 One-year Cumulative Percent Revision for Elective Primary Total Knee Arthroplasty Performed one year prior to COVID-19 Emergency vs. Procedures Performed Between March 2020 and the End of 2021 in Medicare Patients 65 Years of Age and Older with Primary Osteoarthritis, 2019-2021



Procedural Trends (Knee)

- LOS decreased to 1.2 days for TKA as well as THA
- Cementless fixation increasing in TKA to reach 21% in 2022
- Utilization of robotics in TKA has increased over 6-fold over the last 6 years and is now reported in over 13% of procedures



Procedural Trends (Hip)

- Increased THA for femoral neck fracture trend continues
- Robotic use in THA more than doubled and computer navigation use increased by 40%
- General anesthesia use decreasing over time for THA cases

Figure 2.4a Total Hip Arthroplasty and Hemiarthroplasty Procedures Performed for Femoral Neck Fracture, 2012-2022

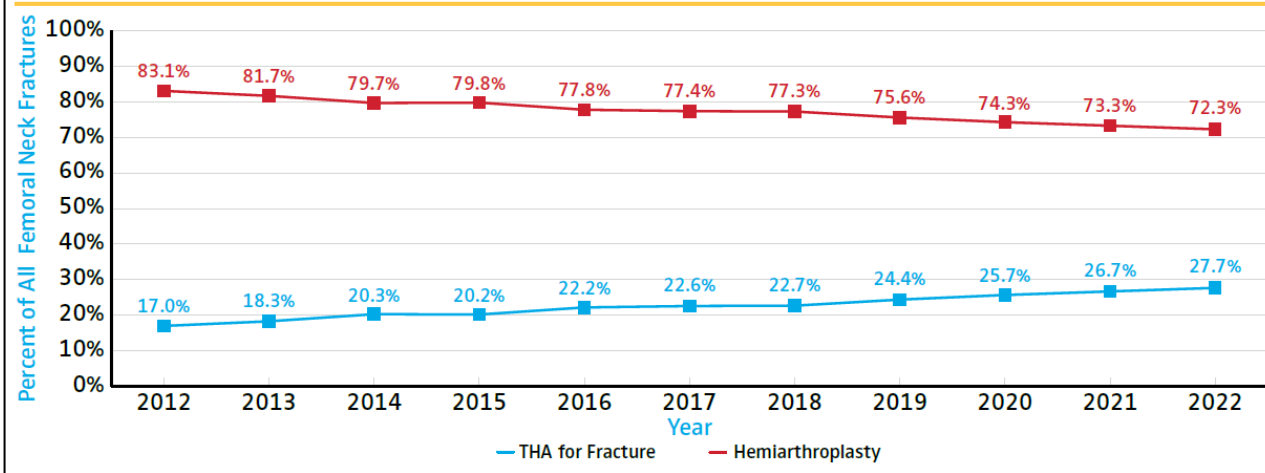
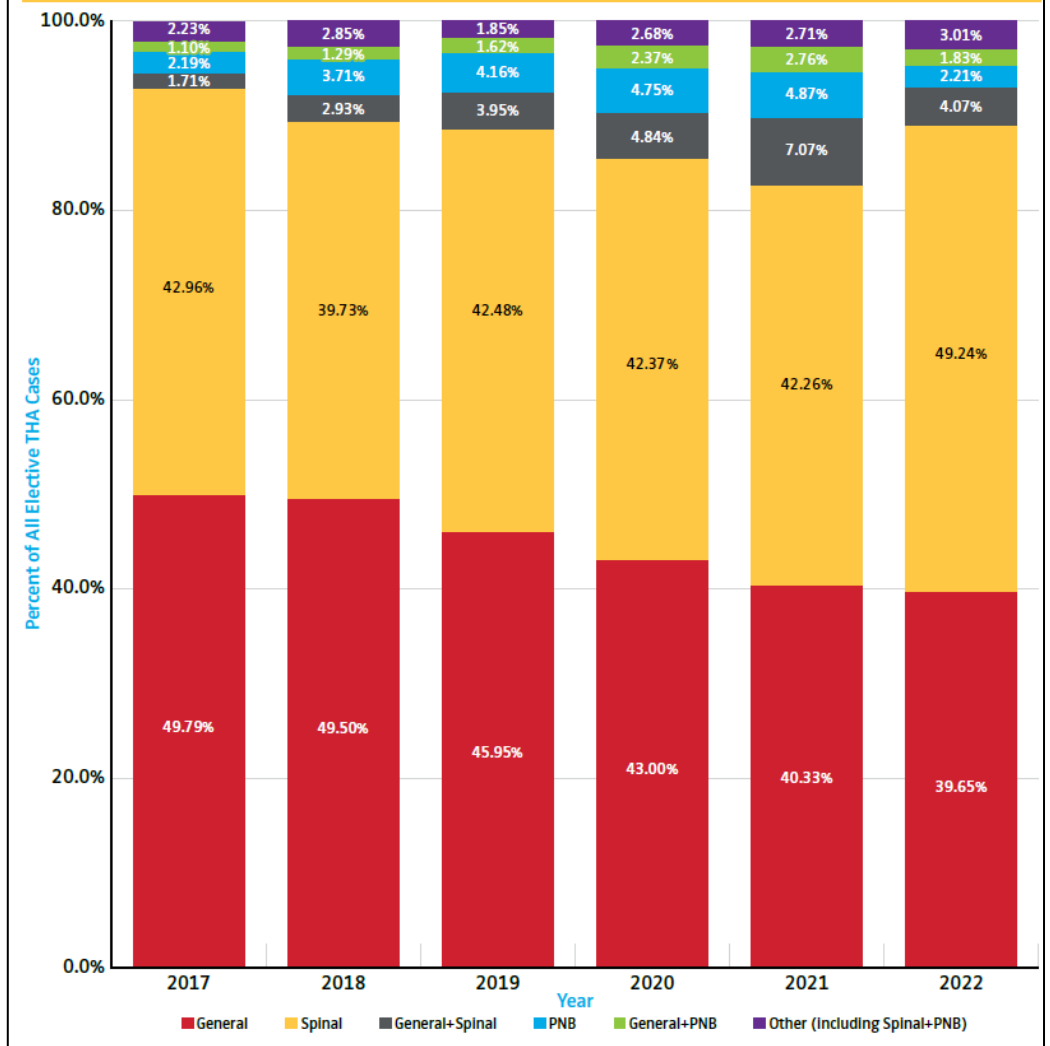
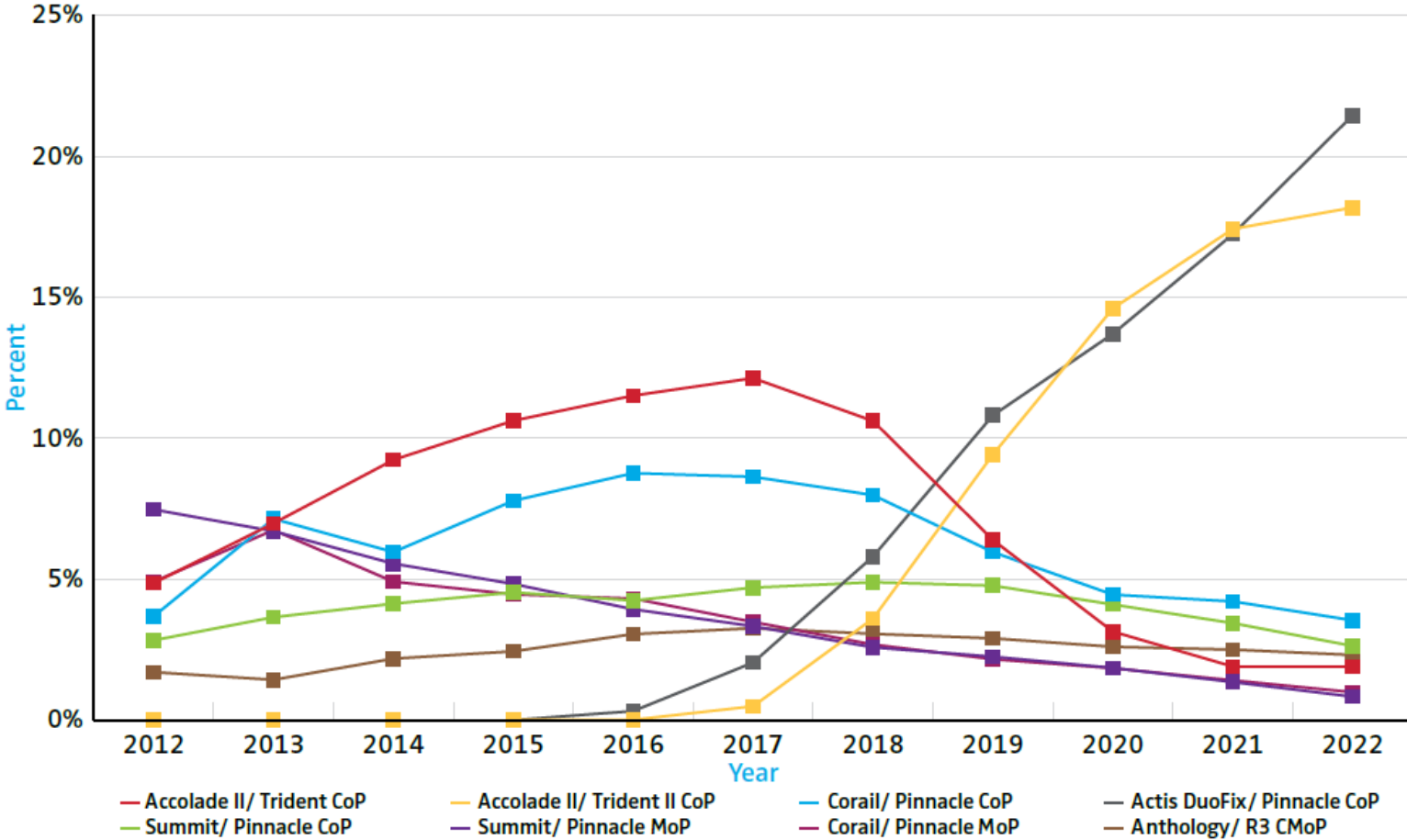


Figure 2.28 Elective Primary Total Hip Arthroplasty Anesthesia Technique by Year, 2017-2022 (N=300,027)



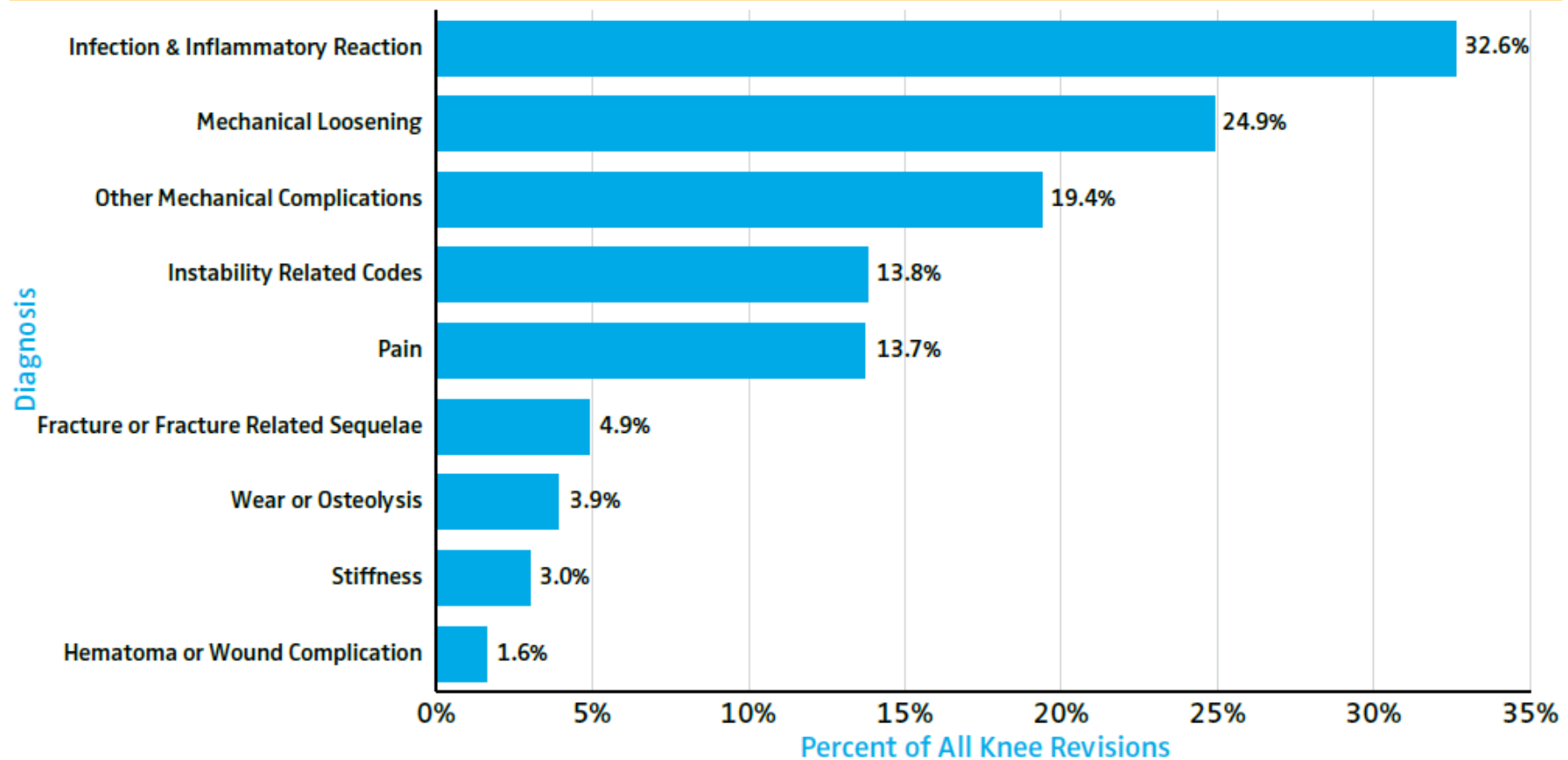
Implant Utilization

Figure 2.29 Elective Primary Total Hip Arthroplasty Femoral Stem/Acetabular Component Combinations by Year, 2012-2022 (N=771,240)



Revision Procedures

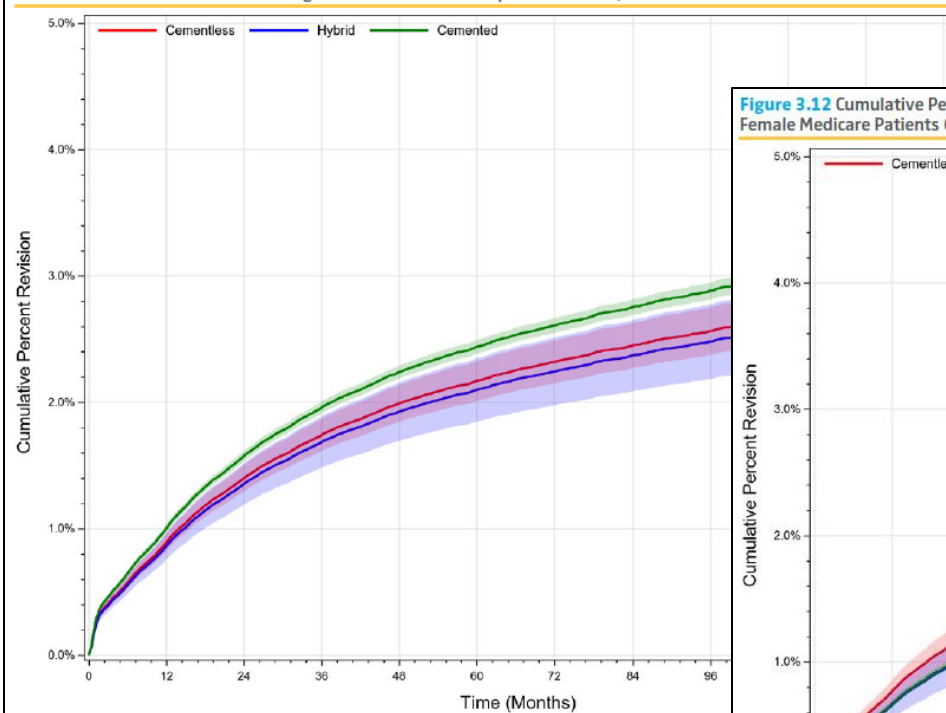
Figure 3.25 Distribution of Diagnosis Associated with All Knee Revisions, 2012-2022 (N=140,499)



Cumulative Percent Revision

Compared to cemented fixation, **cementless fixation for primary total knee arthroplasty** is associated with a reduced rate of cumulative percent revision in all-age men but a significantly increased rate in women aged 65 and older.

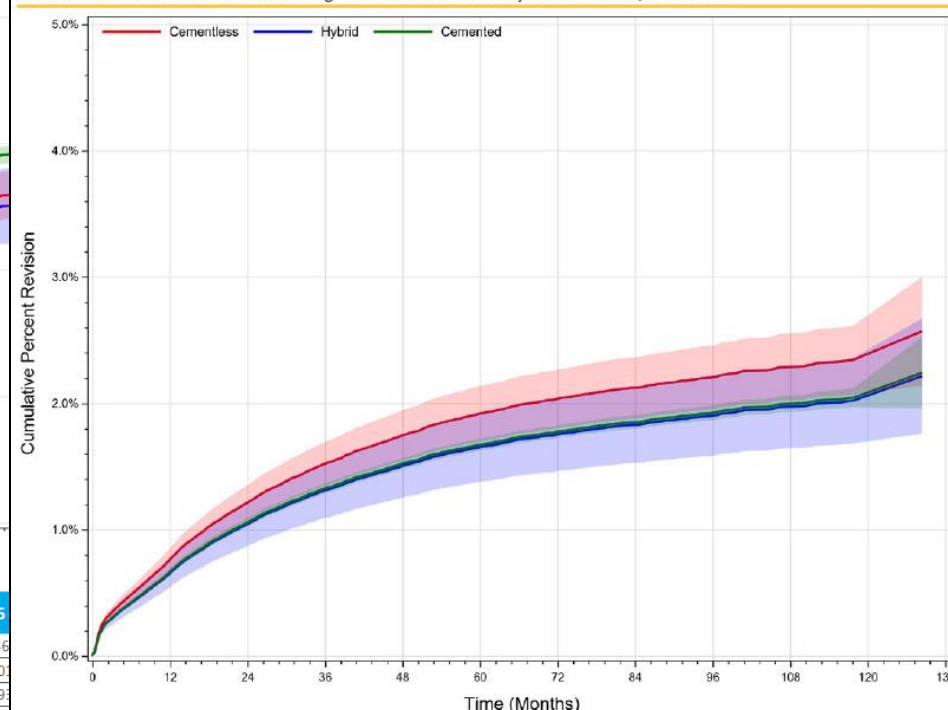
Figure 3.11 Cumulative Percent Revision for Cemented Versus Cementless Fixation Primary Total Knee Arthroplasty in Male Medicare Patients 65 Years of Age and older with Primary Osteoarthritis, 2012-2022



Number at Risk (Months)	0	12	24	36	48	60	72	84	96
Cemented	373,105	329,914	294,946	260,352	218,740	173,740	122,036	76,529	42,568
Cementless	47,354	34,676	25,536	18,775	13,303	9,154	5,833	3,029	1,500
Hybrid	12,620	11,518	10,480	9,542	8,452	7,069	5,335	3,533	2,190
Total	433,079	376,108	330,962	288,669	240,495	189,963	133,204	83,091	46,258

Age/CCI adjusted HR (95%CI), p-value
 Cementless vs. Cemented: 0.888(0.815,0.967) p=0.0065
 Hybrid vs. Cemented: 0.859(0.753,0.979) p=0.0227

Figure 3.12 Cumulative Percent Revision for Cemented Versus Cementless Fixation Primary Total Knee Arthroplasty in Female Medicare Patients 65 Years of Age and older with Primary Osteoarthritis, 2012-2022



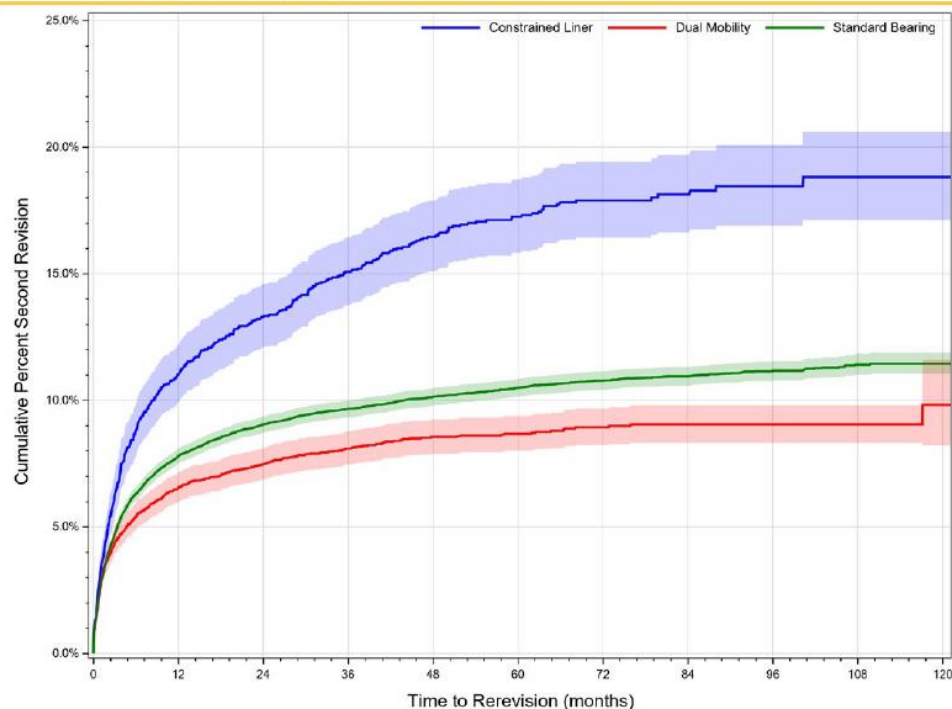
Number at Risk (Months)	0	12	24	36	48	60	72	84	96	108	120	132
Cemented	337,844	305,981	272,994	241,144	199,807	156,088	107,231	66,369	36,681	16,236	4,557	1
Cementless	22,108	16,902	12,225	8,920	6,069	4,046	2,668	1,381	543	183	45	2
Hybrid	8,647	7,949	7,162	6,447	5,495	4,576	3,422	2,255	1,398	640	139	1
Total	368,599	330,832	292,381	256,511	211,371	164,710	113,321	70,005	38,622	17,059	4,741	4

Age/CCI adjusted HR (95%CI), p-value
 Cementless vs. Cemented: 1.148 (1.007,1.309) p=0.0384
 Hybrid vs. Cemented: 0.988 (0.827,1.181) p=0.8978

Cumulative Percent Re-Revision

After adjusting for age, sex, and CCI, **dual mobility cases were found to have a significantly reduced cumulative percent re-revision** compared to standard and constrained design cases in Medicare patients aged 65 and older.

Figure 2.43 Cumulative Percent Re-Revision after Revision Total Hip Arthroplasty for Dual Mobility and Standard Bearings in Medicare Patients 65 Years of Age and Older, 2012-2022



Number at Risk (Months)	0	12	24	36	48	60	72	84	96	108	120
Constrained Liner	2,941	2,330	2,034	1,761	1,470	1,158	816	520	284	112	36
Dual Mobility	7,090	5,912	5,033	4,141	3,193	2,378	1,678	1,139	585	223	79
Standard	31,322	25,798	22,823	20,259	17,574	14,614	11,784	9,176	5,456	2,490	778
Total	41,353	34,040	29,890	26,161	22,237	18,150	14,278	10,835	6,325	2,825	893

Age/Sex/CCI adjusted HR (95%CI), p-value
 Standard vs. Dual Mobility: 1.235 (1.128,1.352), p<0.001
 Constrained vs. Dual Mobility: 1.998 (1.766,2.259), p<0.001

Device-Specific Cumulative Revision

The ability to look at revision rates for particular implants is one of the great strengths of the AJRR. The tables below (3.3-3.5) display cumulative percent revision stratified by knee constructs as well as bearing and fixation types with 95% confidence intervals. With the exception of Optetrak Logic CR, all TKA device constructs included in analysis have a **cumulative percent revision of less than 2.3% at three years and less than 4.1% at final follow-up for each respective device**. The aggregate of included cemented, hybrid, or cementless devices was less than 2.2% cumulative percent revision at ten years.

Table 3.5 Unadjusted Cumulative Percent Revision of Cementless Knee Arthroplasty Construct Combinations for Primary Total Knee Arthroplasty in Patients ≥65 Years of Age with Primary Osteoarthritis, 2012-2022

Femoral Component	Tibial Component	N Total	N Revised	1 Yr	3 Yrs	5 Yrs	7 Yrs	10 Yrs
Triathlon CR	Triathlon	36,559	436	0.78 (0.69, 0.88)	1.31 (1.19, 1.45)	1.55 (1.39, 1.72)	1.73 (1.53, 1.95)	1.73 (1.53, 1.95)
Triathlon PS	Triathlon	7,075	130	1.13 (0.90, 1.40)	1.96 (1.63, 2.34)	2.24 (1.86, 2.68)	2.50 (2.03, 3.05)	2.50 (2.03, 3.05)
Persona CR	Persona	2,296	36	1.02 (0.67, 1.51)	2.05 (1.38, 2.94)	3.09 (1.42, 5.85)	3.09 (1.42, 5.85)	—
Attune PS	Attune	1,033	8	0.61 (0.26, 1.28)	0.94 (0.44, 1.83)	—	—	—
Attune CR	Attune	699	12	1.46 (0.75, 2.59)	1.76 (0.91, 3.11)	2.87 (1.11, 6.06)	—	—
Natural-Knee II GS CR	Natural-Knee II	690	9	0.43 (0.12, 1.21)	1.08 (0.48, 2.13)	1.52 (0.74, 2.79)	1.52 (0.74, 2.79)	1.52 (0.74, 2.79)
Vanguard CR	Regenerex	523	7	0.76 (0.26, 1.85)	1.34 (0.60, 2.63)	1.34 (0.60, 2.63)	1.34 (0.60, 2.63)	1.34 (0.60, 2.63)
Sigma CR	MBT	505	4	0.40 (0.08, 1.35)	0.84 (0.28, 2.04)	0.84 (0.28, 2.04)	0.84 (0.28, 2.04)	0.84 (0.28, 2.04)
Overall	—	49,380	642	0.84 (0.76, 0.92)	1.43 (1.32, 1.55)	1.68 (1.54, 1.83)	1.86 (1.69, 2.05)	1.92 (1.71, 2.14)

Patient Reported Outcome Measures

- 496 institutions submitted PROMs (24% increase from the prior Annual Report)
- Over 85% achieve MCID on HOOS-Jr. and KOOS-Jr.
- Patients older than 75 years of age showed less improvement compared to younger patients

Table 3.9 Overall Change Between Preoperative and 1-Year Postoperative PROM Scores after Primary Knee Arthroplasty by PROM, 2012-2022

Patient-Reported Outcome Measure (PROM)	PROM Component	Patients with Preoperative Score	Patients with Linked Postoperative Score	Response Rate, Percentage of Patients Who Completed a Preoperative and 1-Year Score	Patients with Meaningful Improvement*
KOOS, JR. (Knee Disability and Osteoarthritis Outcome Score)	Score	119,471	30,994	25.90%	85.50%
PROMIS-10 (Patient-Reported Outcomes Measurement Information System 10)	Mental T	91,370	23,419	25.60%	33.40%
	Physical T	91,364	23,420	25.60%	63.70%
VR-12 (The Veterans RAND 12 Item Health Survey)	Mental Health Component	32,053	9,526	29.70%	33.60%
	Physical Health Component	31,851	9,533	29.90%	73.00%

*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.

Recent Publications and Presentations

- **Is American Joint Replacement Registry Data Consistent with International Survivorship in Knee Arthroplasty? A Comparative Analysis.** Bryan D. Springer MD, James I. Huddleston MD, Kyle Mullen MPH, Patrick Donnelly MS, Edward Caton, Keith Tucker FRCS. 2023 Knee Society Podium Presentation. Sept 7-9. Monterey, CA
- **Cemented Femoral Fixation in Total Hip Arthroplasty Reduces the Risk of Periprosthetic Femur Fracture in Patients 65 Years and Older: An Analysis From the American Joint Replacement Registry.** Mackenzie Kelly MD, Antonia F. Chen MD, MBA, Sean P. Ryan MD, Zachary M. Working MD, Kimberly R. Porter PhD, MPH, Ayushmita De PhD, Kyle Mullen MPH, Ryland Kagan MD. Journal of Arthroplasty. 2023 Apr 25;S0883-5403(23)00395-9. doi: 10.1016/j.arth.2023.04.039
- **Collared femoral stem design for total hip arthroplasty reduces risk of periprosthetic femur fracture in patients 65 years or older: An Analysis from the American Joint Replacement Registry.** Mackenzie Kelly MD, Antonia F Chen MD MBA, Sean P Ryan MD, Zachary Working MD, Ayushmita De PhD, Kyle Mullen, MPH, Kimberly Porter MPH, PHD, Ryland Kagan, MD. Podium Presentation. 2022 12th International Congress of Arthroplasty Registries, May 13-15 in Montreal, Canada.
- **Does Antibiotic Laden Bone Cement Reduce Acute Periprosthetic Joint Infection in Primary TKA?** Nourie BO, Cozzarelli NF, Krueger CA, Fillingham YA. Top 100 Posters Award presented at the 2023 AAHKS Annual Meeting, Grapevine, TX

And MANY MORE at www.aaos.org/registries/publications

Contact the AAOS Registry Program

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