# Orthopaedic & Rheumatologic Institute

Cleveland Clinic

2016
**Outcomes**

# Measuring Outcomes Promotes Quality Improvement

Measuring and understanding outcomes of medical treatments promotes quality improvement. Cleveland Clinic has created a series of Outcomes books similar to this one for its clinical institutes. Designed for a physician audience, the Outcomes books contain a summary of many of our surgical and medical treatments, with a focus on outcomes data and a review of new technologies and innovations.

The Outcomes books are not a comprehensive analysis of all treatments provided at Cleveland Clinic, and omission of a particular treatment does not necessarily mean we do not offer that treatment. When there are no recognized clinical outcome measures for a specific treatment, we may report process measures associated with improved outcomes. When process measures are unavailable, we may report volume measures; a relationship has been demonstrated between volume and improved outcomes for many treatments, particularly those involving surgical and procedural techniques.

In addition to these institute-based books of clinical outcomes, Cleveland Clinic supports transparent public reporting of healthcare quality data. The following reports are available to the public:

- Joint Commission Performance Measurement Initiative (qualitycheck.org)
- Centers for Medicare and Medicaid Services (CMS) Hospital Compare (medicare.gov/hospitalcompare), and Physician Compare (medicare.gov/PhysicianCompare)
- Cleveland Clinic Quality Performance Report (clevelandclinic.org/QPR)

Our commitment to transparent reporting of accurate, timely information about patient care reflects Cleveland Clinic's culture of continuous improvement and may help referring physicians make informed decisions.

We hope you find these data valuable, and we invite your feedback. Please send your comments and questions via email to:

OutcomesBooksFeedback@ccf.org.

To view all of our Outcomes books, please visit clevelandclinic.org/outcomes.

Dear Colleague:

Welcome to this 2016 Cleveland Clinic Outcomes book. Every year, we publish Outcomes books for 14 clinical institutes with multiple specialty services. These publications are unique in healthcare. Each one provides an overview of medical or surgical trends, innovations, and clinical data for a particular specialty over the past year. We are pleased to make this information available.

Cleveland Clinic uses data to manage outcomes across the full continuum of care. Our unique organizational structure contributes to our success. Patient services at Cleveland Clinic are delivered through institutes, and each institute is based on a single disease or organ system. Institutes combine medical and surgical services, along with research and education, under unified leadership. Institutes define quality benchmarks for their specialty services and report on longitudinal progress.

All Cleveland Clinic Outcomes books are available in print and online. Additional data are available through our online Quality Performance Reports (clevelandclinic.org/QPR). The site offers process measure, outcome measure, and patient experience data in advance of national and state public reporting sites.

Our practice of releasing annual Outcomes books has become increasingly relevant as healthcare transforms from a volume-based to a value-based system. We appreciate your interest and hope you find this information useful and informative.

Sincerely,

Delos M. Cosgrove, MD
CEO and President

# what's inside

# Chairman's Letter

Dear Colleagues,

Thank you for your interest in the 2016 Outcomes for Cleveland Clinic's Orthopaedic & Rheumatologic Institute. Here we provide an overview of our ongoing efforts to measure our patients' health and functional outcomes following the full range of surgical procedures and medical management of a wide range of rheumatologic diseases.

Our institute is committed to the best outcomes for patients, and we continually strive to make advancements. 2016 was a productive year for us. Our standout advancements included:

- Receiving two new National Institutes of Health grants for the development and study of tissue-engineered grafts and rotator cuff repair
- Establishing two new institute-endowed chairs for Innovations in Healthcare and Wellness in Functional Medicine
- Collecting 97% of patient-reported outcomes in 11,000 orthopaedic surgical procedures performed in 5 hospitals within the health system
- Implementing patient-reported outcomes for all rheumatology patients at all facilities across the health system

We welcome your feedback, questions, and ideas for collaboration. Please contact me via email at OutcomesBooksFeedback@ccf.org and reference the Orthopaedic & Rheumatologic Institute Outcomes book in your message.

Sincerely,

Joseph P. Iannotti

Joseph Iannotti, MD, PhD
Chairman, Orthopaedic & Rheumatologic Institute

# Institute Overview

This year's Outcomes book profiles the clinical outcomes of patients treated by the institute's caregivers in 2016. Patients with the most complex clinical problems from around the nation and the world come to the Orthopaedic & Rheumatologic Institute for care and expert opinions. These outcomes contributed to Cleveland Clinic's ranking among the nation's top 3 rheumatology programs and top 3 orthopaedics programs in *U.S. News & World Report* for 2016–2017.

The institute comprises Orthopaedic Surgery, Rheumatic and Immunologic Diseases, Musculoskeletal Physical Medicine and Rehabilitation, and Physical Therapy. Current full-time faculty in both Cleveland and Florida include 58 orthopaedic surgeons (55 orthopaedic, 3 spine), 30 rheumatologists, 12 musculoskeletal radiologists, 9 podiatrists, 12 sports and exercise medicine primary physicians, 4 nonoperative orthopaedists, and 2 physiatrists (PM&R physicians).

The institute is also dedicated to the cultivation of new knowledge and innovation through basic, translational, and clinical research. One of its missions is to educate and train 45 residents and fellows as well as colleagues at Cleveland Clinic and beyond who are contributing to the fields of orthopaedics and rheumatology.

## Adult Shoulder Surgery, 2009 – 2016

| Procedure | Yearly Volume | | Average Age, Years | | Males/ Females, % | | Length of Stay, Days | | Discharged Home, % | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 |
| **Open Surgery** | **1084** | **1085** | | | | | | | | |
| Total shoulder arthroplasty | 189 | 180 | 66.1 | 64.6 | 53/47 | 57/43 | 2.3 | 1.7 | 94 | 94 |
| Osteoarthritis | 165 | 160 | 66.2 | 65.1 | 56/44 | 58/42 | 2.2 | 1.7 | 95 | 94 |
| Other reasons | 24 | 20 | 65.2 | 60.9 | 33/67 | 50/50 | 2.9 | 2.2 | 85 | 89 |
| Reverse total shoulder arthroplasty | 121 | 215 | 70.9 | 70.6 | 38/62 | 38/62 | 2.6 | 2.3 | 84 | 86 |
| Hemiarthroplasty | 69 | 35 | 57.6 | 58.3 | 56/44 | 49/51 | 2.4 | 2.4 | 91 | 86 |
| Revision of total shoulder arthroplasty | 58 | 72 | 63.7 | 61.2 | 54/46 | 53/47 | 3.1 | 3.0 | 90 | 90 |
| Rotator cuff repair | 306 | 220 | 57.3 | 56.9 | 58/42 | 56/44 | - | - | 100 | 99 |
| Capsulorrhaphy | 52 | 42 | 28.6 | 27.7 | 72/28 | 79/21 | - | - | 100 | 100 |
| Biceps tenodesis | 59 | 72 | 51.7 | 55.3 | 78/22 | 76/24 | - | - | 99 | 100 |
| Fracture treatment | 77 | 102 | 49.4 | 50.1 | 52/48 | 56/44 | 3.2 | 4.2 | 94 | 94 |
| Proximal humerus | 40 | 45 | 59.8 | 59.5 | 31/69 | 36/64 | 3.2 | 4.1 | 90 | 90 |
| Clavicle | 37 | 57 | 38.0 | 42.6 | 76/24 | 72/28 | - | - | 99 | 96 |
| Other treatment | 153 | 147 | 52.0 | 52.6 | 57/43 | 58/42 | 5.8 | 6.1 | 95 | 92 |
| **Arthroscopic Surgery** | **1263** | **1214** | | | | | | | | |
| Rotator cuff repair | 617 | 658 | 56.6 | 58.2 | 62/38 | 61/39 | - | - | 100 | 100 |
| Capsulorrhaphy | 96 | 64 | 28.9 | 30.0 | 73/27 | 73/27 | - | - | 100 | 100 |
| Biceps tenodesis | 39 | 51 | 51.3 | 50.9 | 64/36 | 59/41 | - | - | 99 | 100 |
| SLAP repair | 126 | 95 | 32.0 | 29.9 | 80/20 | 79/21 | - | - | 100 | 99 |
| Subacromial decompression | 231 | 125 | 51.6 | 54.0 | 58/42 | 45/55 | - | - | 100 | 100 |
| Debridement | 104 | 154 | 50.8 | 50.3 | 61/39 | 60/40 | - | - | 98 | 99 |
| Other treatment | 50 | 67 | 45.1 | 52.4 | 62/38 | 61/39 | - | - | 99 | 100 |

SLAP = superior labrum from anterior to posterior

Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Adult patients are aged 18 or older. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **Yearly Volume:** number of surgeries performed per year
- **Average Age, Years:** average patient age
- **Males/Females, %:** males-to-females ratio
- **Length of Stay, Days:** average length of stay in days for inpatient surgeries
- **Discharged Home, %:** percentage of patients who were discharged home or to home care

| Procedure | In-Hospital Mortality, % | | 30-Day Readmission Rate, % | | 30-Day Reoperation Rate, % | | 90-Day Infection Rate, % | | Preop Function | | 90-Day Postop Function | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 |
| **Open Surgery** | | | | | | | | | | | | |
| Total shoulder arthroplasty | 0.0 | 0.0 | 1.7 | 1.1 | 0.7 | 0.0 | 0.1 | 0.0 | 2.6 | 3.5 | 6.2 | 5.0 |
| Osteoarthritis | 0.0 | 0.0 | 1.2 | 1.3 | 0.6 | 0.0 | 0.1 | 0.0 | 2.6 | 3.2 | 6.3 | 5.1 |
| Other reasons | 0.0 | 0.0 | 5.0 | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 | - | - | - | - |
| Reverse total shoulder arthroplasty | 0.0 | 0.0 | 2.7 | 3.8 | 0.4 | 1.9 | 0.1 | 0.0 | 2.2 | 2.4 | 5.3 | 5.1 |
| Hemiarthroplasty | 0.0 | 0.0 | 2.4 | 3.1 | 0.6 | 0.0 | 0.3 | 0.0 | - | - | - | - |
| Revision of total shoulder arthroplasty | 0.5 | 0.0 | 7.4 | 7.2 | 5.7 | 3.0 | 1.8 | 0.0 | - | - | - | - |
| Rotator cuff repair | 0.0 | 0.0 | 1.1 | 1.4 | 0.4 | 0.0 | 0.2 | 0.0 | 3.2 | 2.8 | 5.6 | 4.8 |
| Capsulorrhaphy | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | - | - | - | - | - | - |
| Biceps tenodesis | 0.0 | 0.0 | 1.8 | 1.4 | 0.2 | 0.0 | 0.0 | 0.0 | - | - | - | - |
| Fracture treatment | 0.0 | 0.0 | 4.4 | 3.1 | 1.3 | 1.0 | - | - | - | - | - | - |
| Proximal humerus | 0.0 | 0.0 | 7.5 | 7.1 | 2.5 | 0.0 | - | - | - | - | - | - |
| Clavicle | 0.0 | 0.0 | 0.9 | 0.0 | 0.0 | 1.8 | - | - | - | - | - | - |
| Other treatment | 0.2 | 0.0 | 5.5 | 6.7 | 2.1 | 4.1 | 1.0 | 0.0 | - | - | - | - |
| **Arthroscopic Surgery** | | | | | | | | | | | | |
| Rotator cuff repair | 0.0 | 0.0 | 0.9 | 0.8 | 0.2 | 0.2 | 0.2 | 0.0 | 3.3 | 3.2 | 5.7 | 5.0 |
| Capsulorrhaphy | 0.0 | 0.0 | 0.2 | 0.0 | 0.1 | 0.0 | - | - | - | - | - | - |
| Biceps tenodesis | 0.0 | 0.0 | 0.0 | 2.0 | 0.4 | 0.0 | 0.0 | 0.0 | - | - | - | - |
| SLAP repair | 0.0 | 0.0 | 0.5 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | - | - | - | - |
| Subacromial decompression | 0.0 | 0.0 | 0.6 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | - | - | - | - |
| Debridement | 0.0 | 0.0 | 1.4 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | 3.2 | 3.4 | 5.7 | 5.0 |
| Other treatment | 0.0 | 0.0 | 2.4 | 7.8 | 0.6 | 6.0 | 0.0 | 0.0 | - | - | - | - |

SLAP = superior labrum from anterior to posterior

Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Adult patients are aged 18 or older. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **In-Hospital Mortality, %**: rate of patient mortality prior to discharge from the hospital encounter during which surgery occurred
- **30-Day Readmission Rate, %:** rate of readmission as an inpatient for any reason to a Cleveland Clinic hospital within 30 days of discharge
- **30-Day Reoperation Rate, %:** rate of reoperation on the same joint within 30 days of discharge
- **90-Day Infection Rate, %:** rate of infection within 90 days of surgery
- **Preop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to arm problems prior to surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)
- **90-Day Postop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to arm problems 90 days after surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)

## Adult Hand and Upper Extremity Surgery, 2009 – 2016

| Procedure | Yearly Volume | | Average Age, Years | | Males/ Females, % | | Length of Stay, Days | | Discharged Home, % | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 |
| **Open Surgery** | **3774** | **4223** | | | | | | | | |
| Total elbow arthroplasty | 18 | 17 | 63.2 | 73.1 | 22/78 | 0/100 | - | - | - | - |
| Ulnar nerve neuroplasty at elbow | 98 | 91 | 52.6 | 52.5 | 56/44 | 63/37 | - | - | 99 | 100 |
| Elbow tenotomy | 77 | 49 | 48.3 | 48.2 | 48/52 | 57/43 | - | - | 100 | 100 |
| Distal bicep repair | 58 | 85 | 48.2 | 49.7 | 96/4 | 95/5 | - | - | 99 | 99 |
| Carpal tunnel release | 1223 | 1438 | 59.2 | 59.4 | 38/62 | 39/61 | - | - | 100 | 100 |
| Without distal radial fracture | 1197 | 1404 | 59.3 | 59.6 | 38/62 | 39/61 | - | - | 100 | 100 |
| With distal radial fracture | 26 | 34 | 55.3 | 52.3 | 25/75 | 15/85 | - | - | 98 | 100 |
| Wrist arthrodesis | 41 | 54 | 54.0 | 57.2 | 62/38 | 63/37 | - | - | 98 | 98 |
| Hand arthroplasty | 163 | 215 | 61.2 | 61.4 | 22/78 | 24/76 | - | - | 100 | 100 |
| Palmar fasciectomy | 31 | 40 | 63.3 | 64.1 | 76/24 | 70/30 | - | - | 100 | 100 |
| De Quervain's release | 76 | 103 | 52.1 | 52.7 | 18/82 | 16/84 | - | - | 100 | 100 |
| Trigger finger release | 385 | 519 | 60.9 | 61.5 | 37/63 | 38/62 | - | - | 100 | 100 |
| Finger arthrodesis | 62 | 76 | 56.4 | 59.1 | 33/67 | 34/66 | - | - | 100 | 99 |
| Finger amputation | 39 | 42 | 55.8 | 58.5 | 68/32 | 81/19 | - | - | 93 | 86 |
| Fracture treatment | 519 | 562 | 49.6 | 51.8 | 45/55 | 44/56 | 4.3 | 5.4 | 97 | 95 |
| Humeral shaft | 39 | 47 | 59.0 | 62.9 | 34/66 | 38/62 | 5.6 | 5.9 | 79 | 74 |
| Distal humerus | 23 | 32 | 57.3 | 60.7 | 38/62 | 22/78 | - | - | 91 | 87 |
| Radial head | 9 | 7 | 47.5 | 59.2 | 42/58 | 57/43 | - | - | - | - |
| Proximal ulna | 25 | 32 | 57.6 | 58.6 | 41/59 | 44/56 | - | - | 96 | 85 |
| Radial or ulnar shaft | 31 | 42 | 49.1 | 46.2 | 49/51 | 55/45 | - | - | 94 | 97 |
| Distal radius | 187 | 225 | 57.5 | 56.6 | 24/76 | 24/76 | - | - | 98 | 99 |
| Scaphoid | 56 | 40 | 39.6 | 37.4 | 62/38 | 65/35 | - | - | 99 | 92 |
| Hand or finger | 149 | 137 | 38.6 | 42.1 | 69/31 | 72/28 | - | - | 100 | 99 |
| Mass excision | 348 | 340 | 52.3 | 52.6 | 37/63 | 35/65 | - | - | 100 | 100 |
| Other treatment | 636 | 592 | 50.2 | 52.6 | 57/43 | 53/47 | 5.7 | 5.9 | 97 | 95 |
| **Arthroscopic Surgery** | **41** | **19** | | | | | | | | |
| Elbow treatment | 24 | 14 | 41.8 | 43.9 | 81/19 | 79/21 | - | - | 100 | 100 |
| Wrist treatment | 17 | 5 | 41.5 | 35.0 | 48/52 | 20/80 | - | - | 100 | 100 |

Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Adult patients are aged 18 or older. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **Yearly Volume:** number of surgeries performed per year
- **Average Age, Years:** average patient age
- **Males/Females, %:** males-to-females ratio
- **Length of Stay, Days:** average length of stay in days for inpatient surgeries
- **Discharged Home, %:** percentage of patients who were discharged home or to home care

| Procedure | In-Hospital Mortality, % | | 30-Day Readmission Rate, % | | 30-Day Reoperation Rate, % | | 90-Day Infection Rate, % | | Preop Function | | 90-Day Postop Function | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 |
| **Open Surgery** | | | | | | | | | | | | |
| Total elbow arthroplasty | - | - | - | - | - | - | - | - | - | - | - | - |
| Ulnar nerve neuroplasty at elbow | 0.0 | 0.0 | 0.5 | 2.2 | 0.1 | 0.0 | - | - | - | - | - | - |
| Elbow tenotomy | 0.0 | 0.0 | 0.2 | 0.0 | 0.2 | 0.0 | - | - | - | - | - | - |
| Distal bicep repair | 0.0 | 0.0 | 0.0 | 2.4 | 1.0 | 1.2 | - | - | - | - | - | - |
| Carpal tunnel release | 0.0 | 0.0 | 0.6 | 1.1 | 0.3 | 0.1 | - | - | 4.5 | 4.8 | 6.8 | 6.9 |
| Without distal radial fracture | 0.0 | 0.0 | 0.6 | 1.1 | 0.3 | 0.1 | - | - | 4.6 | 4.8 | 6.8 | 6.9 |
| With distal radial fracture | 0.0 | 0.0 | 0.6 | 0.0 | 0.0 | 0.0 | - | - | - | - | - | - |
| Wrist arthrodesis | 0.0 | 0.0 | 0.4 | 1.9 | 1.8 | 0.0 | - | - | - | - | - | - |
| Hand arthroplasty | 0.0 | 0.0 | 0.6 | 0.9 | 0.1 | 0.0 | - | - | 4.2 | 4.6 | 6.3 | 5.5 |
| Palmar fasciectomy | 0.0 | 0.0 | 0.9 | 0.0 | 0.0 | 0.0 | - | - | - | - | - | - |
| De Quervain's release | 0.0 | 0.0 | 1.0 | 1.0 | 0.0 | 0.0 | - | - | - | - | - | - |
| Trigger finger release | 0.0 | 0.0 | 0.6 | 1.4 | 0.4 | 0.6 | - | - | - | - | - | - |
| Finger arthrodesis | 0.0 | 0.0 | 1.2 | 1.3 | 0.2 | 3.9 | - | - | - | - | - | - |
| Finger amputation | 0.0 | 0.0 | 6.5 | 7.9 | 1.5 | 7.1 | - | - | - | - | - | - |
| Fracture treatment | 0.0 | 0.0 | 1.7 | 3.1 | 1.5 | 0.7 | - | - | 3.3 | 2.5 | 6.7 | 6.7 |
| Humeral shaft | 0.4 | 0.0 | 6.5 | 10.9 | 1.5 | 0.0 | - | - | - | - | - | - |
| Distal humerus | 0.0 | 0.0 | 2.7 | 3.3 | 2.5 | 0.0 | - | - | - | - | - | - |
| Radial head | - | - | - | - | - | - | - | - | - | - | - | - |
| Proximal ulna | 0.0 | 0.0 | 3.9 | 10.7 | 3.4 | 6.3 | - | - | - | - | - | - |
| Radial or ulnar shaft | 0.0 | 0.0 | 1.5 | 0.0 | 2.8 | 2.4 | - | - | - | - | - | - |
| Distal radius | 0.0 | 0.0 | 1.7 | 2.3 | 1.5 | 0.0 | - | - | - | - | - | - |
| Scaphoid | 0.0 | 0.0 | 0.5 | 2.6 | 0.5 | 0.0 | - | - | - | - | - | - |
| Hand or finger | 0.0 | 0.0 | 0.6 | 0.7 | 1.1 | 0.7 | - | - | - | - | - | - |
| Mass excision | 0.0 | 0.0 | 0.7 | 1.5 | 0.7 | 0.0 | - | - | - | - | - | - |
| Other treatment | 0.1 | 0.5 | 2.4 | 3.3 | 1.6 | 1.4 | - | - | 4.0 | 3.4 | 5.9 | 5.4 |
| **Arthroscopic Surgery** | | | | | | | | | | | | |
| Elbow treatment | - | - | - | - | - | - | - | - | - | - | - | - |
| Wrist treatment | - | - | - | - | - | - | - | - | - | - | - | - |

Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Adult patients are aged 18 or older. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **In-Hospital Mortality, %:** rate of patient mortality prior to discharge from the hospital encounter during which surgery occurred
- **30-Day Readmission Rate, %:** rate of readmission as an inpatient for any reason to a Cleveland Clinic hospital within 30 days of discharge
- **30-Day Reoperation Rate, %:** rate of reoperation on the same joint within 30 days of discharge
- **90-Day Infection Rate, %:** rate of infection within 90 days of surgery
- **Preop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to arm problems prior to surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)
- **90-Day Postop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to arm problems 90 days after surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)

## Adult Hip Surgery, 2009 – 2016

| Procedure | Yearly Volume | | Average Age, Years | | Males/ Females, % | | Length of Stay, Days | | Discharged Home, % | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 |
| **Open Surgery** | **2911** | **3801** | | | | | | | | |
| Hip resurfacing | 355 | 318 | 53.5 | 53.3 | 75/25 | 98/2 | 2.9 | 2.1 | 94 | 97 |
| Total hip arthroplasty | 1538 | 2275 | 63.2 | 64.1 | 45/55 | 44/56 | 3.2 | 2.2 | 66 | 84 |
| Osteoarthritis | 1280 | 1909 | 64.3 | 65.3 | 45/55 | 44/56 | 3.0 | 2.0 | 67 | 86 |
| Rheumatoid arthritis | 39 | 24 | 63.3 | 63.8 | 22/78 | 25/75 | 3.5 | 2.6 | 54 | 75 |
| Avascular necrosis | 169 | 162 | 54.4 | 53.8 | 57/43 | 54/46 | 3.4 | 2.4 | 67 | 76 |
| Other reasons (eg, fracture) | 50 | 180 | 63.2 | 60.7 | 36/64 | 29/71 | 5.6 | 4.1 | 48 | 73 |
| Conversion to total hip arthroplasty | 77 | 21 | 62.8 | 66.2 | 49/51 | 57/43 | 4.4 | 4.8 | 62 | 56 |
| Hemiarthroplasty | 74 | 97 | 78.5 | 80.4 | 36/64 | 39/61 | 7.9 | 6.4 | 11 | 7 |
| Revision of total hip arthroplasty | 310 | 435 | 65.1 | 65.7 | 48/52 | 48/52 | 5.0 | 5.7 | 53 | 59 |
| Infection | 62 | 175 | 64.1 | 63.5 | 56/44 | 56/44 | 7.4 | 7.7 | 44 | 52 |
| Other reasons | 248 | 260 | 65.4 | 67.3 | 46/54 | 42/58 | 4.4 | 4.3 | 56 | 63 |
| Treatment of hip or pelvis fracture | 296 | 434 | 74.9 | 77.0 | 34/66 | 30/70 | 6.4 | 5.9 | 22 | 18 |
| Other treatment | 261 | 221 | 58.9 | 61.2 | 45/55 | 38/62 | 8.9 | 10.9 | 64 | 69 |
| **Arthroscopic Surgery** | **171** | **226** | | | | | | | | |
| Treatment of labral tear | 156 | 218 | 34.7 | 35.0 | 31/69 | 29/71 | - | - | 100 | 100 |
| Without osteoarthritis | 142 | 215 | 33.7 | 34.8 | 31/69 | 29/71 | - | - | 100 | 100 |
| With osteoarthritis | 14 | 3 | 45.0 | 48.3 | 39/61 | 33/67 | - | - | - | - |
| Other treatment | 15 | 8 | 37.7 | 39.4 | 41/59 | 63/37 | - | - | - | - |

Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Adult patients are aged 18 or older. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **Yearly Volume:** number of surgeries performed per year
- **Average Age, Years:** average patient age
- **Males/Females, %:** males-to-females ratio
- **Length of Stay, Days:** average length of stay in days for inpatient surgeries
- **Discharged Home, %:** percentage of patients who were discharged home or to home care

| Procedure | In-Hospital Mortality, % | | 30-Day Readmission Rate, % | | 30-Day Reoperation Rate, % | | 90-Day Infection Rate, % | | Preop Function | | 90-Day Postop Function | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 |
| **Open Surgery** | | | | | | | | | | | | |
| Hip resurfacing | 0.0 | 0.0 | 1.5 | 1.3 | 0.1 | 0.3 | 0.4 | 0.0 | - | - | - | - |
| Total hip arthroplasty | 0.0 | 0.0 | 3.5 | 3.0 | 1.0 | 0.5 | 1.0 | 0.7 | 2.7 | 2.5 | 7.0 | 6.8 |
| Osteoarthritis | 0.0 | 0.0 | 3.1 | 2.5 | 0.8 | 0.5 | 0.9 | 0.8 | 2.8 | 2.7 | 7.2 | 7.1 |
| Rheumatoid arthritis | 0.4 | 0.0 | 3.3 | 4.2 | 0.7 | 4.2 | 1.1 | 5.6 | - | - | - | - |
| Avascular necrosis | 0.0 | 0.0 | 4.9 | 6.3 | 1.4 | 0.6 | 1.6 | 0.0 | - | - | - | - |
| Other reasons (eg, fracture) | 0.6 | 0.0 | 9.6 | 4.5 | 2.8 | 0.6 | 1.6 | 0.0 | - | - | - | - |
| Conversion to total hip arthroplasty | 0.2 | 0.0 | 9.5 | 25.0 | 2.4 | 4.8 | - | - | - | - | - | - |
| Hemiarthroplasty | 3.2 | 4.3 | 19.7 | 16.8 | 1.6 | 1.0 | - | - | - | - | - | - |
| Revision of total hip arthroplasty | 0.3 | 0.2 | 9.2 | 10.9 | 3.8 | 3.5 | 1.5 | 3.3 | 3.0 | 2.6 | 5.1 | 3.9 |
| Infection | 0.2 | 0.6 | 14.0 | 14.9 | 5.1 | 4.2 | 0.7 | 2.8 | 2.5 | 2.3 | 4.0 | 4.0 |
| Other reasons | 0.3 | 0.0 | 8.0 | 8.2 | 3.5 | 3.1 | 1.7 | 3.6 | 3.1 | 2.8 | 5.4 | 3.7 |
| Treatment of hip or pelvis fracture | 1.6 | 0.8 | 12.3 | 11.3 | 1.4 | 1.2 | - | - | - | - | - | - |
| Other treatment | 1.5 | 0.5 | 10.9 | 15.4 | 4.7 | 5.0 | - | - | - | - | - | - |
| **Arthroscopic Surgery** | | | | | | | | | | | | |
| Treatment of labral tear | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | - | - | 3.6 | 3.6 | 6.3 | 5.6 |
| Without osteoarthritis | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | - | - | 3.6 | 3.4 | 6.3 | 5.6 |
| With osteoarthritis | - | - | - | - | - | - | - | - | - | - | - | - |
| Other treatment | - | - | - | - | - | - | - | - | - | - | - | - |

Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Adult patients are aged 18 or older. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **In-Hospital Mortality, %:** rate of patient mortality prior to discharge from the hospital encounter during which surgery occurred
- **30-Day Readmission Rate, %:** rate of readmission as an inpatient for any reason to a Cleveland Clinic hospital within 30 days of discharge
- **30-Day Reoperation Rate, %:** rate of reoperation on the same joint within 30 days of discharge
- **90-Day Infection Rate, %:** rate of infection within 90 days of surgery
- **Preop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to leg problems prior to surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)
- **90-Day Postop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to leg problems 90 days after surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)

## Adult Knee Surgery, 2009 – 2016

| Procedure | Yearly Volume | | Average Age, Years | | Males/ Females, % | | Length of Stay, Days | | Discharged Home, % | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 |
| **Open Surgery** | **3854** | **4350** | | | | | | | | |
| Unilateral total knee arthroplasty | 2148 | 2695 | 65.3 | 66.1 | 38/62 | 40/60 | 3.3 | 2.2 | 59 | 86 |
| Osteoarthritis | 2025 | 2614 | 65.5 | 66.3 | 38/62 | 40/60 | 3.2 | 2.1 | 59 | 86 |
| Rheumatoid arthritis | 79 | 19 | 64.0 | 62.2 | 22/78 | 16/84 | - | - | - | - |
| Avascular necrosis | 17 | 10 | 57.9 | 60.4 | 20/80 | 10/90 | - | - | - | - |
| Other reasons | 27 | 52 | 62.0 | 59.5 | 51/49 | 63/37 | 5.9 | 4.0 | 64 | 78 |
| Bilateral total knee arthroplasty | 150 | 138 | 61.8 | 61.7 | 42/58 | 49/51 | 3.8 | 3.0 | 13 | 54 |
| Partial knee arthroplasty | 368 | 336 | 63.3 | 64.4 | 46/54 | 49/51 | 2.3 | 2.1 | 89 | 97 |
| Revision of total knee arthroplasty | 368 | 457 | 64.1 | 64.9 | 43/57 | 44/56 | 4.4 | 4.4 | 60 | 69 |
| Infection | 90 | 162 | 64.5 | 64.8 | 54/46 | 49/51 | 6.1 | 6.7 | 53 | 52 |
| Other reasons | 278 | 295 | 64.0 | 65.0 | 40/60 | 42/58 | 3.8 | 3.2 | 62 | 78 |
| Treatment of periarticular knee fracture | 121 | 154 | 61.6 | 60.2 | 36/64 | 38/62 | 6.7 | 6.3 | 50 | 50 |
| Other treatment | 699 | 570 | 53.5 | 51.2 | 53/47 | 56/44 | 7.6 | 7.7 | 78 | 87 |
| **Arthroscopic Surgery** | **2981** | **2355** | | | | | | | | |
| ACL reconstruction | 442 | 401 | 31.8 | 31.9 | 62/38 | 57/43 | - | - | 100 | 100 |
| Meniscectomy | 1837 | 1560 | 51.8 | 52.9 | 54/46 | 56/44 | - | - | 100 | 100 |
| Meniscus injury without osteoarthritis | 783 | 869 | 48.0 | 50.3 | 59/41 | 59/41 | - | - | 100 | 100 |
| Meniscus injury with osteoarthritis | 1029 | 561 | 54.8 | 56.7 | 51/49 | 51/49 | - | - | 100 | 100 |
| Other reasons | 25 | 130 | 49.2 | 53.2 | 45/55 | 57/43 | - | - | 99 | 100 |
| Meniscus repair | 34 | 44 | 33.8 | 36.3 | 63/37 | 57/43 | - | - | 100 | 100 |
| Chondroplasty | 243 | 154 | 43.7 | 42.5 | 44/56 | 44/56 | - | - | 99 | 99 |
| Other treatment | 425 | 196 | 50.2 | 46.3 | 46/54 | 48/52 | - | - | 99 | 96 |

ACL = anterior cruciate ligament

Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Adult patients are aged 18 or older. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **Yearly Volume:** number of surgeries performed per year
- **Average Age, Years:** average patient age
- **Males/Females, %:** males-to-females ratio
- **Length of Stay, Days:** average length of stay in days for inpatient surgeries
- **Discharged Home, %:** percentage of patients who were discharged home or to home care

| Procedure | In-Hospital Mortality, % | | 30-Day Readmission Rate, % | | 30-Day Reoperation Rate, % | | 90-Day Infection Rate, % | | Preop Function | | 90-Day Postop Function | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 |
| **Open Surgery** | | | | | | | | | | | | |
| Unilateral total knee arthroplasty | 0.0 | 0.0 | 4.1 | 2.9 | 0.8 | 0.6 | 1.4 | 0.5 | 3.1 | 3.2 | 6.4 | 6.3 |
| Osteoarthritis | 0.0 | 0.0 | 3.9 | 2.9 | 0.8 | 0.6 | 1.3 | 0.5 | 3.1 | 3.2 | 6.5 | 6.4 |
| Rheumatoid arthritis | - | - | - | - | - | - | - | - | - | - | - | - |
| Avascular necrosis | - | - | - | - | - | - | - | - | - | - | - | - |
| Other reasons | 0.6 | 0.0 | 12.0 | 4.0 | 1.1 | 0.0 | 3.6 | 0.0 | - | - | - | - |
| Bilateral total knee arthroplasty | 0.0 | 0.7 | 3.7 | 2.9 | 1.1 | 0.0 | 0.4 | 1.5 | - | - | - | - |
| Partial knee arthroplasty | 0.0 | 0.0 | 2.5 | 1.5 | 0.5 | 0.9 | 0.4 | 2.2 | - | - | - | - |
| Revision of total knee arthroplasty | 0.2 | 0.4 | 8.1 | 7.1 | 3.0 | 2.0 | 2.6 | 1.9 | 2.7 | 2.0 | 4.8 | 3.9 |
| Infection | 0.2 | 0.6 | 12.8 | 10.1 | 5.4 | 2.6 | 2.0 | 6.1 | 2.5 | 1.6 | 3.7 | 2.5 |
| Other reasons | 0.3 | 0.3 | 6.5 | 5.5 | 2.2 | 1.7 | 2.7 | 0.5 | 2.8 | 2.3 | 5.2 | 5.0 |
| Treatment of periarticular knee fracture | 0.4 | 0.0 | 9.7 | 10.7 | 2.4 | 2.6 | - | - | - | - | - | - |
| Other treatment | 0.4 | 0.4 | 6.9 | 5.0 | 2.3 | 1.2 | 0.7 | 0.0 | 3.5 | 3.0 | 4.6 | 4.3 |
| **Arthroscopic Surgery** | | | | | | | | | | | | |
| ACL reconstruction | 0.0 | 0.0 | 1.0 | 0.5 | 0.5 | 0.2 | 0.5 | 0.0 | 4.3 | 4.1 | 6.8 | 6.6 |
| Meniscectomy | 0.0 | 0.0 | 0.8 | 1.0 | 0.2 | 0.4 | 0.2 | 0.2 | 4.0 | 3.5 | 5.9 | 5.8 |
| Meniscus injury without osteoarthritis | 0.0 | 0.0 | 0.8 | 1.0 | 0.2 | 0.1 | 0.0 | 0.0 | 4.2 | 3.1 | 6.2 | 6.1 |
| Meniscus injury with osteoarthritis | 0.0 | 0.0 | 0.7 | 0.9 | 0.2 | 0.7 | 0.3 | 0.5 | 3.9 | 3.9 | 5.8 | 5.8 |
| Other reasons | 0.0 | 0.0 | 2.0 | 1.6 | 0.6 | 0.8 | 0.0 | 0.0 | - | - | - | - |
| Meniscus repair | 0.0 | 0.0 | 0.4 | 0.0 | 0.4 | 0.0 | - | - | - | - | - | - |
| Chondroplasty | 0.1 | 0.0 | 1.1 | 0.0 | 0.8 | 0.0 | 0.1 | 0.0 | - | - | - | - |
| Other treatment | 0.1 | 0.5 | 6.9 | 4.1 | 14.6 | 3.1 | 0.2 | 0.0 | - | - | - | - |

ACL = anterior cruciate ligament

Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Adult patients are aged 18 or older. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **In-Hospital Mortality, %:** rate of patient mortality prior to discharge from the hospital encounter during which surgery occurred
- **30-Day Readmission Rate, %:** rate of readmission as an inpatient for any reason to a Cleveland Clinic hospital within 30 days of discharge
- **30-Day Reoperation Rate, %:** rate of reoperation on the same joint within 30 days of discharge
- **90-Day Infection Rate, %:** rate of infection within 90 days of surgery
- **Preop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to leg problems prior to surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)
- **90-Day Postop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to leg problems 90 days after surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)

## Adult Foot and Ankle Surgery, 2009 – 2016

| Procedure | Yearly Volume | | Average Age, Years | | Males/ Females, % | | Length of Stay, Days | | Discharged Home, % | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 |
| **Open Surgery** | **2092** | **2251** | | | | | | | | |
| Total ankle arthroplasty | 12 | 13 | 66.4 | 69.3 | 53/47 | 46/54 | - | - | - | - |
| Ankle arthrodesis | 54 | 37 | 57.2 | 60.9 | 54/46 | 57/43 | - | - | 85 | 89 |
| Osteoarthritis | 25 | 15 | 59.4 | 60.3 | 51/49 | 53/47 | - | - | - | - |
| Traumatic injury | 13 | 4 | 54.3 | 60.8 | 57/43 | 75/25 | - | - | - | - |
| Other reasons | 16 | 18 | 55.7 | 61.3 | 60/40 | 56/44 | - | - | - | - |
| Achilles tendon treatment | 108 | 122 | 45.8 | 46.3 | 69/31 | 67/33 | - | - | 99 | 98 |
| Acute rupture repair | 82 | 89 | 43.7 | 43.5 | 77/23 | 76/24 | - | - | 100 | 99 |
| Chronic reconstruction | 26 | 33 | 52.8 | 53.8 | 41/59 | 42/58 | - | - | 96 | 97 |
| Foot arthrodesis | 114 | 127 | 54.4 | 54.4 | 38/62 | 30/70 | - | - | 92 | 90 |
| Osteoarthritis | 56 | 51 | 56.7 | 56.4 | 37/63 | 20/80 | - | - | 93 | 90 |
| Deformity | 21 | 23 | 53.7 | 55.4 | 33/67 | 35/65 | - | - | 86 | 90 |
| Other reasons | 37 | 53 | 49.8 | 51.8 | 42/58 | 38/62 | - | - | 96 | 91 |
| Flat foot or cavus foot correction | 159 | 184 | 53.6 | 56.1 | 18/82 | 23/77 | - | - | 99 | 98 |
| Big toe arthrodesis | 170 | 139 | 59.5 | 61.7 | 21/79 | 27/73 | - | - | 99 | 99 |
| Osteoarthritis | 52 | 33 | 60.4 | 63.2 | 21/79 | 30/70 | - | - | 98 | 97 |
| Deformity | 97 | 97 | 59.2 | 61.5 | 22/78 | 28/72 | - | - | 100 | 100 |
| Other reasons | 21 | 9 | 54.2 | 59.4 | 41/59 | 0/100 | - | - | - | - |
| Cheilectomy | 67 | 84 | 53.2 | 54.4 | 34/66 | 31/69 | - | - | 100 | 100 |
| Bunion correction | 152 | 149 | 50.1 | 49.5 | 10/90 | 9/91 | - | - | 100 | 100 |
| Hammertoe correction | 79 | 72 | 60.1 | 60.4 | 21/79 | 28/72 | - | - | 100 | 100 |
| Bunion and hammertoe correction | 40 | 34 | 58.8 | 59.5 | 9/91 | 18/82 | - | - | 100 | 100 |
| Fracture treatment | 385 | 455 | 47.5 | 51.1 | 46/54 | 43/57 | 4.4 | 4.3 | 86 | 81 |
| Tibia or fibula | 153 | 201 | 45.9 | 50.1 | 55/45 | 50/50 | 4.4 | 4.3 | 86 | 79 |
| Ankle | 167 | 186 | 50.8 | 54.3 | 37/63 | 32/68 | 4.5 | 4.1 | 82 | 78 |
| Foot or toes | 65 | 68 | 42.6 | 45.0 | 49/51 | 51/49 | - | - | 97 | 95 |
| Amputation | 164 | 226 | 61.2 | 63.0 | 65/35 | 70/30 | 9.2 | 9.5 | 76 | 66 |
| Below knee | 33 | 34 | 55.6 | 55.2 | 64/36 | 68/32 | 10.6 | 9.7 | 40 | 44 |
| Foot | 56 | 91 | 61.5 | 65.0 | 70/30 | 77/23 | 9.4 | 11.2 | 74 | 56 |
| Toes | 75 | 101 | 63.4 | 63.8 | 63/37 | 63/37 | 7.3 | 7.2 | 92 | 83 |
| Excision of leg or ankle tumor | 58 | 29 | 48.4 | 46.6 | 42/58 | 38/62 | - | - | 99 | 100 |
| Excision of foot or toe tumor | 106 | 113 | 51.4 | 53.3 | 33/67 | 33/67 | - | - | 100 | 100 |
| Other treatment | 424 | 467 | 48.7 | 50.3 | 41/59 | 43/57 | 7.8 | 6.3 | 94 | 94 |
| **Arthroscopic Surgery** | **49** | **31** | | | | | | | | |
| Osteochondritis dissecans lesion repair | 15 | 16 | 39.2 | 36.9 | 50/50 | 38/62 | - | - | - | - |
| Other treatment | 34 | 15 | 40.6 | 50.3 | 43/57 | 60/40 | - | - | - | - |

Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Adult patients are aged 18 or older. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **Yearly Volume:** number of surgeries performed per year
- **Average Age, Years:** average patient age
- **Males/Females, %:** males-to-females ratio
- **Length of Stay, Days:** average length of stay in days for inpatient surgeries
- **Discharged Home, %:** percentage of patients who were discharged home or to home care

| Procedure | In-Hospital Mortality, % | | 30-Day Readmission Rate, % | | 30-Day Reoperation Rate, % | | 90-Day Infection Rate, % | | Preop Function | | 90-Day Postop Function | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 |
| **Open Surgery** | | | | | | | | | | | | |
| Total ankle arthroplasty | - | - | - | - | - | - | - | - | - | - | - | - |
| Ankle arthrodesis | 0.0 | 0.0 | 2.1 | 3.1 | 0.5 | 0.0 | - | - | - | - | - | - |
| Osteoarthritis | - | - | - | - | - | - | - | - | - | - | - | - |
| Traumatic injury | - | - | - | - | - | - | - | - | - | - | - | - |
| Other reasons | - | - | - | - | - | - | - | - | - | - | - | - |
| Achilles tendon treatment | 0.0 | 0.0 | 1.2 | 0.8 | 0.5 | 0.0 | - | - | - | - | - | - |
| Acute rupture repair | 0.0 | 0.0 | 1.3 | 1.1 | 0.7 | 0.0 | - | - | - | - | - | - |
| Chronic reconstruction | 0.0 | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 | - | - | - | - | - | - |
| Foot arthrodesis | 0.0 | 0.0 | 2.3 | 2.4 | 1.0 | 0.0 | - | - | - | - | - | - |
| Osteoarthritis | 0.0 | 0.0 | 1.6 | 2.0 | 1.8 | 0.0 | - | - | - | - | - | - |
| Deformity | 0.0 | 0.0 | 2.2 | 0.0 | 0.0 | 0.0 | - | - | - | - | - | - |
| Other reasons | 0.0 | 0.0 | 3.8 | 2.1 | 0.0 | 0.0 | - | - | - | - | - | - |
| Flat foot or cavus foot correction | 0.0 | 0.0 | 0.4 | 1.1 | 0.4 | 0.0 | - | - | - | - | - | - |
| Big toe arthrodesis | 0.0 | 0.0 | 1.1 | 1.4 | 0.2 | 0.0 | - | - | - | - | - | - |
| Osteoarthritis | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | - | - | - | - | - | - |
| Deformity | 0.0 | 0.0 | 1.5 | 2.1 | 0.3 | 0.0 | - | - | - | - | - | - |
| Other reasons | - | - | - | - | - | - | - | - | - | - | - | - |
| Cheilectomy | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 2.4 | - | - | - | - | - | - |
| Bunion correction | 0.0 | 0.0 | 0.8 | 1.3 | 0.5 | 0.0 | - | - | - | - | - | - |
| Hammertoe correction | 0.0 | 0.0 | 1.5 | 0.0 | 0.7 | 2.8 | - | - | - | - | - | - |
| Bunion and hammertoe correction | 0.0 | 0.0 | 1.1 | 0.0 | 1.4 | 0.0 | - | - | - | - | - | - |
| Fracture treatment | 0.0 | 0.5 | 5.2 | 3.8 | 3.4 | 2.0 | - | - | 3.2 | 2.1 | 5.4 | 3.7 |
| Tibia or fibula | 0.0 | 1.1 | 5.7 | 5.4 | 3.7 | 1.5 | - | - | - | - | - | - |
| Ankle | 0.1 | 0.0 | 5.8 | 2.9 | 4.0 | 2.7 | - | - | - | - | - | - |
| Foot or toes | 0.0 | 0.0 | 2.8 | 1.5 | 0.9 | 1.5 | - | - | - | - | - | - |
| Amputation | 0.1 | 0.5 | 9.4 | 14.0 | 2.1 | 3.1 | - | - | - | - | - | - |
| Below knee | 0.5 | 2.9 | 14.0 | 5.9 | 2.1 | 0.0 | - | - | - | - | - | - |
| Foot | 0.0 | 0.0 | 13.2 | 20.7 | 2.8 | 3.3 | - | - | - | - | - | - |
| Toes | 0.0 | 0.0 | 4.8 | 11.2 | 1.5 | 4.0 | - | - | - | - | - | - |
| Excision of leg or ankle tumor | 0.0 | 0.0 | 3.3 | 6.9 | 0.5 | 10.3 | - | - | - | - | - | - |
| Excision of foot or toe tumor | 0.0 | 0.0 | 1.4 | 0.0 | 0.4 | 0.0 | - | - | - | - | - | - |
| Other treatment | 0.1 | 0.5 | 3.1 | 2.0 | 2.2 | 1.5 | - | - | - | - | - | - |
| **Arthroscopic Surgery** | | | | | | | | | | | | |
| Osteochondritis dissecans lesion repair | - | - | - | - | - | - | - | - | - | - | - | - |
| Other treatment | - | - | - | - | - | - | - | - | - | - | - | - |

Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Adult patients are aged 18 or older. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **In-Hospital Mortality, %**: rate of patient mortality prior to discharge from the hospital encounter during which surgery occurred
- **30-Day Readmission Rate, %:** rate of readmission as an inpatient for any reason to a Cleveland Clinic hospital within 30 days of discharge
- **30-Day Reoperation Rate, %:** rate of reoperation on the same joint within 30 days of discharge
- **90-Day Infection Rate, %:** rate of infection within 90 days of surgery
- **Preop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to leg problems prior to surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)
- **90-Day Postop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to leg problems 90 days after surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)

## Pediatric Shoulder and Hand/Upper Extremity Surgery, 2009 – 2016

| Procedure | Yearly Volume | | Average Age, Years | | Males/ Females, % | | Length of Stay, Days | | Discharged Home, % | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 |
| **Open Shoulder Surgery** | **34** | **38** | | | | | | | | |
| Capsulorrhaphy | 12 | 12 | 16.1 | 15.4 | 79/21 | 83/17 | - | - | - | - |
| Treatment of shoulder fracture | 14 | 21 | 14.9 | 14.6 | 85/15 | 90/10 | - | - | 100 | 100 |
| Other treatment | 8 | 5 | 12.7 | 12.8 | 56/44 | 80/20 | - | - | - | - |
| **Arthroscopic Shoulder Surgery** | **57** | **49** | | | | | | | | |
| Capsulorrhaphy | 30 | 19 | 16.1 | 15.8 | 75/25 | 79/21 | - | - | - | - |
| SLAP repair | 27 | 30 | 15.9 | 15.9 | 79/21 | 83/17 | - | - | 100 | 100 |
| **Open Hand/UE Surgery** | **381** | **348** | | | | | | | | |
| Trigger finger release | 13 | 7 | 3.7 | 3.6 | 46/54 | 71/29 | - | - | - | - |
| Fracture treatment | 236 | 232 | 10.1 | 10.5 | 65/35 | 63/37 | 0.9 | 1.0 | 100 | 100 |
| Humeral shaft | 65 | 52 | 6.6 | 7.1 | 50/50 | 56/44 | 0.8 | 0.8 | 100 | 100 |
| Distal humerus | 3 | 9 | 11.6 | 14.0 | 84/16 | 78/22 | - | - | - | - |
| Radial head | 5 | 7 | 9.4 | 7.7 | 42/58 | 29/71 | - | - | - | - |
| Proximal ulna | 5 | 3 | 11.1 | 15.3 | 63/37 | 33/67 | - | - | - | - |
| Radial or ulnar shaft | 44 | 45 | 9.0 | 9.2 | 66/34 | 58/42 | - | - | 100 | 100 |
| Distal radius | 48 | 44 | 11.0 | 11.0 | 72/28 | 64/36 | - | - | 100 | 100 |
| Scaphoid | 10 | 10 | 15.9 | 15.5 | 90/10 | 90/10 | - | - | - | - |
| Hand or finger | 56 | 62 | 13.1 | 12.6 | 74/26 | 69/31 | - | - | 100 | 100 |
| Mass excision | 24 | 29 | 12.5 | 13.4 | 41/59 | 45/55 | - | - | 100 | 100 |
| Other treatment | 108 | 80 | 8.4 | 9.4 | 62/38 | 78/22 | - | - | 100 | 100 |
| **Arthroscopic Hand/UE Surgery** | **4** | **5** | | | | | | | | |

SLAP = superior labrum from anterior to posterior, UE = upper extremity

Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Pediatric patients are younger than 18 years. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **Yearly Volume:** number of surgeries performed per year
- **Average Age, Years:** average patient age
- **Males/Females, %:** males-to-females ratio
- **Length of Stay, Days:** average length of stay in days for inpatient surgeries
- **Discharged Home, %:** percentage of patients who were discharged home or to home care

| Procedure | In-Hospital Mortality, % | | 30-Day Readmission Rate, % | | 30-Day Reoperation Rate, % | | 90-Day Infection Rate, % | | Preop Function | | 90-Day Postop Function | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 |
| **Open Shoulder Surgery** | | | | | | | | | | | | |
| Capsulorrhaphy | - | - | - | - | - | - | - | - | - | - | - | - |
| Treatment of shoulder fracture | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | - | - | - | - | - | - |
| Other treatment | - | - | - | - | - | - | - | - | - | - | - | - |
| **Arthroscopic Shoulder Surgery** | | | | | | | | | | | | |
| Capsulorrhaphy | - | - | - | - | - | - | - | - | - | - | - | - |
| SLAP repair | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | - | - | - | - | - | - |
| **Open Hand/UE Surgery** | | | | | | | | | | | | |
| Trigger finger release | - | - | - | - | - | - | - | - | - | - | - | - |
| Fracture treatment | 0.0 | 0.0 | 0.5 | 0.0 | 1.4 | 0.9 | - | - | - | - | - | - |
| Humeral shaft | 0.0 | 0.0 | - | - | - | - | - | - | - | - | - | - |
| Distal humerus | - | - | - | - | - | - | - | - | - | - | - | - |
| Radial head | - | - | - | - | - | - | - | - | - | - | - | - |
| Proximal ulna | - | - | - | - | - | - | - | - | - | - | - | - |
| Radial or ulnar shaft | 0.0 | 0.0 | 0.0 | 0.0 | 2.6 | 0.0 | - | - | - | - | - | - |
| Distal radius | 0.0 | 0.0 | 0.3 | 0.0 | 2.1 | 0.0 | - | - | - | - | - | - |
| Scaphoid | - | - | - | - | - | - | - | - | - | - | - | - |
| Hand or finger | 0.0 | 0.0 | 0.5 | 0.0 | 0.5 | 1.6 | - | - | - | - | - | - |
| Mass excision | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | - | - | - | - | - | - |
| Other treatment | 0.0 | 0.0 | 1.0 | 0.0 | 0.8 | 1.3 | - | - | - | - | - | - |
| **Arthroscopic Hand/UE Surgery** | | | | | | | | | | | | |

SLAP = superior labrum from anterior to posterior, UE = upper extremity

Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Pediatric patients are younger than 18 years. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **In-Hospital Mortality, %:** rate of patient mortality prior to discharge from the hospital encounter during which surgery occurred
- **30-Day Readmission Rate, %:** rate of readmission as an inpatient for any reason to a Cleveland Clinic hospital within 30 days of discharge
- **30-Day Reoperation Rate, %:** rate of reoperation on the same joint within 30 days of discharge
- **90-Day Infection Rate, %:** rate of infection within 90 days of surgery
- **Preop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to arm problems prior to surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)
- **90-Day Postop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to arm problems 90 days after surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)

## Pediatric Hip, Knee, and Foot/Ankle Surgery, 2009 – 2016

| Procedure | Yearly Volume | | Average Age, Years | | Males/ Females, % | | Length of Stay, Days | | Discharged Home, % | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 |
| **Open Hip Surgery** | **61** | **37** | | | | | | | | |
| Treatment of hip or pelvis fracture | 5 | 2 | 10.6 | 12.5 | 69/31 | 100/0 | - | - | - | - |
| Other treatment | 56 | 35 | 8.6 | 9.7 | 47/53 | 71/29 | 3.4 | 2.8 | 99 | 100 |
| **Arthroscopic Hip Surgery** | **35** | **32** | | | | | | | | |
| **Open Knee Surgery** | **128** | **116** | | | | | | | | |
| Treatment of periarticular knee fracture | 20 | 15 | 9.5 | 10.1 | 80/20 | 73/27 | - | - | - | - |
| Other treatment | 108 | 101 | 13.4 | 14.0 | 48/52 | 45/55 | 3.5 | 2.2 | 99 | 100 |
| **Arthroscopic Knee Surgery** | **308** | **273** | | | | | | | | |
| ACL reconstruction | 159 | 160 | 15.5 | 15.6 | 47/53 | 48/52 | - | - | 100 | 100 |
| Meniscectomy | 66 | 41 | 15.5 | 16.0 | 64/36 | 76/24 | - | - | 100 | 100 |
| Meniscus repair | 16 | 15 | 15.3 | 15.7 | 66/34 | 93/7 | - | - | - | - |
| Chondroplasty | 22 | 25 | 14.6 | 15.1 | 54/46 | 40/60 | - | - | 100 | 100 |
| Other treatment | 45 | 32 | 15.1 | 14.8 | 44/56 | 50/50 | - | - | 100 | 100 |
| **Open Foot/Ankle Surgery** | **254** | **242** | | | | | | | | |
| Flat foot or cavus foot correction | 21 | 14 | 12.8 | 14.2 | 54/46 | 57/43 | - | - | - | - |
| Fracture treatment | 65 | 61 | 13.6 | 13.6 | 71/29 | 64/36 | - | - | 100 | 98 |
| Tibia or fibula | 39 | 49 | 13.4 | 13.9 | 74/26 | 67/33 | - | - | 100 | 100 |
| Ankle | 10 | 3 | 14.2 | 15.7 | 63/37 | 67/33 | - | - | - | - |
| Foot or toes | 16 | 9 | 13.7 | 11.3 | 68/32 | 44/56 | - | - | - | - |
| Excision of leg or ankle tumor | 11 | 14 | 13.0 | 12.1 | 55/45 | 50/50 | - | - | - | - |
| Excision of foot or toe tumor | 9 | 4 | 12.4 | 12.5 | 53/47 | 25/75 | - | - | - | - |
| Other treatment | 148 | 149 | 10.8 | 12.1 | 49/51 | 42/58 | 2.9 | 2.4 | 100 | 100 |
| **Arthroscopic Foot/Ankle Surgery** | **5** | **3** | | | | | | | | |

ACL = anterior cruciate ligament

Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Pediatric patients are younger than 18 years. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **Yearly Volume:** number of surgeries performed per year
- **Average Age, Years:** average patient age
- **Males/Females, %:** males-to-females ratio
- **Length of Stay, Days:** average length of stay in days for inpatient surgeries
- **Discharged Home, %:** percentage of patients who were discharged home or to home care

| Procedure | In-Hospital Mortality, % | | 30-Day Readmission Rate, % | | 30-Day Reoperation Rate, % | | 90-Day Infection Rate, % | | Preop Function | | 90-Day Postop Function | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 | 2009-15 | 2016 |
| **Open Hip Surgery** | | | | | | | | | | | | |
| Treatment of hip or pelvis fracture | - | - | - | - | - | - | - | - | - | - | - | - |
| Other treatment | 0.0 | 0.0 | 3.4 | 11.8 | 3.6 | 2.9 | 4.8 | 0.0 | - | - | - | - |
| **Arthroscopic Hip Surgery** | | | | | | | | | | | | |
| **Open Knee Surgery** | | | | | | | | | | | | |
| Treatment of periarticular knee fracture | - | - | - | - | - | - | - | - | - | - | - | - |
| Other treatment | 0.0 | 0.0 | 2.0 | 1.0 | 1.1 | 2.0 | 0.8 | 0.0 | - | - | - | - |
| **Arthroscopic Knee Surgery** | | | | | | | | | | | | |
| ACL reconstruction | 0.0 | 0.0 | 0.6 | 0.6 | 0.4 | 0.6 | 0.3 | 0.0 | - | - | - | - |
| Meniscectomy | 0.0 | 0.0 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | - | - | - | - |
| Meniscus repair | - | - | - | - | - | - | - | - | - | - | - | - |
| Chondroplasty | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | - | - | - | - |
| Other treatment | 0.0 | 0.0 | 1.0 | 0.0 | 0.6 | 0.0 | 0.0 | 0.0 | - | - | - | - |
| **Open Foot/Ankle Surgery** | | | | | | | | | | | | |
| Flat foot or cavus foot correction | - | - | - | - | - | - | - | - | - | - | - | - |
| Fracture treatment | 0.0 | 0.0 | 0.5 | 0.0 | 0.4 | 0.0 | - | - | - | - | - | - |
| Tibia or fibula | 0.0 | 0.0 | 0.8 | 0.0 | 0.7 | 0.0 | - | - | - | - | - | - |
| Ankle | - | - | - | - | - | - | - | - | - | - | - | - |
| Foot or toes | - | - | - | - | - | - | - | - | - | - | - | - |
| Excision of leg or ankle tumor | - | - | - | - | - | - | - | - | - | - | - | - |
| Excision of foot or toe tumor | - | - | - | - | - | - | - | - | - | - | - | - |
| Other treatment | 0.0 | 0.0 | 1.2 | 0.7 | 0.8 | 0.0 | - | - | - | - | - | - |
| **Arthroscopic Foot/Ankle Surgery** | | | | | | | | | | | | |

ACL = anterior cruciate ligament

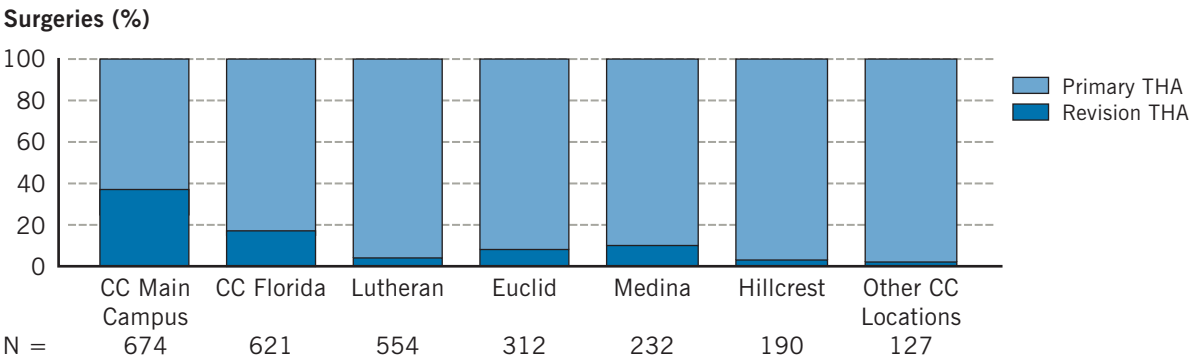
Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Pediatric patients are younger than 18 years. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **In-Hospital Mortality, %:** rate of patient mortality prior to discharge from the hospital encounter during which surgery occurred
- **30-Day Readmission Rate, %:** rate of readmission as an inpatient for any reason to a Cleveland Clinic hospital within 30 days of discharge
- **30-Day Reoperation Rate, %:** rate of reoperation on the same joint within 30 days of discharge
- **90-Day Infection Rate, %:** rate of infection within 90 days of surgery
- **Preop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to leg problems prior to surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)
- **90-Day Postop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to leg problems 90 days after surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)

## Percentage of Primary and Revision Total Hip Arthroplasties Performed at Cleveland Clinic Hospitals

2016

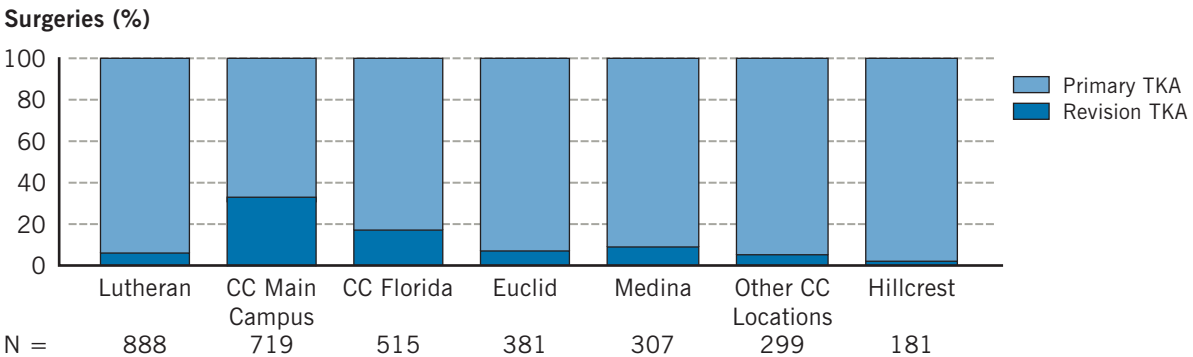



CC = Cleveland Clinic, THA = total hip arthroplasty

At Cleveland Clinic main campus and Cleveland Clinic Florida, 37% and 17%, respectively, of all total hip arthroplasty surgeries performed are revisions. Conversely, all other Cleveland Clinic hospitals individually perform < 10%. Approximately 58% of all total hip arthroplasty revision surgeries across Cleveland Clinic health system are performed at Cleveland Clinic main campus.

## Percentage of Primary and Revision Total Knee Arthroplasties Performed at Cleveland Clinic Hospitals

2016



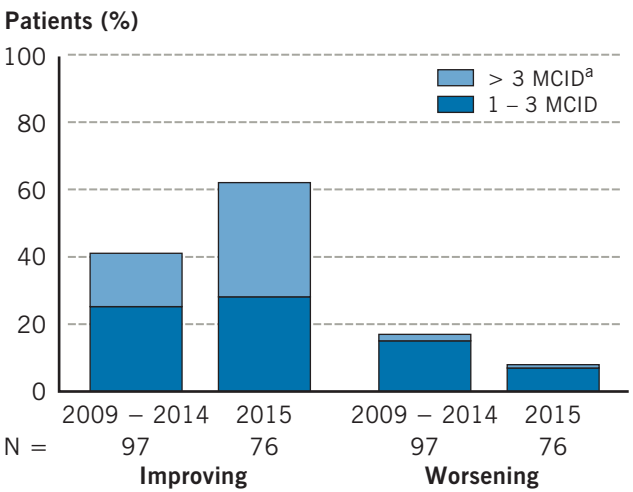

CC = Cleveland Clinic, TKA = total knee arthroplasty

At Cleveland Clinic main campus and Cleveland Clinic Florida, 33% and 17%, respectively, of all total knee arthroplasty surgeries performed are revisions. Conversely, all other Cleveland Clinic hospitals individually perform < 9%. Approximately 53% of all total knee arthroplasty revision surgeries across Cleveland Clinic health system are performed at Cleveland Clinic main campus.

## Shoulder Instability

### Shoulder-Related Pain 1 Year After Surgery

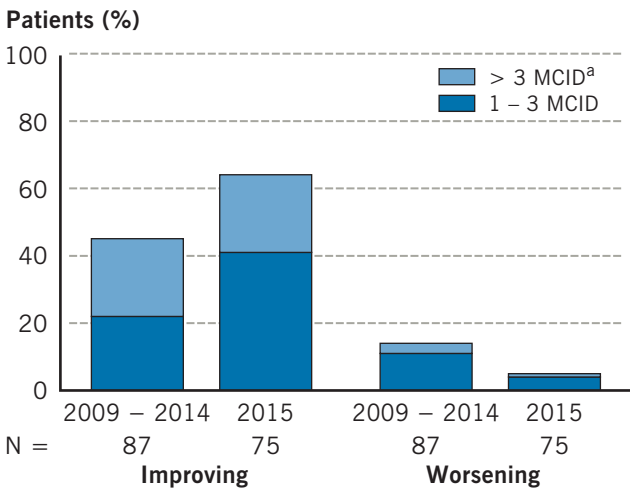
2009 – 2015




On average, 50% of patients reported a clinically important improvement in shoulder-related pain after 1 year, while 14% reported worsening (36% showed no detectable change in shoulder-related pain).

### Shoulder-Related Function 1 Year After Surgery

2009 – 2015



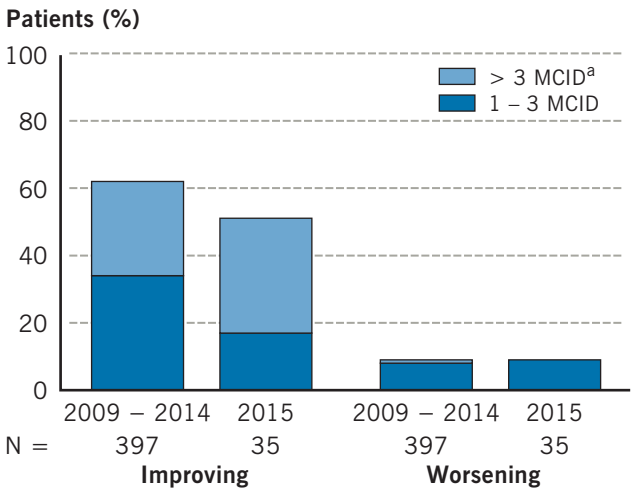

On average, 54% of patients reported a clinically important improvement in shoulder-related function after 1 year, while 10% reported worsening (36% showed no detectable change in shoulder-related function).

Shoulder-related pain and function are measured using a modified Penn Shoulder Score (PSS) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For shoulder-related pain, the MCID is 13.9 (N = 232) on a scale from 0 (extreme pain) to 100 (no pain). For shoulder-related function, the MCID is 13.4 (N = 219) on a scale from 0 (extreme limitations) to 100 (no limitations).

## Arm-Related Physical Function 1 Year After Surgery

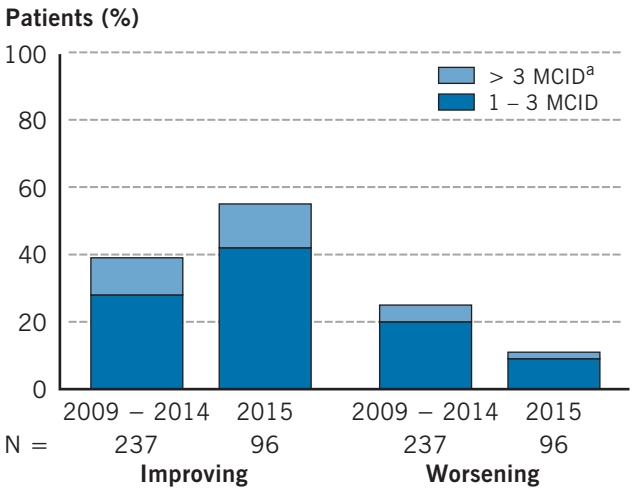
2009 – 2015




On average, 60% of patients reported a clinically important improvement in arm-related physical function after 1 year, while 9% reported worsening (31% showed no detectable change in arm-related physical function).

## Whole-Body Physical Function 1 Year After Surgery

2009 – 2015




On average, 43% of patients reported a clinically important improvement in whole-body physical function after 1 year, while 21% reported worsening (36% showed no detectable change in whole-body physical function).

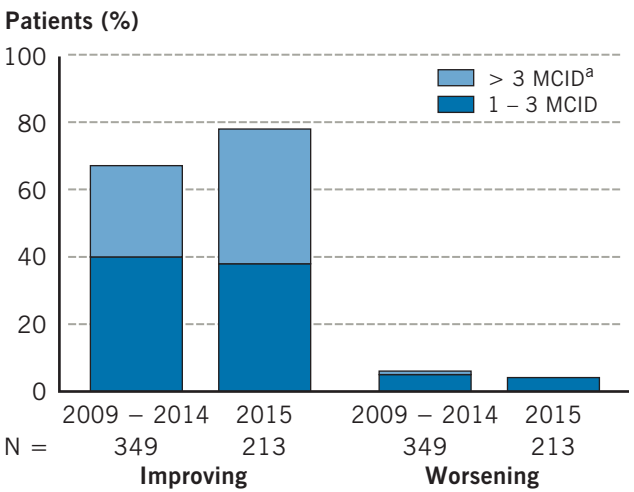
Arm-related physical function is measured using the Review of Musculoskeletal System (ROMS) questionnaire. Whole-body physical function is measured using the Veterans RAND 12 (VR-12) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For arm-related physical function, the MCID is 1.8 (N = 517) on a scale from 0 (extreme limitations) to 10 (no limitations). For whole-body physical function, the MCID is 6.2 (N = 433) on a norm-based scale where 50 represents the mean score of a nonpatient control group and every 10 units represents 1 SD from the mean.

## Rotator Cuff Repair

### Shoulder-Related Pain 1 Year After Surgery

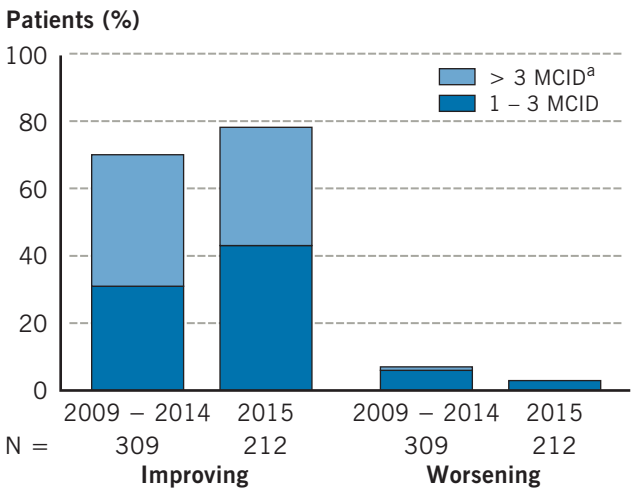
2009 – 2015




On average, 71% of patients reported a clinically important improvement in shoulder-related pain after 1 year, while 6% reported worsening (23% showed no detectable change in shoulder-related pain).

### Shoulder-Related Function 1 Year After Surgery

2009 – 2015



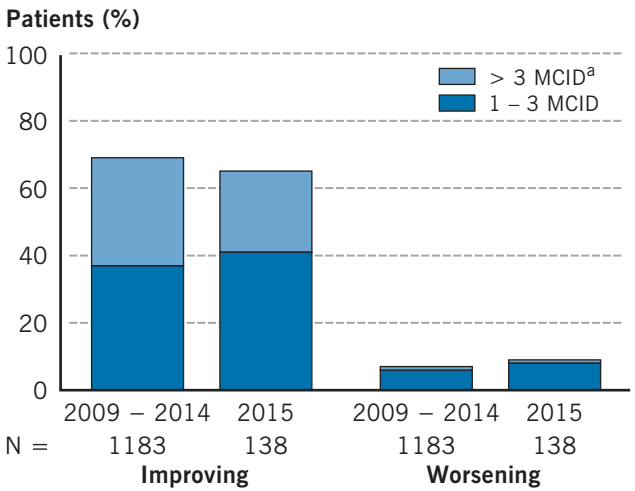

On average, 73% of patients reported a clinically important improvement in shoulder-related function after 1 year, while 6% reported worsening (21% showed no detectable change in shoulder-related function).

Shoulder-related pain and function are measured using a modified Penn Shoulder Score (PSS) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For shoulder-related pain, the MCID is 13.6 (N = 800) on a scale from 0 (extreme pain) to 100 (no pain). For shoulder-related function, the MCID is 13.9 (N = 760) on a scale from 0 (extreme limitations) to 100 (no limitations).

## Arm-Related Physical Function 1 Year After Surgery

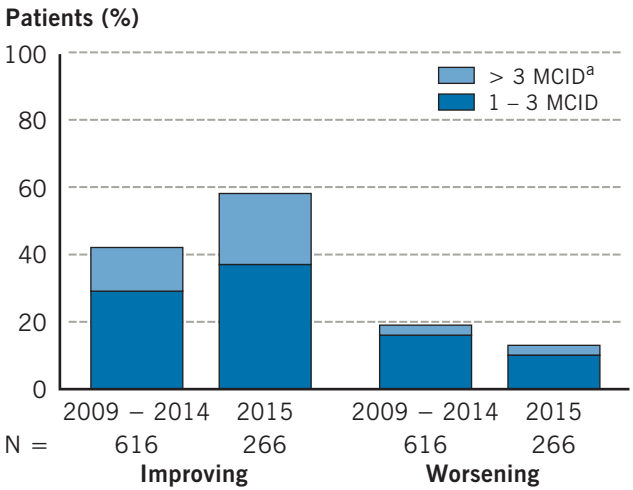
2009 – 2015




On average, 68% of patients reported a clinically important improvement in arm-related physical function after 1 year, while 7% reported worsening (25% showed no detectable change in arm-related physical function).

## Whole-Body Physical Function 1 Year After Surgery

2009 – 2015




On average, 47% of patients reported a clinically important improvement in whole-body physical function after 1 year, while 17% reported worsening (36% showed no detectable change in whole-body physical function).

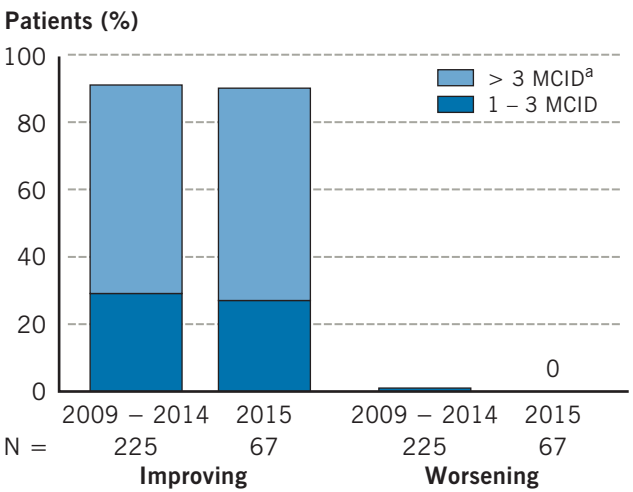
Arm-related physical function is measured using the Review of Musculoskeletal System (ROMS) questionnaire. Whole-body physical function is measured using the Veterans RAND 12 (VR-12) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For arm-related physical function, the MCID is 1.8 (N = 1593) on a scale from 0 (extreme limitations) to 10 (no limitations). For whole-body physical function, the MCID is 5.2 (N = 1196) on a norm-based scale where 50 represents the mean score of a nonpatient control group and every 10 units represents 1 SD from the mean.

## Total Shoulder Arthroplasty for Osteoarthritis

### Shoulder-Related Pain 1 Year After Surgery

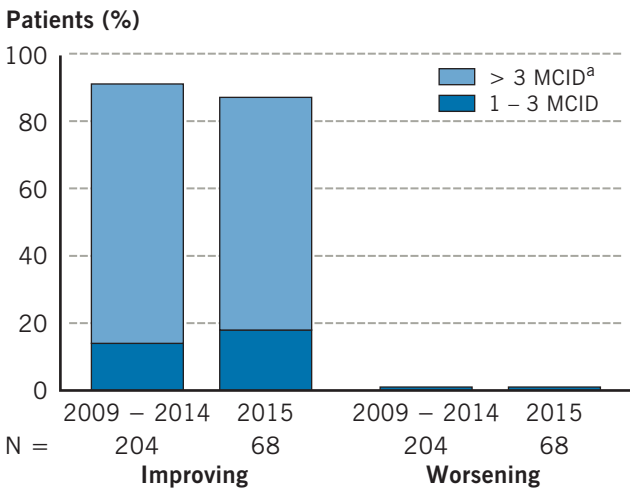
2009 – 2015




On average, 89% of patients reported a clinically important improvement in shoulder-related pain after 1 year, while 1% reported worsening (10% showed no detectable change in shoulder-related pain).

### Shoulder-Related Function 1 Year After Surgery

2009 – 2015



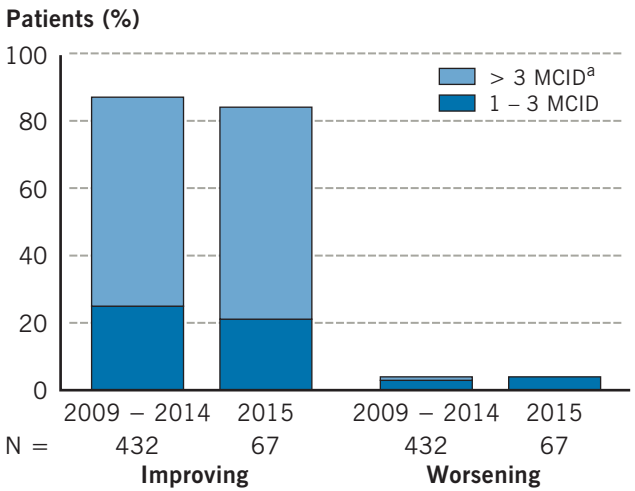

On average, 90% of patients reported a clinically important improvement in shoulder-related function after 1 year, while 1% reported worsening (9% showed no detectable change in shoulder-related function).

Shoulder-related pain and function are measured using a modified Penn Shoulder Score (PSS) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For shoulder-related pain, the MCID is 12.1 (N = 474) on a scale from 0 (extreme pain) to 100 (no pain). For shoulder-related function, the MCID is 13.4 (N = 456) on a scale from 0 (extreme limitations) to 100 (no limitations).

## Arm-Related Physical Function 1 Year After Surgery

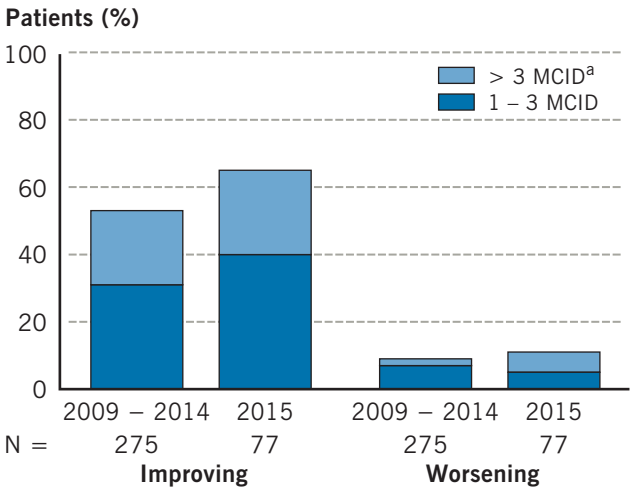
2009 – 2015




On average, 87% of patients reported a clinically important improvement in arm-related physical function after 1 year, while 4% reported worsening (9% showed no detectable change in arm-related physical function).

## Whole-Body Physical Function 1 Year After Surgery

2009 – 2015




On average, 56% of patients reported a clinically important improvement in whole-body physical function after 1 year, while 9% reported worsening (35% showed no detectable change in whole-body physical function).

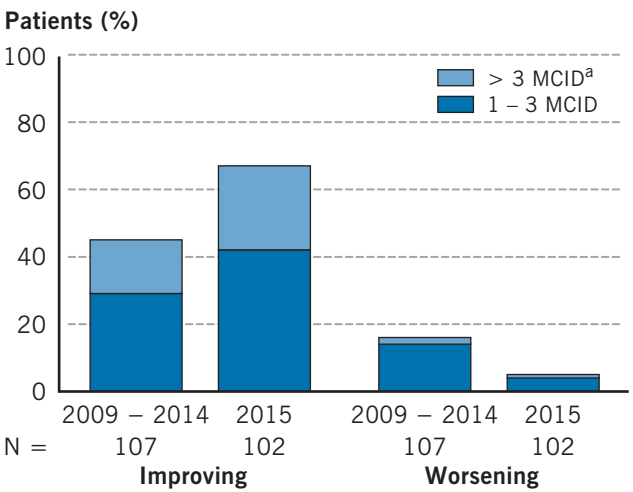
Arm-related physical function is measured using the Review of Musculoskeletal System (ROMS) questionnaire. Whole-body physical function is measured using the Veterans RAND 12 (VR-12) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For arm-related physical function, the MCID is 1.6 (N = 593) on a scale from 0 (extreme limitations) to 10 (no limitations). For whole-body physical function, the MCID is 5.2 (N = 544) on a norm-based scale where 50 represents the mean score of a nonpatient control group and every 10 units represents 1 SD from the mean.

## Hip Arthroscopy

### Hip-Related Pain 1 Year After Surgery

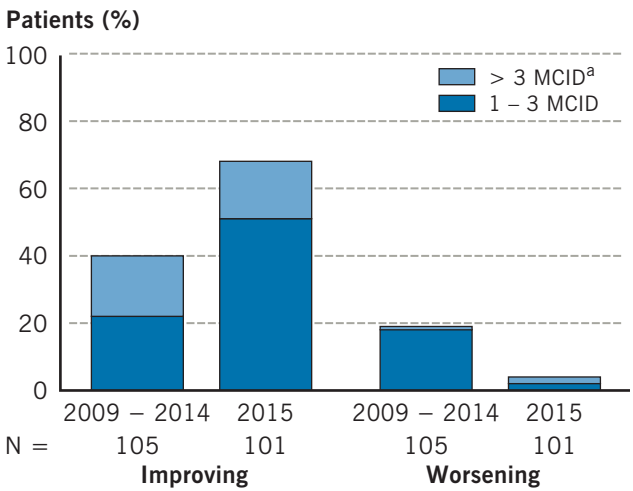
2009 – 2015




On average, 56% of patients reported a clinically important improvement in hip-related pain after 1 year, while 10% reported worsening (34% showed no detectable change in hip-related pain).

### Hip-Related Function 1 Year After Surgery

2009 – 2015



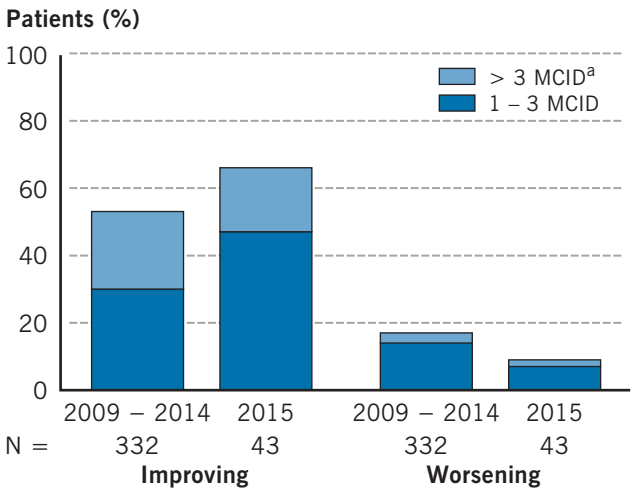

On average, 53% of patients reported a clinically important improvement in hip-related function after 1 year, while 11% reported worsening (36% showed no detectable change in hip-related function).

Hip-related pain and function are measured using a modified Hip dysfunction and Osteoarthritis Outcome Score (HOOS) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For hip-related pain, the MCID is 13.0 (N = 231) on a scale from 0 (extreme pain) to 100 (no pain). For hip-related function, the MCID is 15.0 (N = 227) on a scale from 0 (extreme limitations) to 100 (no limitations).

## Leg-Related Physical Function 1 Year After Surgery

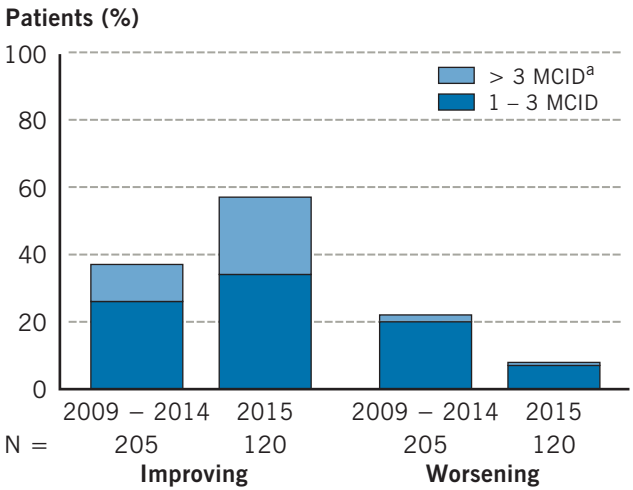
2009 – 2015




On average, 55% of patients reported a clinically important improvement in leg-related physical function after 1 year, while 16% reported worsening (29% showed no detectable change in leg-related physical function).

## Whole-Body Physical Function 1 Year After Surgery

2009 – 2015




On average, 44% of patients reported a clinically important improvement in whole-body physical function after 1 year, while 17% reported worsening (39% showed no detectable change in whole-body physical function).

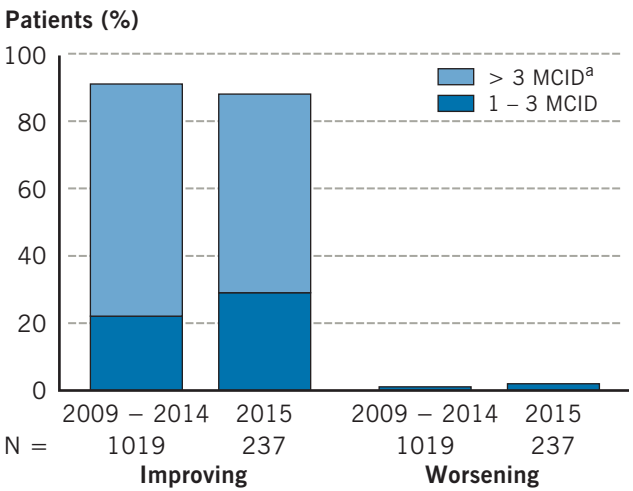
Leg-related physical function is measured using the Review of Musculoskeletal System (ROMS) questionnaire. Whole-body physical function is measured using the Veterans RAND 12 (VR-12) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For leg-related physical function, the MCID is 2.0 (N = 419) on a scale from 0 (extreme limitations) to 10 (no limitations). For whole-body physical function, the MCID is 6.8 (N = 376) on a norm-based scale where 50 represents the mean score of a nonpatient control group and every 10 units represents 1 SD from the mean.

## Total Hip Arthroplasty for Osteoarthritis

### Hip-Related Pain 1 Year After Surgery

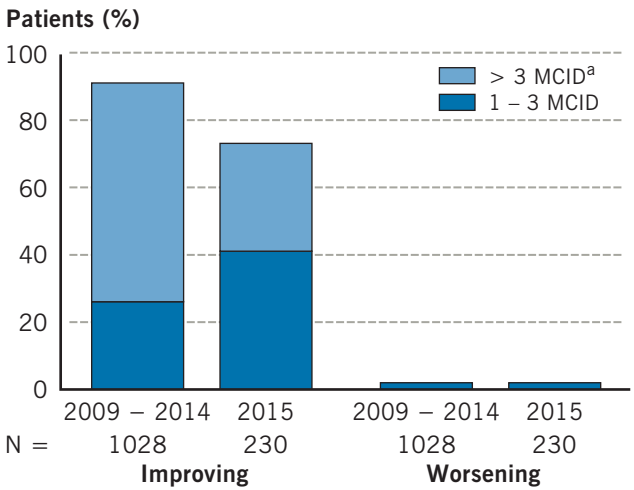
2009 – 2015




On average, 92% of patients reported a clinically important improvement in hip-related pain after 1 year, while 2% reported worsening (6% showed no detectable change in hip-related pain).

### Hip-Related Function 1 Year After Surgery

2009 – 2015



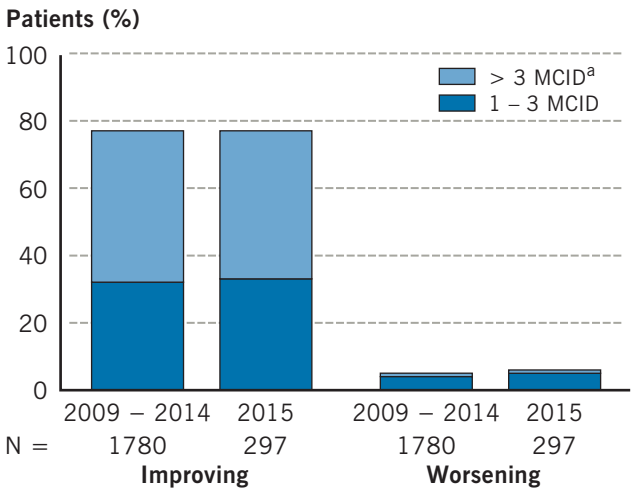

On average, 88% of patients reported a clinically important improvement in hip-related function after 1 year, while 2% reported worsening (10% showed no detectable change in hip-related function).

Hip-related pain and function are measured using a modified Hip dysfunction and Osteoarthritis Outcome Score (HOOS) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For hip-related pain, the MCID is 12.1 (N = 1455) on a scale from 0 (extreme pain) to 100 (no pain). For hip-related function, the MCID is 12.7 (N = 1452) on a scale from 0 (extreme limitations) to 100 (no limitations).

## Leg-Related Physical Function 1 Year After Surgery

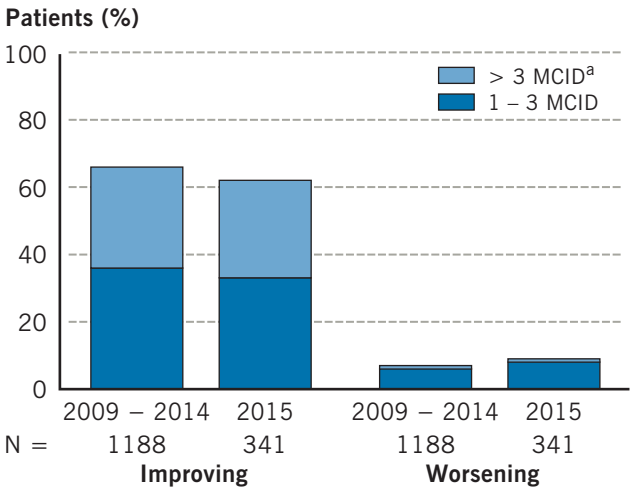
2009 – 2015




On average, 77% of patients reported a clinically important improvement in leg-related physical function after 1 year, while 5% reported worsening (18% showed no detectable change in leg-related physical function).

## Whole-Body Physical Function 1 Year After Surgery

2009 – 2015




On average, 66% of patients reported a clinically important improvement in whole-body physical function after 1 year, while 7% reported worsening (27% showed no detectable change in whole-body physical function).

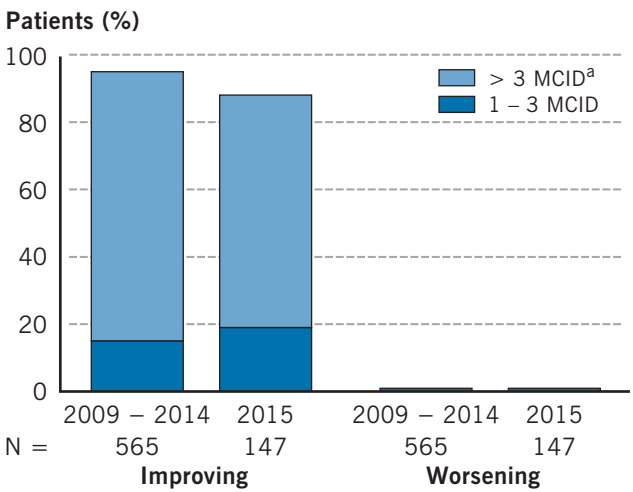
Leg-related physical function is measured using the Review of Musculoskeletal System (ROMS) questionnaire. Whole-body physical function is measured using the Veterans RAND 12 (VR-12) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For leg-related physical function, the MCID is 1.9 (N = 2456) on a scale from 0 (extreme limitations) to 10 (no limitations). For whole-body physical function, the MCID is 5.8 (N = 2496) on a norm-based scale where 50 represents the mean score of a nonpatient control group and every 10 units represents 1 SD from the mean.

## Hip Resurfacing

### Hip-Related Pain 1 Year After Surgery

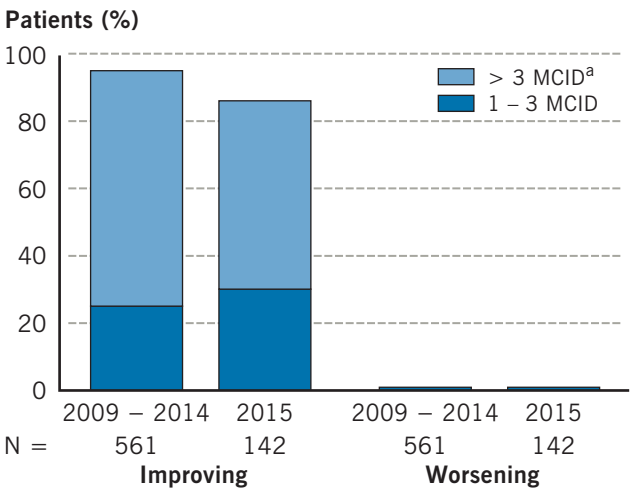
2009 – 2015




On average, 94% of patients reported a clinically important improvement in hip-related pain after 1 year, while 1% reported worsening (5% showed no detectable change in hip-related pain).

### Hip-Related Function 1 Year After Surgery

2009 – 2015



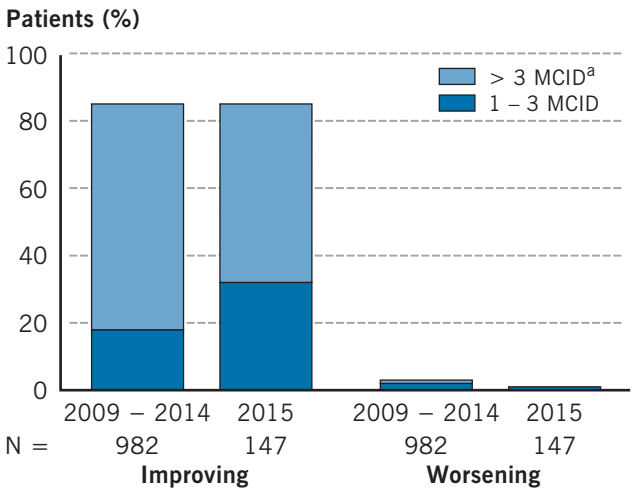

On average, 93% of patients reported a clinically important improvement in hip-related function after 1 year, while 1% reported worsening (6% showed no detectable change in hip-related function).

Hip-related pain and function are measured using a modified Hip dysfunction and Osteoarthritis Outcome Score (HOOS) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For hip-related pain, the MCID is 10.1 (N = 775) on a scale from 0 (extreme pain) to 100 (no pain). For hip-related function, the MCID is 10.6 (N = 766) on a scale from 0 (extreme limitations) to 100 (no limitations).

## Leg-Related Physical Function 1 Year After Surgery

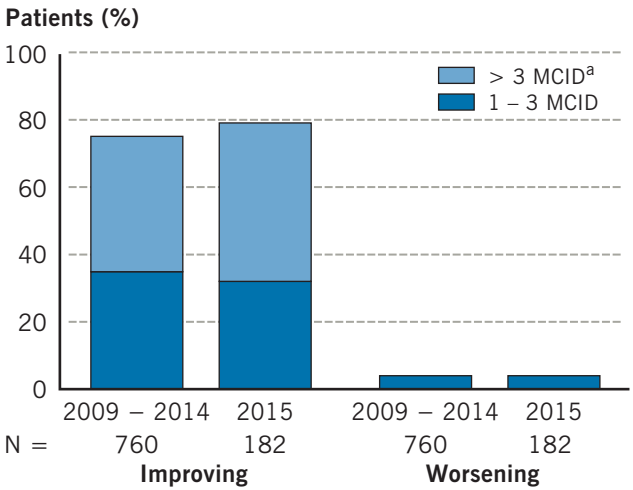
2009 – 2015




On average, 85% of patients reported a clinically important improvement in leg-related physical function after 1 year, while 2% reported worsening (13% showed no detectable change in leg-related physical function).

## Whole-Body Physical Function 1 Year After Surgery

2009 – 2015




On average, 76% of patients reported a clinically important improvement in whole-body physical function after 1 year, while 4% reported worsening (20% showed no detectable change in whole-body physical function).

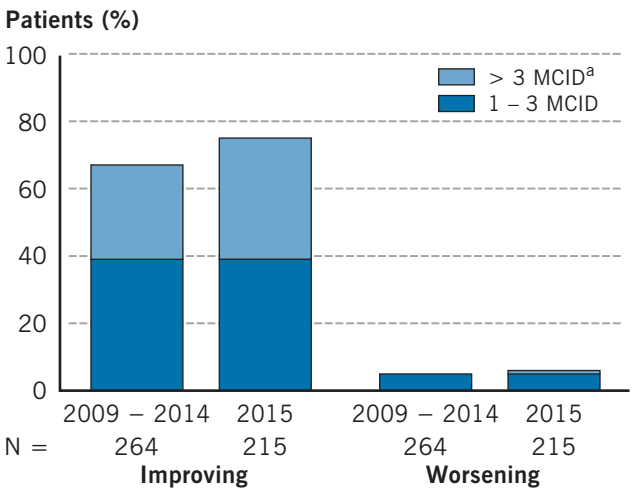
Leg-related physical function is measured using the Review of Musculoskeletal System (ROMS) questionnaire. Whole-body physical function is measured using the Veterans RAND 12 (VR-12) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For leg-related physical function, the MCID is 1.6 (N = 1244) on a scale from 0 (extreme limitations) to 10 (no limitations). For whole-body physical function, the MCID is 6.0 (N = 1084) on a norm-based scale where 50 represents the mean score of a nonpatient control group and every 10 units represents 1 SD from the mean.

## Anterior Cruciate Ligament Reconstruction

### Knee-Related Pain 1 Year After Surgery

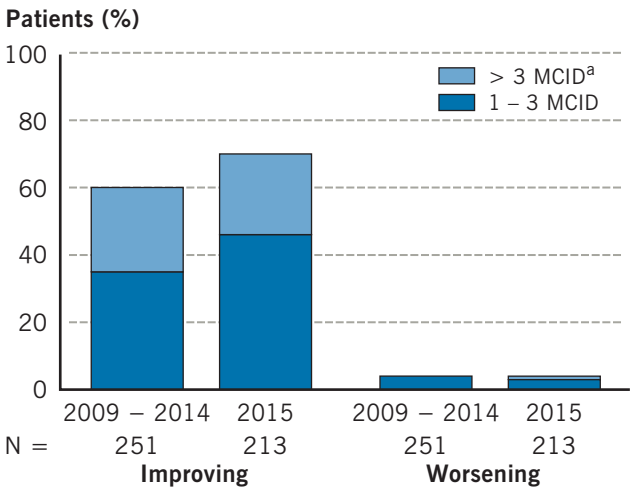
2009 – 2015




On average, 71% of patients reported a clinically important improvement in knee-related pain after 1 year, while 6% reported worsening (23% showed no detectable change in knee-related pain).

### Knee-Related Function 1 Year After Surgery

2009 – 2015



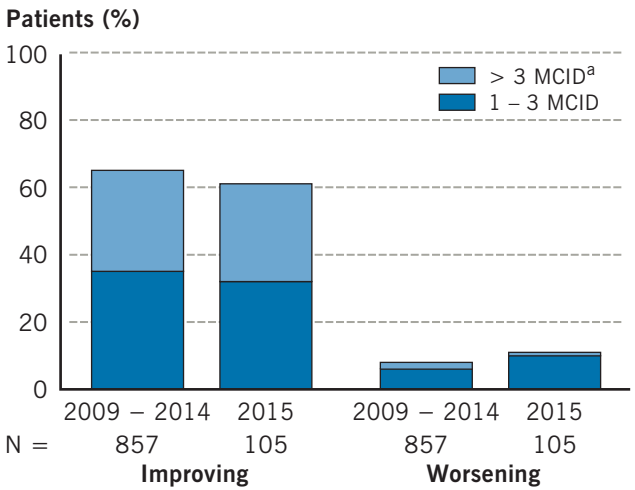

On average, 65% of patients reported a clinically important improvement in knee-related function after 1 year, while 4% reported worsening (31% showed no detectable change in knee-related function).

Knee-related pain and function are measured using a modified Knee injury and Osteoarthritis Outcome Score (KOOS) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For knee-related pain, the MCID is 12.0 (N = 541) on a scale from 0 (extreme pain) to 100 (no pain). For knee-related function, the MCID is 12.3 (N = 524) on a scale from 0 (extreme limitations) to 100 (no limitations).

## Leg-Related Physical Function 1 Year After Surgery

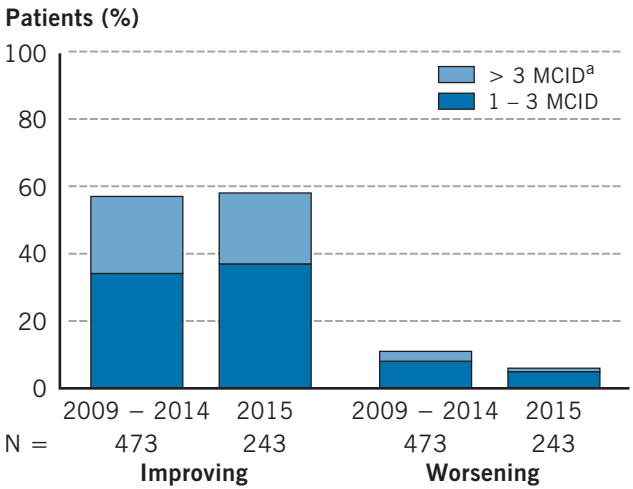
2009 – 2015




On average, 65% of patients reported a clinically important improvement in leg-related physical function after 1 year, while 9% reported worsening (26% showed no detectable change in leg-related physical function).

## Whole-Body Physical Function 1 Year After Surgery

2009 – 2015




On average, 57% of patients reported a clinically important improvement in whole-body physical function after 1 year, while 9% reported worsening (34% showed no detectable change in whole-body physical function).

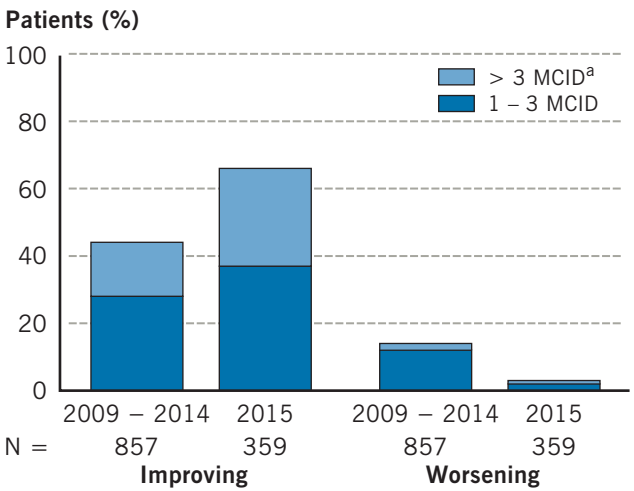
Leg-related physical function is measured using the Review of Musculoskeletal System (ROMS) questionnaire. Whole-body physical function is measured using the Veterans RAND 12 (VR-12) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For leg-related physical function, the MCID is 1.9 (N = 1098) on a scale from 0 (extreme limitations) to 10 (no limitations). For whole-body physical function, the MCID is 7.9 (N = 848) on a norm-based scale where 50 represents the mean score of a nonpatient control group and every 10 units represents 1 SD from the mean.

## Meniscus Treatment

### Knee-Related Pain 1 Year After Surgery

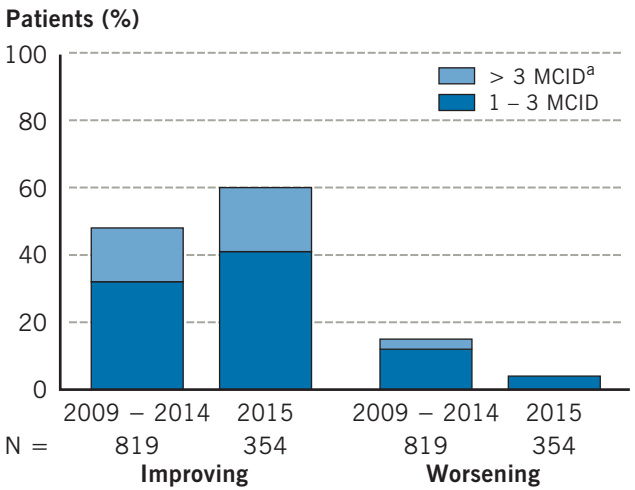
2009 – 2015




On average, 50% of patients reported a clinically important improvement in knee-related pain after 1 year, while 12% reported worsening (38% showed no detectable change in knee-related pain).

### Knee-Related Function 1 Year After Surgery

2009 – 2015



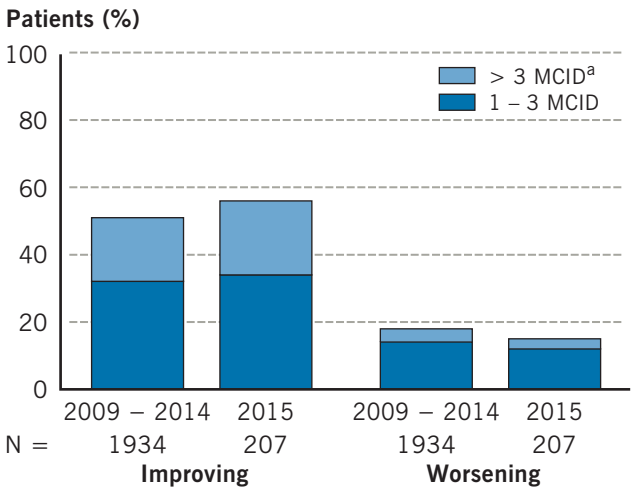

On average, 52% of patients reported a clinically important improvement in knee-related function after 1 year, while 11% reported worsening (37% showed no detectable change in knee-related function).

Knee-related pain and function are measured using a modified Knee injury and Osteoarthritis Outcome Score (KOOS) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For knee-related pain, the MCID is 12.4 (N = 1411) on a scale from 0 (extreme pain) to 100 (no pain). For knee-related function, the MCID is 12.1 (N = 1367) on a scale from 0 (extreme limitations) to 100 (no limitations).

## Leg-Related Physical Function 1 Year After Surgery

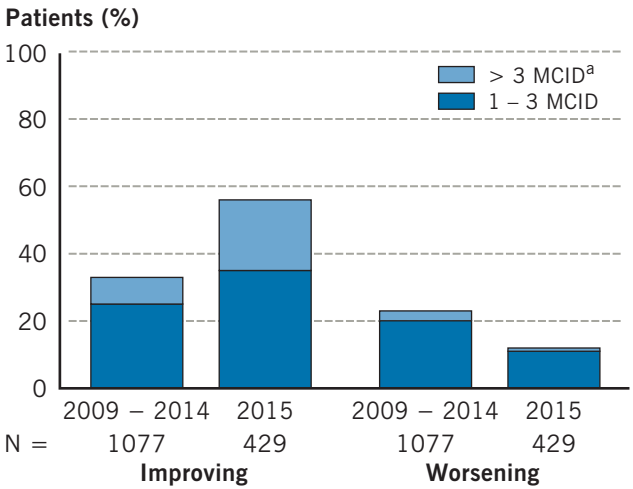
2009 – 2015




On average, 52% of patients reported a clinically important improvement in leg-related physical function after 1 year, while 18% reported worsening (30% showed no detectable change in leg-related physical function).

## Whole-Body Physical Function 1 Year After Surgery

2009 – 2015




On average, 40% of patients reported a clinically important improvement in whole-body physical function after 1 year, while 20% reported worsening (40% showed no detectable change in whole-body physical function).

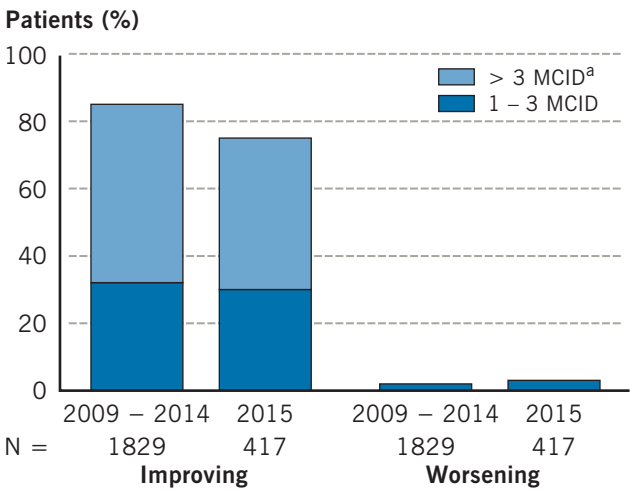
Leg-related physical function is measured using the Review of Musculoskeletal System (ROMS) questionnaire. Whole-body physical function is measured using the Veterans RAND 12 (VR-12) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For leg-related physical function, the MCID is 1.9 (N = 1292) on a scale from 0 (extreme limitations) to 10 (no limitations). For whole-body physical function, the MCID is 6.1 (N = 1896) on a norm-based scale where 50 represents the mean score of a nonpatient control group and every 10 units represents 1 SD from the mean.

## Unilateral Total Knee Arthroplasty for Osteoarthritis

### Knee-Related Pain 1 Year After Surgery

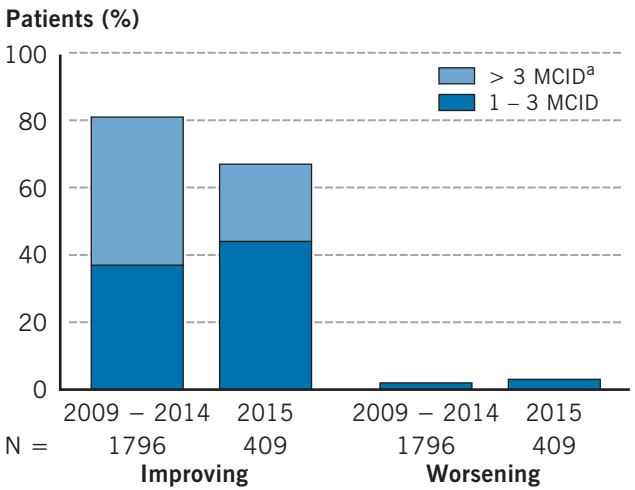
2009 – 2015




On average, 82% of patients reported a clinically important improvement in knee-related pain after 1 year, while 2% reported worsening (16% showed no detectable change in knee-related pain).

### Knee-Related Function 1 Year After Surgery

2009 – 2015



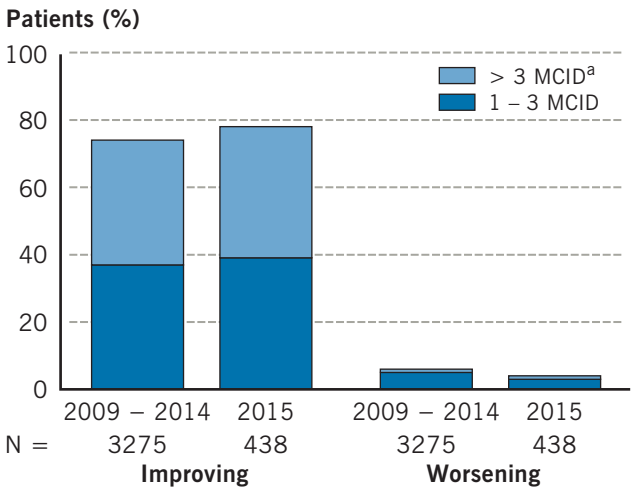

On average, 78% of patients reported a clinically important improvement in knee-related function after 1 year, while 3% reported worsening (19% showed no detectable change in knee-related function).

Knee-related pain and function are measured using a modified Knee injury and Osteoarthritis Outcome Score (KOOS) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For knee-related pain, the MCID is 12.0 (N = 2561) on a scale from 0 (extreme pain) to 100 (no pain). For knee-related function, the MCID is 12.0 (N = 2511) on a scale from 0 (extreme limitations) to 100 (no limitations).

## Leg-Related Physical Function 1 Year After Surgery

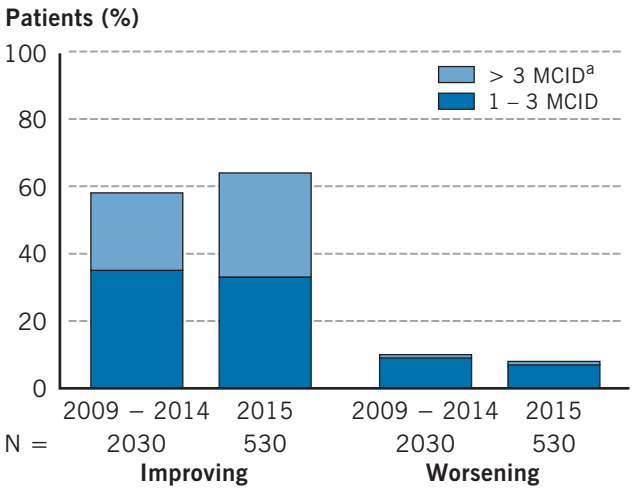
2009 – 2015




On average, 74% of patients reported a clinically important improvement in leg-related physical function after 1 year, while 6% reported worsening (20% showed no detectable change in leg-related physical function).

## Whole-Body Physical Function 1 Year After Surgery

2009 – 2015




On average, 60% of patients reported a clinically important improvement in whole-body physical function after 1 year, while 10% reported worsening (30% showed no detectable change in whole-body physical function).

Leg-related physical function is measured using the Review of Musculoskeletal System (ROMS) questionnaire. Whole-body physical function is measured using the Veterans RAND 12 (VR-12) questionnaire. Data are derived from patient self-reported scores collected at home and during office visits up to 6 months before and 1 year after surgeries performed during the indicated years.

[a]MCID refers to the "minimal clinically important difference" and is estimated here as one-half of the SD of patient-reported data 1 year after surgery. For leg-related physical function, the MCID is 1.8 (N = 4320) on a scale from 0 (extreme limitations) to 10 (no limitations). For whole-body physical function, the MCID is 5.6 (N = 3637) on a norm-based scale where 50 represents the mean score of a nonpatient control group and every 10 units represents 1 SD from the mean.

# Orthopaedic Surgical Quality Improvement

The American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP®) objectively measures and reports risk-adjusted surgical outcomes based on a defined sampling and abstraction methodology. These outcomes data reflect Cleveland Clinic's overall orthopaedic surgery ACS NSQIP performance benchmarked against 559 participating sites.

## Orthopaedic Surgery Outcomes

July 2015 – June 2016

| Outcome | N | Observed Rate (%) | Expected Rate (%) |
|---|---|---|---|
| 30-day mortality | 509 | 0.59 | 0.33 |
| 30-day morbidity | 509 | 2.36 | 3.67 |
| Pneumonia | 509 | 0.39 | 0.58 |
| Deep vein thrombosis/pulmonary embolism | 509 | 1.38 | 0.97 |
| Urinary tract infection | 509 | 0.20 | 0.66 |
| Surgical site infection | 509 | 0.59 | 1.09 |
| Return to operating room | 509 | 2.55 | 2.17 |
| Readmission | 509 | 6.29 | 4.75 |

In addition to overall orthopaedic surgery ACS NSQIP outcomes data, data specific to total knee arthroplasty (TKA) and total hip arthroplasty (THA) are provided. TKA performance is benchmarked against 456 participating sites; THA performance is benchmarked against 463 sites.

## Total Knee Arthroplasty Outcomes

July 2015 – June 2016

| Outcome | N | Observed Rate (%) | Expected Rate (%) |
|---|---|---|---|
| 30-day mortality | 279 | 0.36 | 0.14 |
| 30-day morbidity | 279 | 1.43 | 2.88 |
| Cardiac event | 279 | 0.00 | 0.32 |
| Pneumonia | 279 | 0.00 | 0.49 |
| Unplanned intubation | 279 | 0.00 | 0.19 |
| Deep vein thrombosis/pulmonary embolism | 279 | 1.43 | 1.03 |
| Renal failure | 279 | 0.36 | 0.27 |
| Urinary tract infection | 279 | 0.00 | 0.62 |
| Surgical site infection | 279 | 0.72 | 0.74 |
| Sepsis | 279 | 0.00 | 0.23 |
| Return to operating room | 279 | 1.79 | 1.40 |
| Readmission | 279 | 6.45 | 3.93 |

Source: facs.org/quality-programs/acs-nsqip

## Total Hip Arthroplasty Outcomes

July 2015 – June 2016

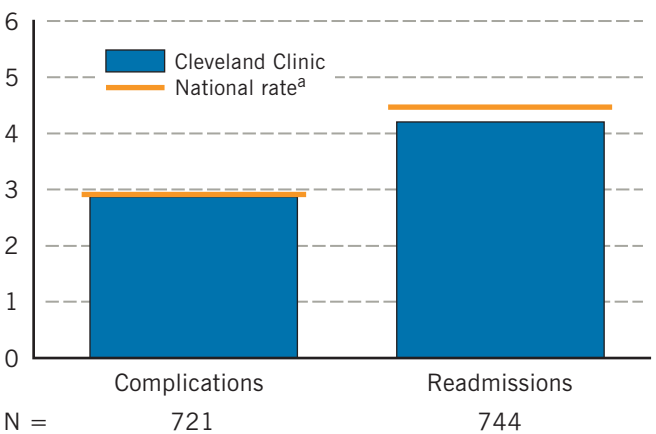
| Outcome | N | Observed Rate (%) | Expected Rate (%) |
|---|---|---|---|
| 30-day morbidity | 215 | 3.26 | 4.89 |
| Cardiac event | 215 | 0.47 | 0.45 |
| Pneumonia | 215 | 0.93 | 0.82 |
| Unplanned intubation | 215 | 0.47 | 0.43 |
| Deep vein thrombosis/pulmonary embolism | 215 | 1.40 | 0.88 |
| Renal failure | 215 | 0.00 | 0.30 |
| Urinary tract infection | 215 | 0.47 | 0.75 |
| Surgical site infection | 215 | 0.47 | 1.53 |
| Sepsis | 215 | 0.65 | 0.39 |
| *C. difficile* colitis | 215 | 0.47 | 0.23 |
| Return to operating room | 215 | 3.26 | 3.18 |
| Readmission | 215 | 6.05 | 5.89 |

Source: facs.org/quality-programs/acs-nsqip

## Elective Primary Total Hip Arthroplasty and/or Total Knee Arthroplasty

**Inpatient Complications** — April 2013 – March 2016

**All-Cause 30-Day Readmissions** — July 2013 – June 2016




[a]Source: medicare.gov/hospitalcompare

CMS calculates elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) outcomes measures based on Medicare claims and enrollment information. The most recent risk-adjusted data available from CMS are shown. Although Cleveland Clinic's THA/TKA complications rate is slightly higher than the US national rate, CMS ranks Cleveland Clinic's performance as "no different than" the US national rate. Cleveland Clinic's THA/TKA readmissions rate is slightly lower than the US national rate and also ranked by CMS as "no different than" the US national rate. To further reduce avoidable readmissions, Cleveland Clinic is focused on optimizing transitions from hospital to home or postacute facility. Specific initiatives have been implemented to ensure effective communication, education, and follow-up.

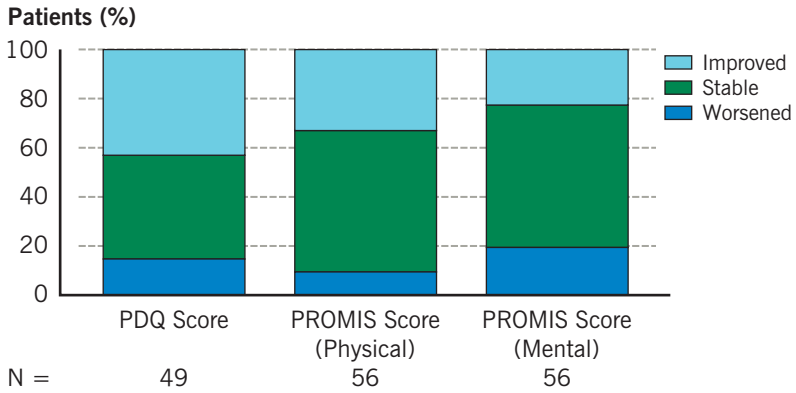
The Center for Spine Health is an interdisciplinary, multispecialty group comprehensively treating spine-related disorders. The center's goals include accurate diagnosis of all spine disorders, speedy return to full function, and measurement of patient-centered outcomes. These outcomes represent ongoing efforts to standardize care around best practices to provide maximum patient benefit at minimal cost to patients and the health system.

The center offers a full continuum of care including medical management, physical therapy, pharmacological interventions, minimally invasive injection procedures, surgical interventions, acupuncture, osteopathic manipulation, specialized exercise programs, and a functional restoration program. The center consists of board-certified neurosurgeons, orthopedic surgeons, spine-medicine specialists, physiatrists, rheumatologists, internists, sports medicine specialists, pain medicine specialists, neurologists, and psychiatrists.

## Cervical Disc Herniation

### Change in Functional Status Following Cervical Decompression With Fusion for Cervical Disc Herniation

Surgical Dates: Jan. 4 – July 11, 2016




PDQ = Pain Disability Questionnaire, PROMIS = Patient-Reported Outcomes Measurement Information System

In patients who underwent cervical fusion for symptoms of severe arm pain due to a cervical disc herniation, 49 had a baseline impairment of physical function, defined as a Pain Disability Questionnaire (PDQ) score > 16; 43% noted improvement after surgery and 14% worsened. Median duration of follow-up was 112 days (range, 41–306). Among 56 patients assessed using the Patient-Reported Outcomes Measurement Information System (PROMIS®),[1] 34% noted clinically meaningful improvement of their PROMIS Physical Health scores and 9% worsened.

In this and subsequent graphs, clinically meaningful change in PROMIS scores was defined as a change of one-half a standard deviation[2] and a total point change of > 16 for the PDQ.

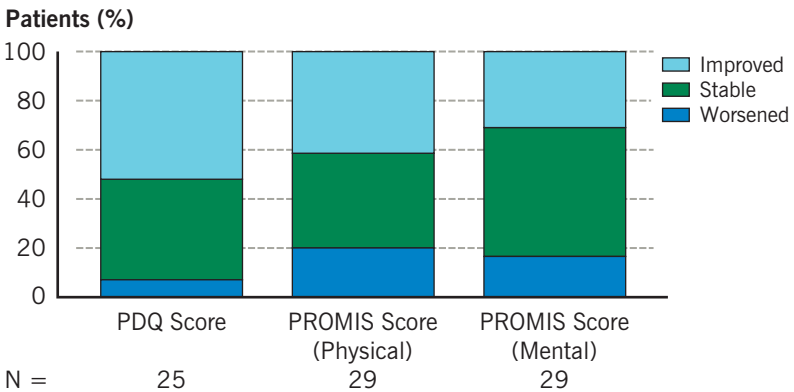
**References**

1. Cella D, Yount S, Rothrock N, Gershon R, Cook K, Reeve B, Ader D, Fries JF, Bruce B, Rose M, on behalf of the PROMIS Cooperative Group. The Patient-Reported Outcomes Measurement Information System (PROMIS). *Med Care*. 2007 May;45(5 Suppl 1):S3-S11.

2. Norman GR, Sloan JA, Wyrwich KW. Interpretation of changes in health-related quality of life: the remarkable universality of half a standard deviation. *Med Care*. 2003 May;41(5):582-592.

## Change in Functional Status Following Cervical Decompression Without Fusion for Cervical Disc Herniation

Surgical Dates: Jan. 12 – July 6, 2016




PDQ = Pain Disability Questionnaire, PROMIS = Patient-Reported Outcomes Measurement Information System

In 25 patients who underwent cervical decompression surgery without fusion for symptoms of severe arm pain due to cervical disc herniation, 52% of those with baseline impairment of physical function (PDQ > 16) noted clinically meaningful functional improvement after surgery and 8% worsened. Median duration of follow-up after surgery was 106 days (range, 40–217). In 29 patients, 41% noted improved PROMIS Physical Health scores, and 21% worsened; 31% noted improvement in their PROMIS Mental Health scores.

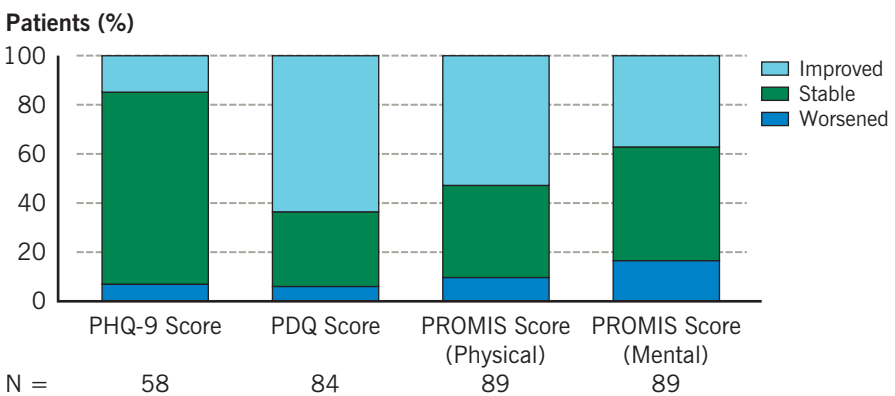
## Lumbar Spinal Disease

### Surgical Treatment

Spinal stenosis results in narrowing of the spinal canal, which can lead to leg pain and impaired walking and standing. For symptomatic patients, the goal of surgery is to decompress the spinal canal to eliminate neural compression and relieve leg pain; this may or may not require instrumented fusion of the operated levels.

#### Change in Functional Status Following Lumbar Decompression With Fusion for Spinal Stenosis

Surgical Dates: Jan. 4 – July 15, 2016




PDQ = Pain Disability Questionnaire, PHQ-9 = Patient Health Questionnaire, PROMIS = Patient-Reported Outcomes Measurement Information System

Among patients undergoing lumbar decompression with fusion for symptomatic spinal stenosis, 58 reported at least moderate depressive symptoms, defined as Patient Health Questionnaire (PHQ-9) score ≥ 10 prior to surgery; 16% noted improvement and 7% worsened in depressive symptoms. Of the 84 patients who had baseline impairment of physical function (PDQ > 16), 64% noted clinically meaningful functional improvement after surgery, while 6% worsened. In 89 patients, 54% noted improvement in PROMIS Physical Health scores while 9% worsened, and 38% noted improvement in PROMIS Mental Health scores. Median duration of follow-up was 152 days (range, 42–398).

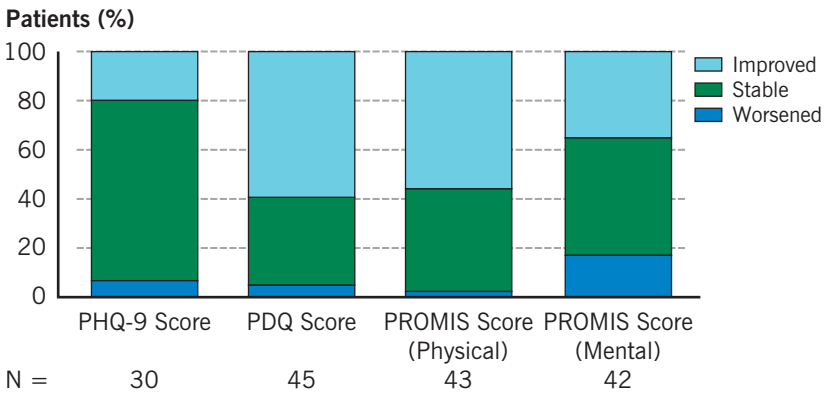
In this and subsequent graphs, clinically meaningful change in PHQ-9 scores was defined as a change of ≥ 5 points.[1]

**Reference**

1. Löwe B, Unützer J, Callahan CM, Perkins AJ, Kroenke K. Monitoring depression treatment outcomes with the Patient Health Questionnaire-9. *Med Care*. 2004 Dec;42(12):1194-1201.

### Change in Functional Status Following Lumbar Decompression Without Fusion for Disc Herniation

Surgical Dates: Jan. 5 – July 19, 2016



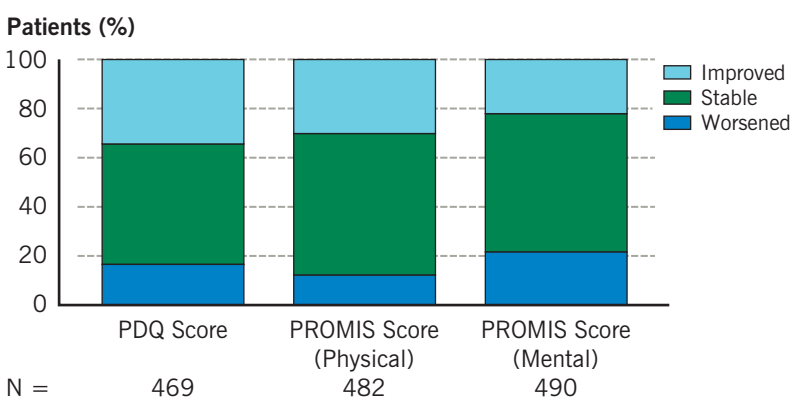

PDQ = Pain Disability Questionnaire, PHQ-9 = Patient Health Questionnaire, PROMIS = Patient-Reported Outcomes Measurement Information System

Among patients undergoing lumbar decompression surgery without fusion to treat severe leg pain from a lumbar disc herniation, 30 patients reported at least moderate depressive symptoms (PHQ-9 ≥ 10) prior to surgery; 73% of patients had no change in their depressive symptoms, while 20% noted improvement and 7% worsened. Among 45 patients who had baseline impairment of physical function (PDQ > 16), 60% noted clinically meaningful improvement after surgery, while 4% worsened. Of 43 patients, 56% improved their PROMIS Physical Health scores after surgery. Median duration of follow-up was 123 days after surgery (range, 38–343).

## Spinal Injections (Nonsurgical Treatment)

### Change in Functional Status Following Lumbar Spinal Injections for Disc Herniation

Treatment Dates: Jan. 4 – July 28, 2016



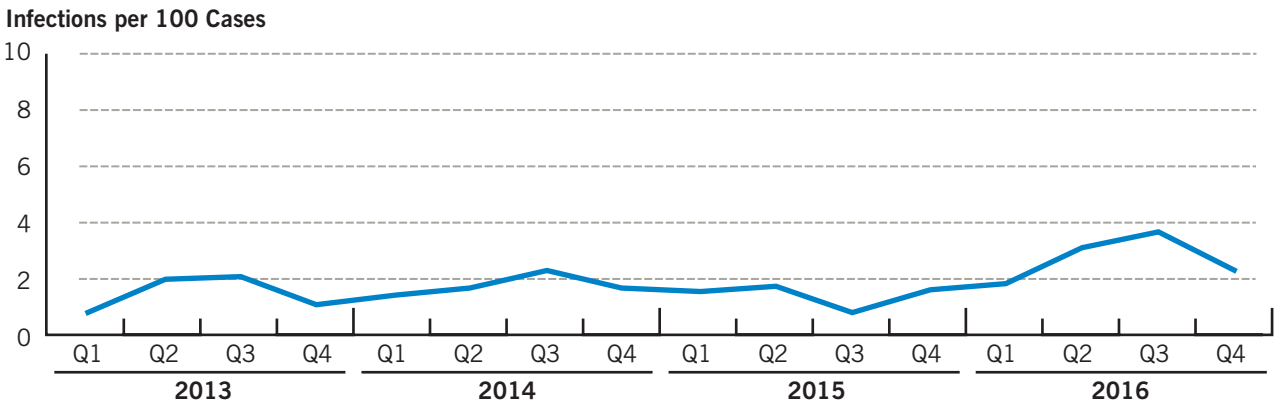

PDQ = Pain Disability Questionnaire,
PROMIS = Patient-Reported Outcomes Measurement Information System

Among patients undergoing lumbar spinal injections for severe leg pain due to a lumbar disc herniation, 469 had baseline impairment of physical function (PDQ > 16); 35% noted clinically meaningful improvement in function after injection while 17% worsened. Among 482 patients, 30% noted sustained improvement in PROMIS Physical Health scores while 13% worsened, and among 490 patients, 22% noted improvement in PROMIS Mental Health scores. Median duration of follow-up was 137 days after injection (range, 35–393).

## Surgical Complications

### Surgical Site Infection Rates for Spinal Surgery (N = 5957)

2013 – 2016




A multiyear effort in the Spine Center to reduce complications continues to center around reducing surgical site infections. Efforts have included nasal swab surveillance, nasal decolonization protocol (when indicated), changing rules for operating theater traffic, updating rules about operating table preparation, changing the perioperative scrub protocol, and new wound closure advisories. A recent increase in infection rates has resulted in significant changes in surgical equipment, planning, and operations to return to formerly low levels.[1,2]

Additionally, the center is working to reduce unplanned readmissions. The trend remains variable and work continues to ensure that patients return home without inpatient readmission within 30 days after surgery.

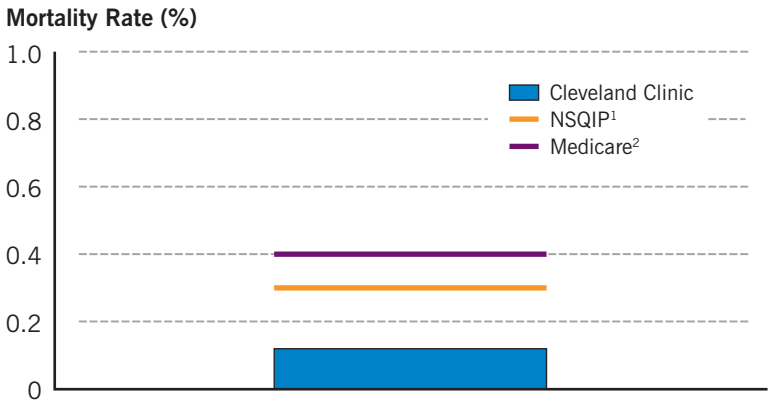
**References**

1. Smith JS, Shaffrey CI, Sansur CA, Berven SH, Fu KM, Broadstone PA, Choma TJ, Goytan MJ, Noordeen HH, Knapp DR Jr, Hart RA, Donaldson WF 3rd, Polly DW Jr, Perra JH, Boachie-Adjei O; Scoliosis Research Society Morbidity and Mortality Committee. Rates of infection after spine surgery based on 108,419 procedures: a report from the Scoliosis Research Society Morbidity and Mortality Committee. *Spine*. 2011 Apr 1;36(7):556-563.

2. Schimmel JJ, Horsting PP, de Kleuver M, Wonders G, van Limbeek J. Risk factors for deep surgical site infections after spinal fusion. *Eur Spine J.* 2010 Oct;19(10):1711-1719.

## Thirty-Day Postoperative Mortality Rate Following Spinal Surgery (N = 3372)

2016




The 30-day postoperative mortality rate following spinal surgery in 2016 was 0.12%, compared with a rate of 0.30% for the National Surgical Quality Improvement Program® (NSQIP®)[1] Database and a rate of 0.40% for the Medicare database.[2]

**References**


1. Schoenfeld AJ, Ochoa LM, Bader JO, Belmont PJ Jr. Risk factors for immediate postoperative complications and mortality following spine surgery: a study of 3475 patients from the National Surgical Quality Improvement Program. *J Bone Joint Surg Am*. 2011 Sep 7;93(17):1577-1582.
2. Deyo RA, Mirza SK, Martin BI, Kreuter W, Goodman DC, Jarvik JG. Trends, major medical complications, and charges associated with surgery for lumbar spinal stenosis in older adults. *JAMA*. 2010 Apr 7;303(13): 1259-1265.

# Concussion

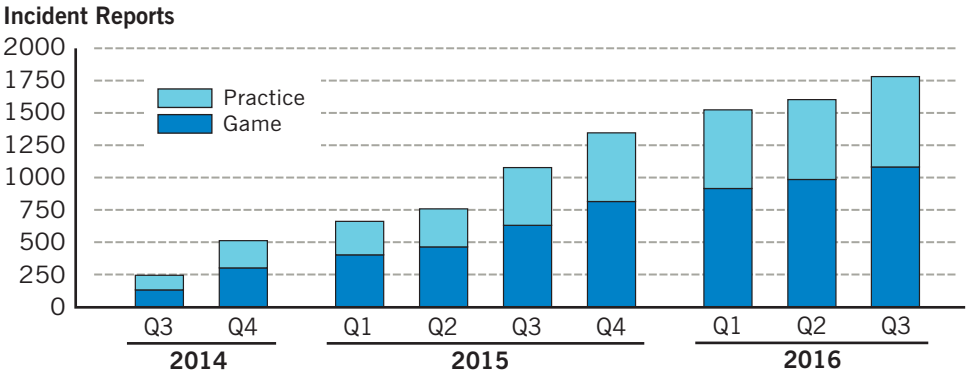
Concussion is a mild traumatic brain injury caused by a bump, blow, or jolt to the head that can present with a variety of symptoms. Cleveland Clinic's Concussion Center continues to be a leader in the evaluation and management of individuals with concussion, including amateur to professional athletes of all ages. In an effort to optimize community-based sports concussion care, the Concussion Center developed and implemented standardized methods of reporting, evaluating, and managing concussion injury in youth, high school, and college athletes. The following outcomes highlight sports concussion management using the Concussion Center's highly integrated, multidisciplinary approach.

## Incident Reporting

The collection and reporting of the details associated with concussion (eg, symptoms, date, time, location of injury, and action taken) facilitates the diagnosis and management of concussion through a standardized process of documentation. Further, common data outcomes and metrics unify the practice patterns of athletic trainers on the sideline and caregivers in the hospital and office. The development and deployment of the Concussion Incident Report module to a mobile device, iPad®, or iPhone® allows athletic trainers to document the key features of the injury and symptoms to facilitate triage and care decision-making in a standardized and rapid manner. The Concussion Incident Report is the first step in ensuring all caregivers are collecting, accessing, and using the same information about the patient. The universal adoption of the Concussion Incident Report by athletic trainers and physicians has provided important evidence, as opposed to opinion, regarding concussion incidence in a large population of athletes. This information is now being used to inform recommendations aimed at making sport participation safer.

### Concussion Incident Reporting Over Time

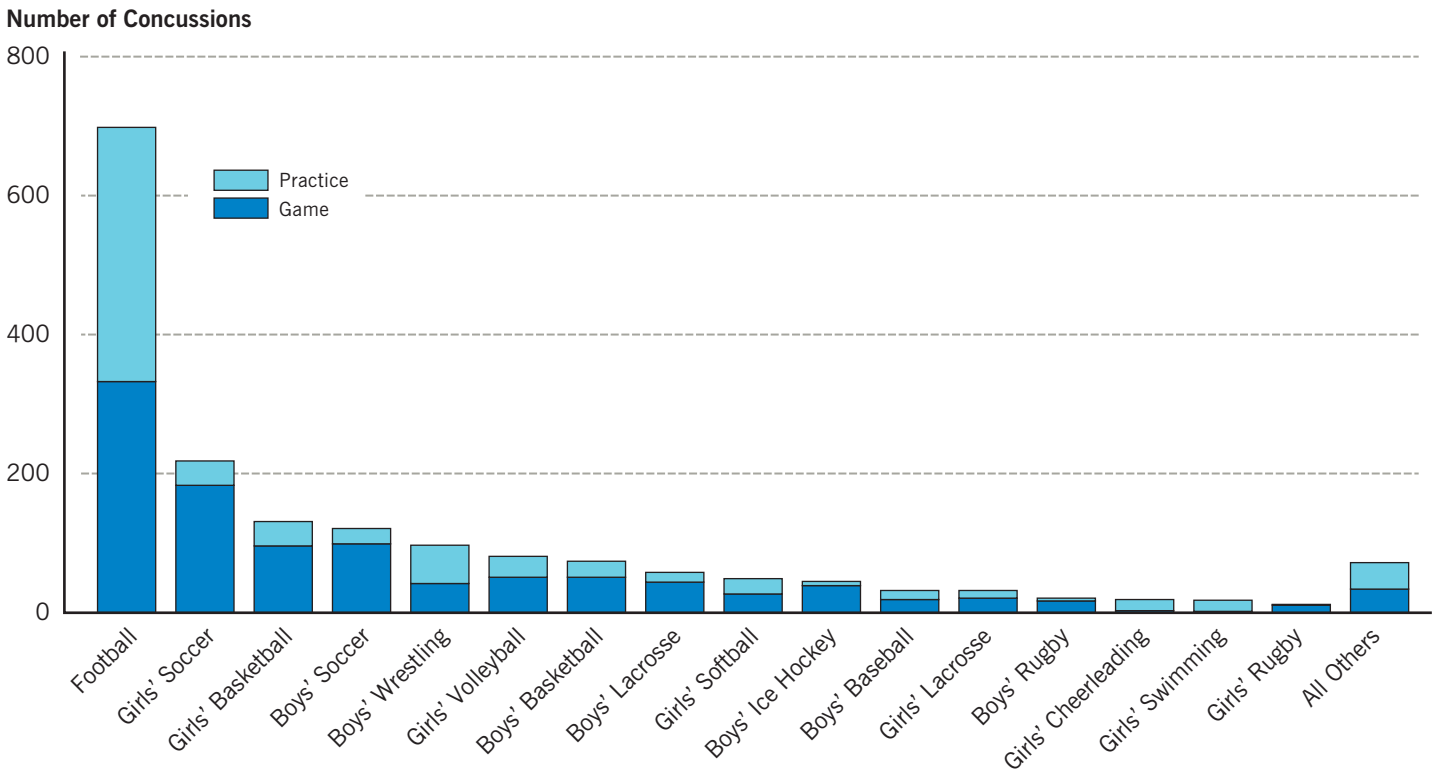
August 2014 – September 2016




The graph illustrates the historical use of the Concussion Incident Report from 2014 to 2016, broken down by venue (at practice or in games). On average, these data suggest that despite the greater time athletes spend practicing than competing, the incidence of concussion was greater during competition. These findings underscore the need for schools and athletic clubs to have appropriate medical personnel, such as athletic trainers, during event competitions. Data from the Concussion Incident Report were further examined to improve the access of care to those athletes who may be most at risk for sustaining a concussion in practice or in competition.

## Concussion Rates by Sport and Venue for High School Athletes (N = 1800)

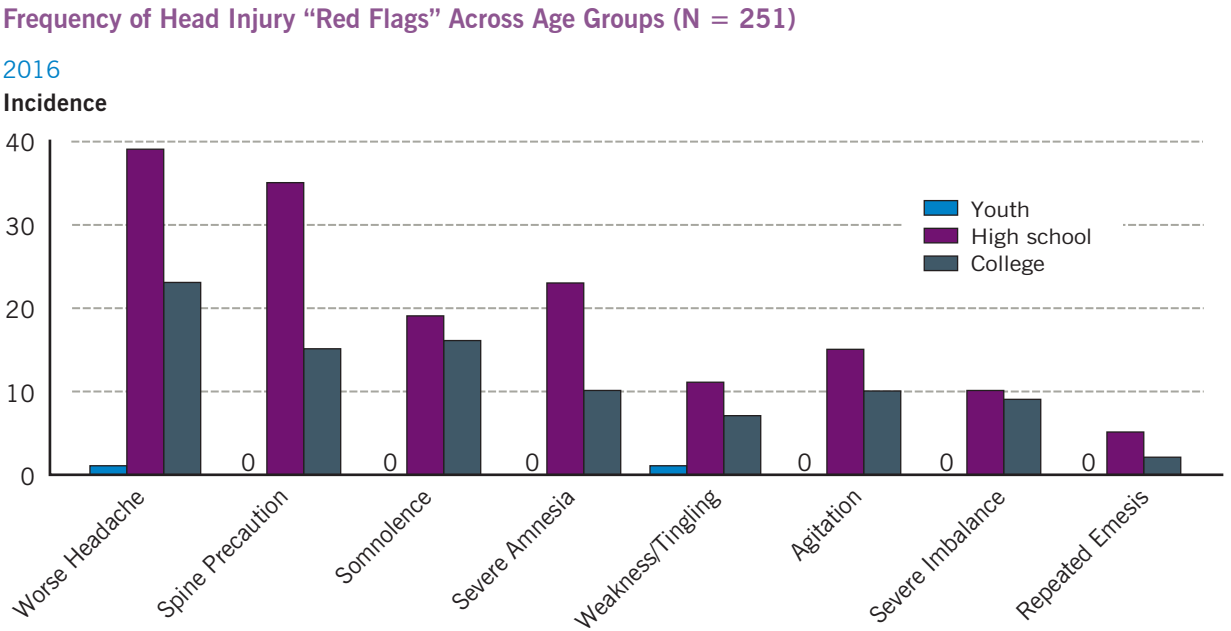
2016




Overall, concussion rates were significantly higher ($P < 0.05$) in competition compared with practice, with the notable exceptions of football, wrestling, cheerleading, and girls' swimming. Concussion rates in these sports were substantially higher in practice compared with competition.

As a result, the Concussion Center has been working with high schools across northeast Ohio to stress the importance of having an athletic trainer present for football practice and competition, as well as recommending modifications to the structure, environment, and type of practice for cheerleaders.

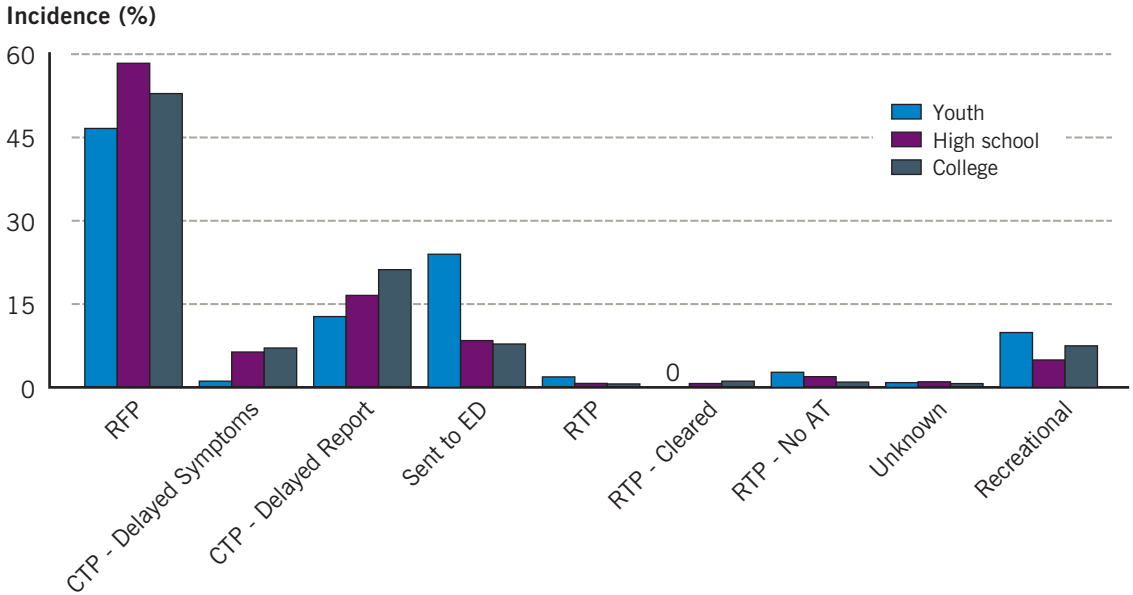
### Frequency of Head Injury "Red Flags" Across Age Groups (N = 251)




Documentation of "red flags," or signs and symptoms that may indicate a more serious head injury, is critical to ensure that patients receive care consistent with the acuity of their injury. The incidence of each red flag category is shown as a function of youth (5–13 years), high school (14–18 years), and college (19–24 years). Only 2 youth patients had red flags, a significantly lower number ($P < 0.05$) compared with 157 in high school and 92 in college.

## Athlete Disposition Following Head Injury (N = 1631)

2016




AT = athletic trainer, CTP = continued to play, RFP = removed from play, RTP = returned to play

Documenting what happens to an athlete after a head injury can lead to better understanding of how a standardized Concussion Incident Report influences patient care. Importantly, less than 1% of high school and college athletes were returned to play following the completion of the incident report, but youth athletes were returned to play at approximately twice that rate. Youth athletes also experienced a lower relative percentage of removal from play (47% vs 59% and 53% for high school and collegiate athletes, respectively). These disparities in management at the youth athlete level further justify the need for licensed personnel, such as athletic trainers, on the sideline. Additionally, youth athletes, despite lower incidence of red flags, were disproportionately sent to the emergency department and subsequently underwent CT scanning.

## Cleveland Clinic Concussion (C3) App

More than 7000 student-athletes in northeast Ohio complete baseline concussion testing annually. Baseline evaluations allow caregivers within the Concussion Center to compare the athlete's performance on cognitive and motor tasks after a suspected concussion to their healthy baseline performance, thus improving diagnosis and treatment. In 2016, 181 student-athletes who were diagnosed with concussions were divided into 2 groups: those who recovered within 3 weeks of their injury (N = 92) and those who were still symptomatic 3 weeks after their injury (N = 89). The C3 app showed significant differences for simple reaction time, choice reaction time, the Trail Making Test, and postural sway during balance testing. Measuring balance using iPad sensors was more sensitive than subjective evaluations of balance. Predictive models are currently being built using clinical and C3 data to identify student-athletes who, after sustaining a concussion, may experience a delayed recovery. This use of predictive analytics will facilitate patient access to the appropriate provider to potentially reduce recovery time.

### Measurement of Cognitive and Motor Function Following Concussion (N = 181)

2016

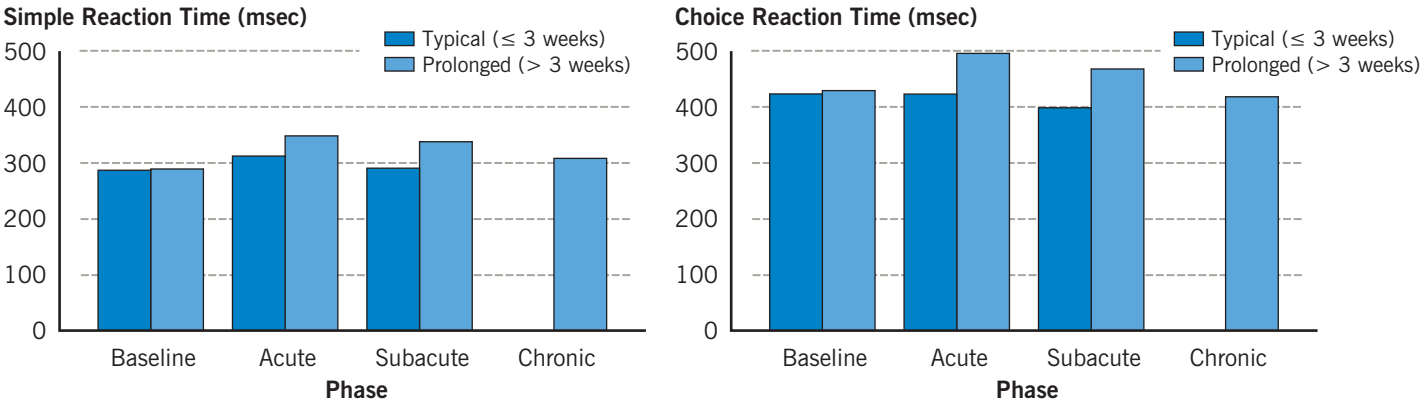
| Module | Baseline | Postinjury | Difference Between Groups Postinjury[a] *P* Values |
|---|---|---|---|
| Graded symptom checklist | | X | **0.0001** |
| Standardized assessment of concussion | | X | 0.17 |
| Trail Making Test A | X | X | 0.05 |
| Trail Making Test B | X | X | **0.01** |
| Simple and choice reaction time | X | X | **0.0003**; **0.0009** |
| Processing speed test | X | X | 0.17 |
| BESS | X | X | 0.26 |
| Instrumented BESS | X | X | **0.02**–0.82 |

BESS = Balance Error Scoring System

[a]Bold type indicates statistical significance.

## Measures of Information Processing Following Concussion (N = 181)

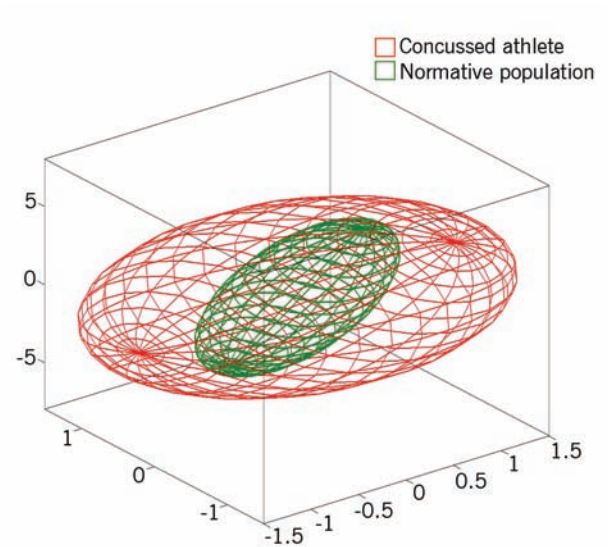
2016




The C3 App uses 2 reaction time tasks to measure the student-athlete's information processing abilities. At baseline, all student-athletes performed comparably on both reaction time tasks. However, at follow-up after injury, significant differences in simple reaction time ($P = 0.0003$) and choice reaction time ($P = 0.0009$) were evident when comparing student-athletes who recovered within 3 weeks with those who took longer than 3 weeks to recover. This difference was noted at all phases of recovery.

## Postural Sway

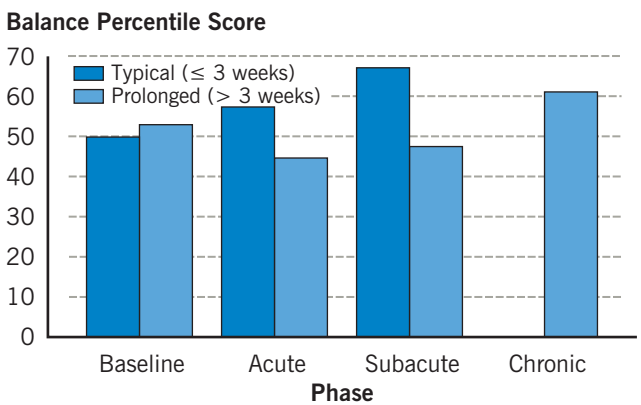
Deficits in postural stability are a hallmark finding after concussion. The clinically accepted test to measure balance is the Balance Error Scoring System (BESS), in which discrete losses of balance are measured while athletes complete 6 20-second balance stances. While this traditional clinical approach to measuring balance using the BESS did not detect differences between the typical and prolonged recovery groups of student-athletes, the Instrumented BESS, in which the iPad inertial sensors are used to measure postural sway, did detect differences. The accelerometer and gyroscope native to the iPad are used to provide a 3-dimensional assessment of postural sway during the 6 BESS stances. This biomechanical metric proved to be more sensitive in detecting deficits in balance postinjury when comparing the typical recovery group of student-athletes with the prolonged recovery group.




Three-dimensional postural sway data from a representative concussed student-athlete. The red ellipse depicts postural sway for the injured athlete, while the green ellipse represents the mean postural sway of healthy age- and gender-matched peers.

### Measures of Balance Following Concussion (N = 181)

2016




Measurements of balance, when compared with baseline, show that the prolonged recovery group of student-athletes had significantly ($P$ = 0.03) lower scores compared with the group of student-athletes who recovered within the typical 3 weeks. These findings suggest that biomechanical approaches to measuring postural stability following concussion are more sensitive than traditional subjective measures.

## Return-to-Play and Return-to-Learning Reporting

In addition to incident reporting, a critical aspect of understanding the outcomes of concussion care involves monitoring the progression of recovery along the pathway to return-to-learning (RTL) and return-to-play (RTP) after concussion. Consensus guidelines exist, which recommend a 6-phase graduated RTP protocol of exertional recovery after concussion, from initial rest (Phase 1) to eventual RTP (Phase 6).[1] However, less is understood about the impact of missed school days and RTL protocols. The development and deployment of the Concussion RTP module to a mobile device, iPad, or iPhone allows athletic trainers, who typically supervise recovery, to closely monitor and document the progress of each individual student-athlete.

### Impact of Sports Concussion on School Days Missed (N = 549)

2016

| Concussion RTP Module Data | |
|---|---|
| Percent of student-athletes with school days missed | 21.3% (N = 117) |
| Average school days missed (N = 117) | 1.7 days |

The RTP module was used for 549 student-athletes. In addition to monitoring the exertional recovery aspects of RTP, athletic trainers used the Concussion RTP module to document the days missed from school by student-athletes. Among the 549 student-athletes, 117 missed a total of 197.5 days from school, for an average of 1.7 days per student-athlete. Absenteeism from school affects parents as well as students. Medical appointments and monitoring youths after a concussion often results in missed days from work. A conservative estimate of missed work time for adults due to their child's concussion is one-half day per missed school day. Therefore, based on a total of 197.5 school days missed and a day of work valued at $190, the financial impact for adults missing work can be estimated at $19,000. In 2015, student-athletes missed an average of 3.4 days of school, exactly double the 2016 rate. This decline in school days missed may have saved an estimated $19,000 for families/employers. The Concussion RTP module will continue to enable a deeper understanding of the impact of sports concussion on both RTL and RTP, and a family's financial situation. These data will be useful in providing patients with realistic expectations related to the projected number of days they may be absent from school and sport. Further, having these data will facilitate interactions with school administrators and school counselors to ensure appropriate accommodations are provided for the student-athlete.

**Reference**

1. McCrory P, Meeuwisse WH, Aubry M, et al. Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012. *Br J Sports Med*. 2013 Apr;47(5):250-258.

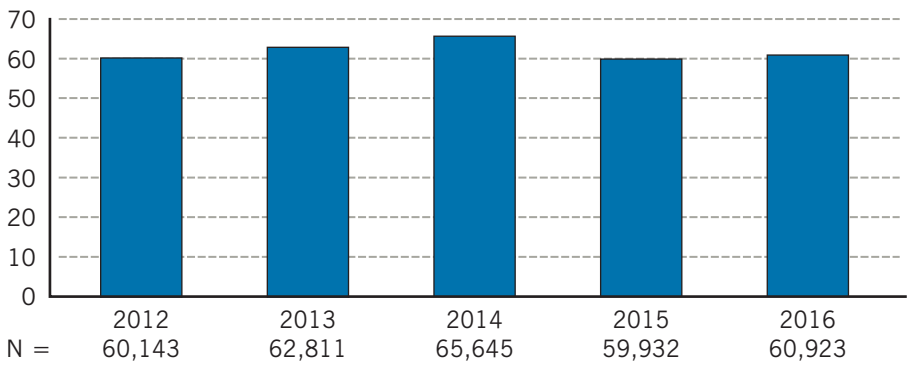
# Rheumatology Overview

*Since the beginning of the BIOLOGIC SUMMITS in 2005, this local meeting has grown into an international event. In 2016, more than 320 attendees gathered in Cleveland. More impressively, each SUMMIT has been repurposed and posted at ccfcme.org/rheumcme and is available free to all. The R. J. Fasenmyer Center for Clinical Immunology has issued more than 40,000 hours of continuing medical education credit for this remarkable meeting.*

*The R. J. Fasenmyer Center sponsors an ongoing program in basic and clinical immunology designed for rheumatologists, holding its fourth annual boot camp (Basic and Clinical Immunology for the Busy Clinician) in Hollywood, Florida, for nearly 100 practitioners.*

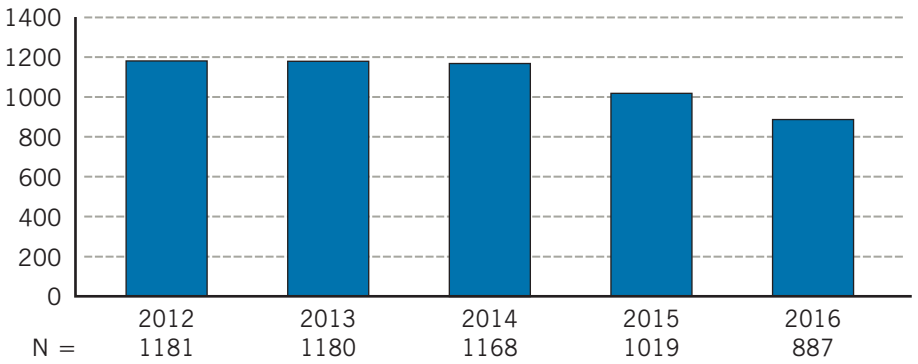
## Patient Visit Volumes

2012 – 2016




## Volume of New Rheumatoid Arthritis Patient Visits

2012 – 2016

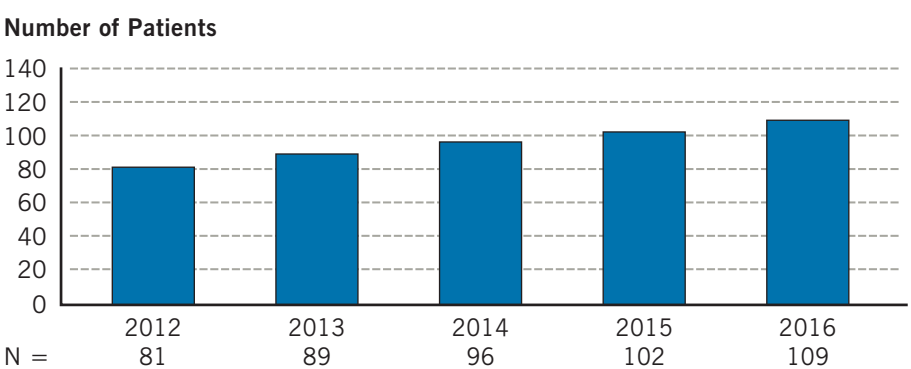


| Most Common Conditions Treated in 2016[a] | |
|---|---|
| **Condition** | **Volume** |
| Rheumatoid arthritis | 4303 |
| Osteoarthritis | 3343 |
| Vasculitis | 2716 |
| Connective tissue diseases | 2510 |
| Osteoporosis | 2420 |
| Chronic pain syndromes | 1841 |
| Fibromyalgia | 1094 |
| **Total** | **18,227** |

[a]Excludes Cleveland Clinic family health centers

## Volume of New Granulomatosis With Polyangiitis (Wegener's) Patient Visits

2012 – 2016



# Rheumatology Overview

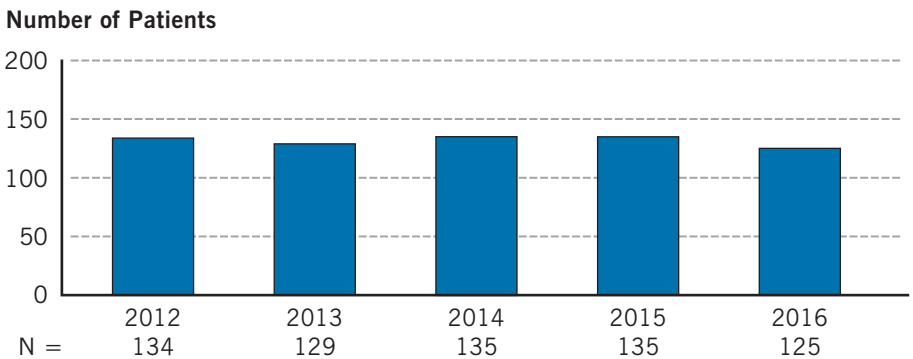
Volume of Medication Infusions
Cleveland Clinic Main Campus — Outpatient

2012 – 2016

| Medication | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|
| Intravenous immunoglobulin (Gammagard®) | 563 | 666 | 641 | 569 | 700 |
| Infliximab (Remicade®) | 555 | 580 | 623 | 603 | 703 |
| Rituximab (Rituxan®) | 355 | 494 | 556 | 688 | 850 |
| Abatacept (Orencia®) | 361 | 351 | 334 | 334 | 332 |
| Zoledronic acid (Reclast®) | 366 | 321 | 262 | 234 | 245 |
| Tocilizumab (Actemra®) | 159 | 186 | 177 | 152 | 135 |
| Belimumab (Benlysta®) | 82 | 127 | 131 | 159 | 155 |
| Pegloticase (Krystexxa®) | 65 | 39 | 70 | 76 | 31 |
| Cyclophosphamide (Cytoxan®) | 21 | 9 | 25 | 12 | 8 |
| Methylprednisolone (Solu-Medrol®) | 6 | 14 | 16 | 11 | 17 |
| Ibandronate (Boniva®) | 16 | 9 | 8 | 6 | 3 |

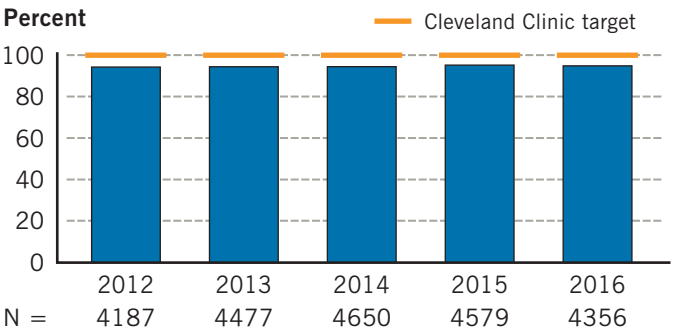
## Volume of New Psoriatic Arthritis Patient Visits

2012 – 2016



## Percentage of Rheumatoid Arthritis Patients Taking Disease-Modifying Antirheumatic Drug Therapy (N = 22,249)

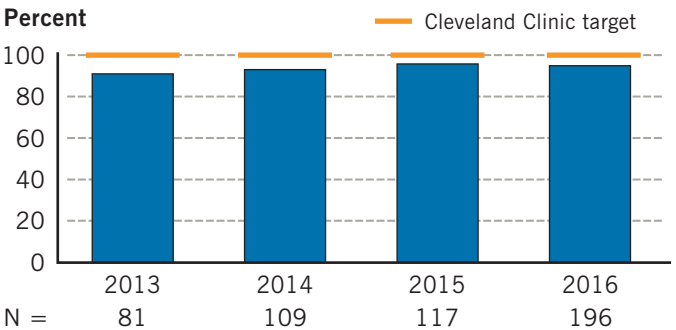
2012 – 2016




American College of Rheumatology guidelines recommend that rheumatoid arthritis patients be treated with disease-modifying antirheumatic drug (DMARD) therapy. More than 94% of rheumatoid arthritis patients who were seen in the Department of Rheumatology at least 2 times during the years 2012–2016 were treated with DMARD therapy in any given year. At some time between 2012 and 2016, 100% of patients had been on a DMARD. Reasons for not prescribing DMARD therapy for the small percentage of patients not on DMARDs included disease remission, refusal of treatment, and contraindications to DMARD therapy.

## Percentage of Newly Diagnosed Patients With Rheumatoid Arthritis Starting Biologic DMARDs Who Had Tuberculosis Testing (N = 503)

2013 – 2016




DMARDs = disease-modifying antirheumatic drugs

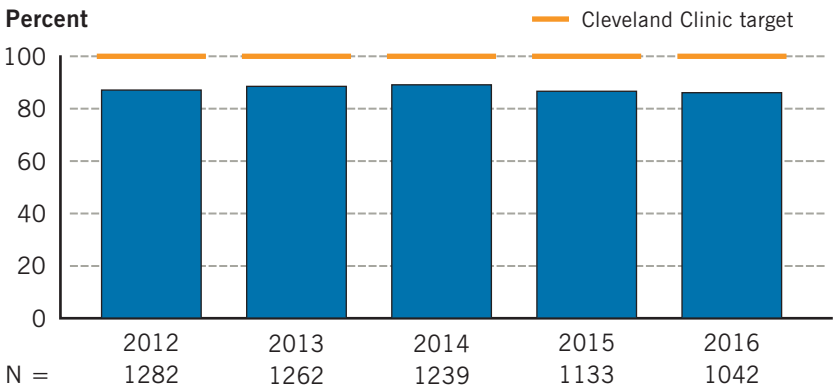
The 2012 Update of the 2008 American College of Rheumatology (ACR) Recommendations for the Use of Disease-Modifying Antirheumatic Drugs and Biologic Agents in the Treatment of Rheumatoid Arthritis[1] recommends tuberculosis (TB) screening before using biologic agents to identify latent TB infection (LTBI). The ACR recommends the tuberculin skin test or interferon-γ release assays as the initial test in all rheumatoid arthritis patients starting biologic agents, regardless of risk factors for LTBI. In 2013, 91% (73 of 81), in 2014, 93% (102 of 109), in 2015, 96% (112 of 117), and in 2016, 95% (186 of 196) of patients had TB testing.

**Reference**

1. Singh JA, Furst DE, Bharat A, Curtis JR, Kavanaugh AF, Kremer JM, Moreland LW, O'Dell J, Winthrop KL, Beukelman T, Bridges SL Jr, Chatham WW, Paulus HE, Suarez-Almazor M, Bombardier C, Dougados M, Khanna D, King CM, Leong AL, Matteson EL, Schousboe JT, Moynihan E, Kolba KS, Jain A, Volkmann ER, Agrawal H, Bae S, Mudano AS, Patkar NM, Saag KG. 2012 update of the 2008 American College of Rheumatology recommendations for the use of disease-modifying antirheumatic drugs and biologic agents in the treatment of rheumatoid arthritis. *Arthritis Care Res (Hoboken)*. 2012 May;64(5):625-639.

## Percentage of Rheumatoid Arthritis Patients Treated With Methotrexate Who Were Prescribed Folic Acid (N = 5958)

2012 – 2016



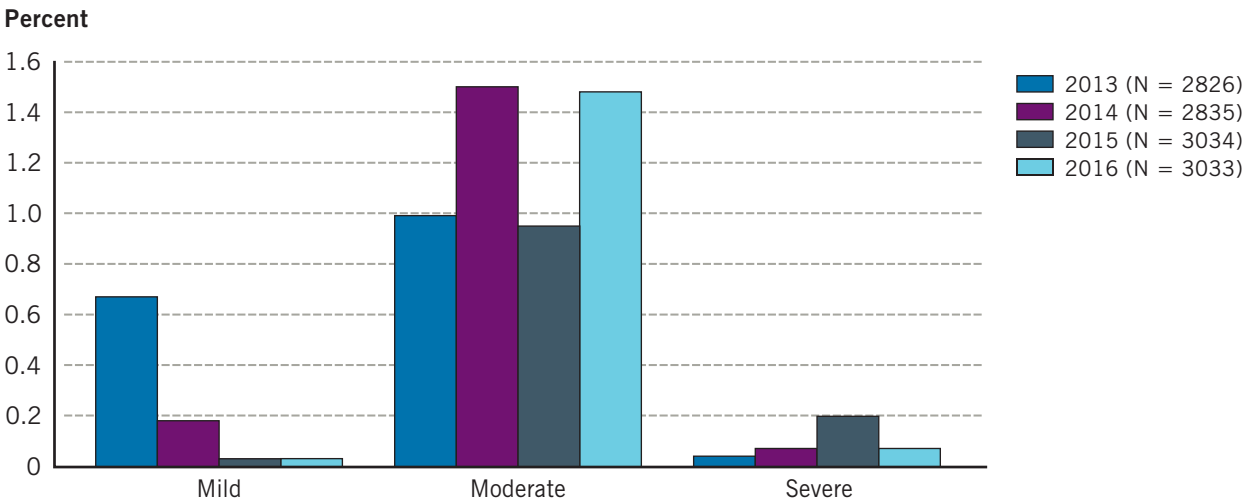

Methotrexate is an effective and frequently used medication for the treatment of rheumatoid arthritis. Long-term therapy is usually required for effective treatment. Methotrexate side effects are a common reason for discontinuation. A Cochrane Review[1] of 6 randomized controlled trials demonstrated that concomitant use of folic acid reduced gastrointestinal toxicity, abnormal transaminase elevation, and patient withdrawal symptoms from methotrexate with no reduction in efficacy. Use of folic acid should be considered in all patients with rheumatoid arthritis. More than 86% of patients were prescribed folic acid; a chart review of a subset of patients who did not receive a folic acid prescription showed frequent use of over the counter folic acid preparations.

**Reference**

1. Shea B, Swinden MV, Tanjong Ghogomu E, Ortiz Z, Katchamart W, Rader T, Bombardier C, Wells GA, Tugwell P. Folic acid and folinic acid for reducing side effects in patients receiving methotrexate for rheumatoid arthritis. *Cochrane Database Syst Rev*. 2013 May 31;(5):CD000951.

## Infusion Reactions in Patients Treated With Biologic and Nonbiologic Therapies in a Rheumatology Infusion Center

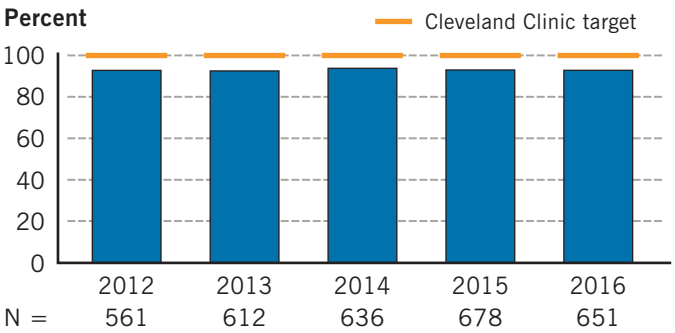
2013 – 2016



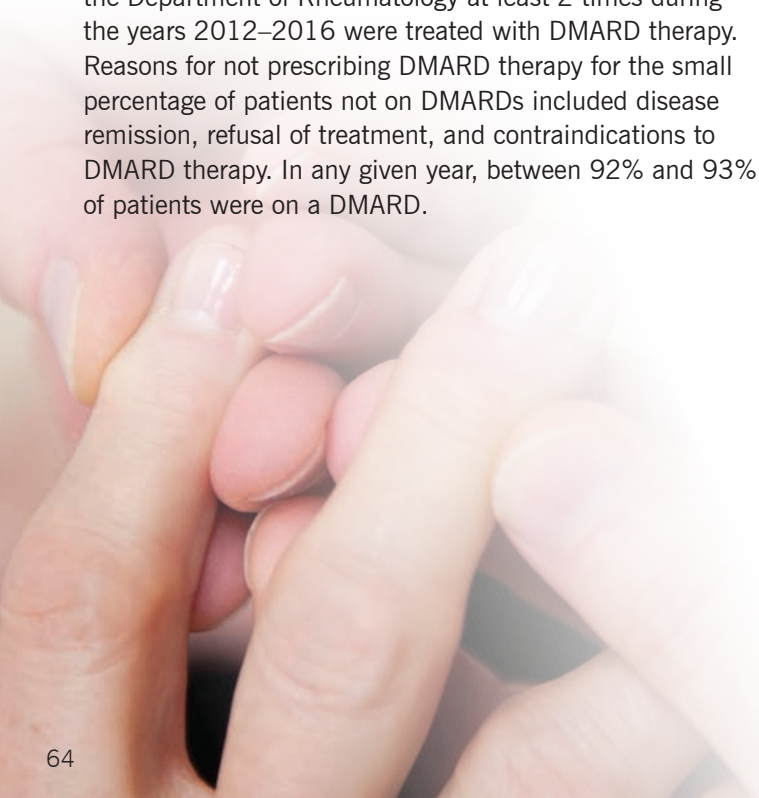

The Rheumatology Infusion Center administered 2826 infusions in 2013, 2835 infusions in 2014, 3034 infusions in 2015, and 3033 infusions in 2016. Both biologic and nonbiologic medications were used to treat a large number of rheumatic diseases. Infusion reactions can be serious complications and require established protocols to guarantee appropriate premedication, infusion rates, and treatment for drug reactions to ensure patient safety. In 2013, reactions occurred in 48 of 2826 infusions (1.7%), and were mild in 19, moderate in 28, and severe in 1 infusion. In 2014, reactions occurred in 50 of 2835 infusions (1.8%), and were mild in 5, moderate in 43, and severe in 2 infusions. In 2015, reactions occurred in 36 of 3034 infusions (1.2%), and were mild in 1, moderate in 29, and severe in 6 infusions. In 2016, reactions occurred in 48 of 3033 patients (1.6%), and were mild in 1, moderate in 45, and severe in 2 infusions. Only 9 patients were not able to complete the infusions (0.23%) in 2013, 2014, 2015, and 2016.

## Percentage of Psoriatic Arthritis Patients Taking Disease-Modifying Antirheumatic Drug Therapy (N = 3138)

2012 – 2016

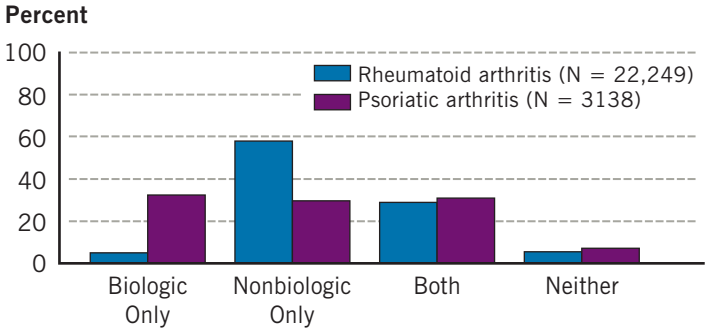



American College of Rheumatology guidelines recommend that psoriatic arthritis patients be treated with disease-modifying antirheumatic drug (DMARD) therapy. More than 99% of psoriatic arthritis patients who were seen in the Department of Rheumatology at least 2 times during the years 2012–2016 were treated with DMARD therapy. Reasons for not prescribing DMARD therapy for the small percentage of patients not on DMARDs included disease remission, refusal of treatment, and contraindications to DMARD therapy. In any given year, between 92% and 93% of patients were on a DMARD.



## Treatment Patterns in Psoriatic and Rheumatoid Arthritis: Use of Biologic DMARDs

2012 – 2016



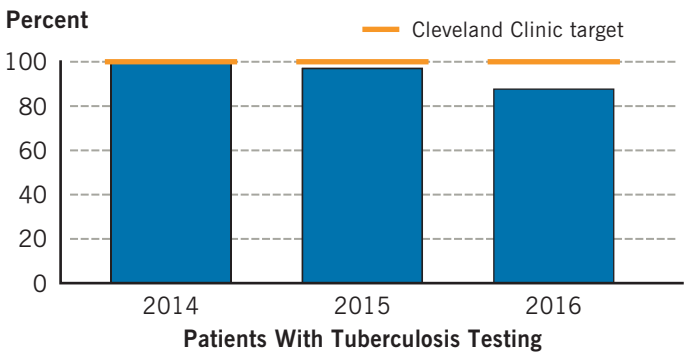

DMARDs = disease-modifying antirheumatic drugs

A comparison was made of DMARD treatment patterns for rheumatoid arthritis (RA) and psoriatic arthritis (PsA). Nonbiologic DMARDs are oral agents (methotrexate, leflunomide, azathioprine, sulfasalazine), while biologic DMARDs are subcutaneous or intravenous medications and are monoclonal antibodies targeting inflammatory cytokines or cells (tumor necrosis factors, IL-1, B-cell). A majority of RA and PsA patients received DMARD therapy in any given year (95% RA; 93% PsA). More patients with PsA received biologic monotherapy than did patients with RA (7.7% RA; 32.4% PsA). Treatment patterns differed with nonbiologic DMARD monotherapy used in 58% of RA patients vs 29.6% of PsA patients.

These outcomes represent DMARD therapy utilization in patients with RA and PsA seen at an academic health center, but may not be representative of general treatment patterns across the US because of clinical factors resulting in selection bias. These outcomes may provide valuable data on practice patterns that may inform clinical trials, decision-making in biologic choice, and differences in responses to agents commonly used in RA and PsA treatment.

## Percentage of Newly Diagnosed Patients With Psoriatic Arthritis Starting Biologic DMARDs Who Had Tuberculosis Testing (N = 133)

2014 – 2016




DMARDs = disease-modifying antirheumatic drugs

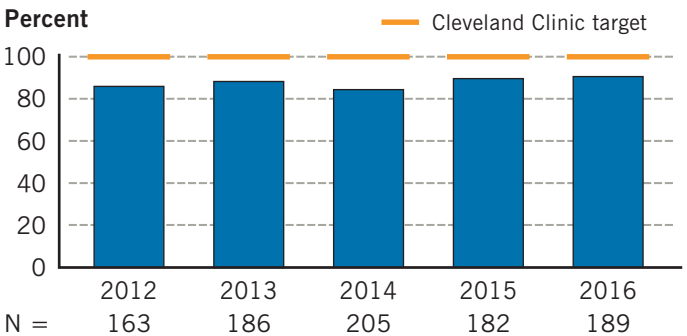
The 2012 Update of the 2008 American College of Rheumatology (ACR) Recommendations for the Use of Disease-Modifying Antirheumatic Drugs and Biologic Agents[1] recommends tuberculosis (TB) screening before using biologic agents to identify latent TB infection (LTBI). The ACR recommends the tuberculin skin test or interferon-γ release assays as the initial test in all patients starting biologic agents, regardless of risk factors for LTBI. Of newly diagnosed psoriatic arthritis patients, 100% in 2014, 97% in 2015, and 87.5% in 2016 had TB testing.

**Reference**

1. Singh JA, Furst DE, Bharat A, Curtis JR, Kavanaugh AF, Kremer JM, Moreland LW, O'Dell J, Winthrop KL, Beukelman T, Bridges SL Jr, Chatham WW, Paulus HE, Suarez-Almazor M, Bombardier C, Dougados M, Khanna D, King CM, Leong AL, Matteson EL, Schousboe JT, Moynihan E, Kolba KS, Jain A, Volkmann ER, Agrawal H, Bae S, Mudano AS, Patkar NM, Saag KG. 2012 update of the 2008 American College of Rheumatology recommendations for the use of disease-modifying antirheumatic drugs and biologic agents in the treatment of rheumatoid arthritis. *Arthritis Care Res (Hoboken)*. 2012 May;64(5):625-639.

## Percentage of Psoriatic Arthritis Patients Treated With Methotrexate Who Were Prescribed Folic Acid (N = 925)

2012 – 2016




Methotrexate is an effective and frequently used medication for the treatment of psoriatic arthritis. Long-term therapy is usually required for effective treatment. Methotrexate side effects are a common reason for discontinuation. A Cochrane Review[1] of 6 randomized controlled trials in rheumatoid arthritis demonstrated that concomitant use of folic acid reduced gastrointestinal toxicity, abnormal transaminase elevation, and patient withdrawal symptoms from methotrexate with no reduction in efficacy. This recommendation is likely to apply to methotrexate use in other conditions such as psoriatic arthritis. Between 86% and 90% of patients were prescribed folic acid; a chart review of a subset of patients who did not receive a folic acid prescription showed frequent use of over the counter preparations.

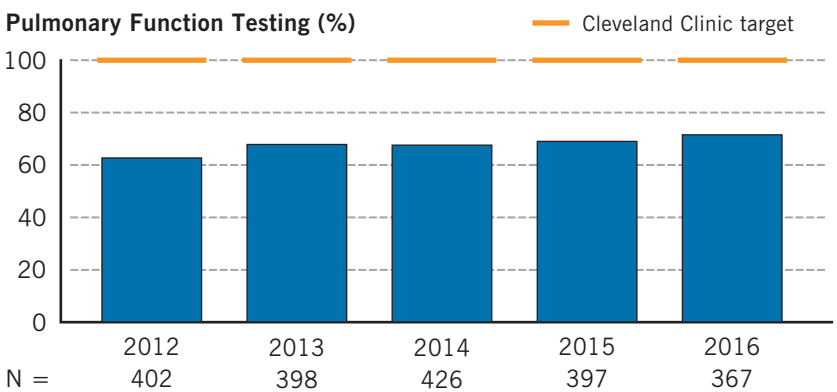
**Reference**

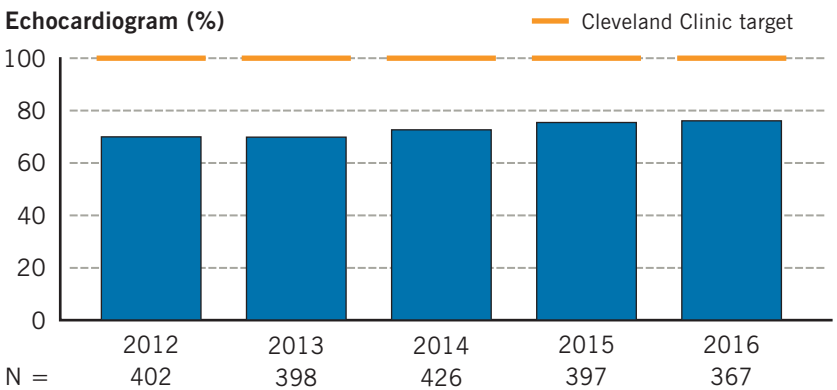
1. Shea B, Swinden MV, Tanjong Ghogomu E, Ortiz Z, Katchamart W, Rader T, Bombardier C, Wells GA, Tugwell P. Folic acid and folinic acid for reducing side effects in patients receiving methotrexate for rheumatoid arthritis. *Cochrane Database Syst Rev*. 2013 May 31;(5):CD000951.

# Progressive Systemic Sclerosis

## Percentage of Patients With Progressive Systemic Sclerosis Who Obtained Pulmonary Function Testing and Echocardiograms (N = 1988)

2012 – 2016



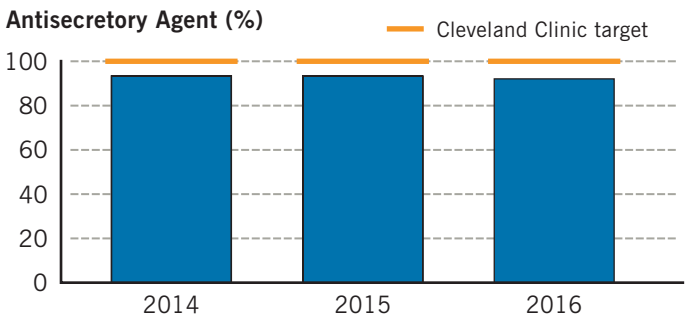

The American College of Rheumatology provided guidelines for detection of pulmonary hypertension (PH) in connective tissue diseases, including progressive systemic sclerosis (PSS).[1] The key recommendation stated that all patients with PSS should be screened for PH with pulmonary function tests (PFTs), including single-breath diffusing capacity for carbon monoxide; transthoracic echocardiogram (echo); and measurement of N-terminal pro-brain natriuretic peptide (NT-proBNP), performed annually. The percentage of patients who had PFTs in the year of the clinic visit plus the previous year ranged from 63% to 71% between 2012 and 2016, with a trend to improved rates of testing since 2012. The percentage of patients who had echos in the year of the clinic visit plus the previous year ranged from 69% to 76% between 2012 and 2016. A chart review of 20 patients who did not obtain a PFT every year (5 PFTs, years 2012–2016) showed that 1 patient had morphea, 1 patient had PFTs performed outside Cleveland Clinic, 16 patients had 1 to 4 PFTs, and only 2 of 20 patients (10%) had no PFTs performed. A chart review of 20 patients who did not obtain an echo every year (5 echos, years 2012–2016) showed that 18 patients had 1 to 4 echos, 1 patient had systemic lupus erythematosus, and only 1 of 20 patients (5%) had no echo. The great majority of patients had a PFT or echo performed during the 5-year period, although yearly tests were achieved in 31% to 76% of patients.

**Reference**

1. Khanna D, Gladue H, Channick R, Chung L, Distler O, Furst DE, Hachulla E, Humbert M, Langleben D, Mathai SC, Saggar R, Visovatti S, Altorok N, Townsend W, FitzGerald J, McLaughlin VV; Scleroderma Foundation and Pulmonary Hypertension Association. Recommendations for screening and detection of connective tissue disease-associated pulmonary arterial hypertension. *Arthritis Rheum*. 2013 Dec;65(12):3194-3201.

## Percentage of Scleroderma Patients With Gastroesophageal Reflux Disease Treated With Antisecretory Medications (N = 408)

2014 – 2016



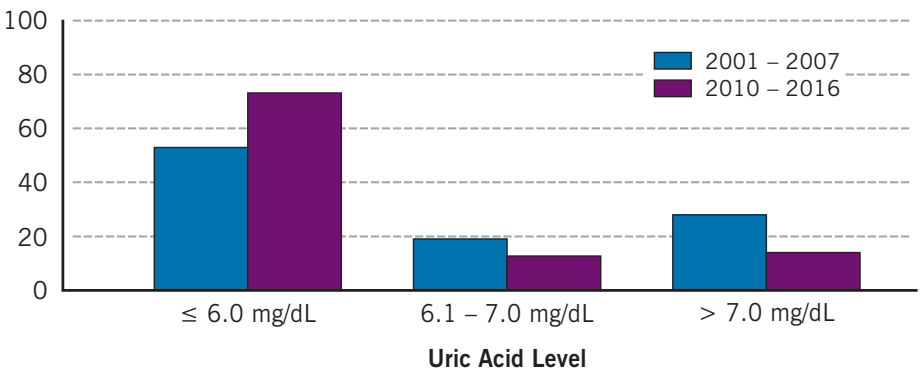

The American Gastroenterological Association Institute Medical Position Panel[1] recommends antisecretory drugs for the treatment of patients with gastroesophageal reflux disease (GERD), based on their ability to heal esophagitis and provide symptomatic relief. In these uses, proton pump inhibitors are more effective than histamine 2 receptor antagonists, which are more effective than placebo. This recommendation is graded A: strongly recommended based on good evidence that it improves important health outcomes. During 2014, 2015, and 2016, 93.4% of patients with progressive systemic sclerosis and GERD were on antisecretory medications.

**Reference**

1. Kahrilas PJ, Shaheen NJ, Vaezi MF, Hiltz SW, Black E, Modlin IM, Johnson SP, Allen J, Brill JV. American Gastroenterological Association Medical Position Statement on the management of gastroesophageal reflux disease. *Gastroenterology*. 2008 Oct;135(4):1383-1391.

## Percentage of Gout Patients Treated With Urate-Lowering Therapy Who Reached Target Uric Acid Level (N = 1910)

2001 – 2016



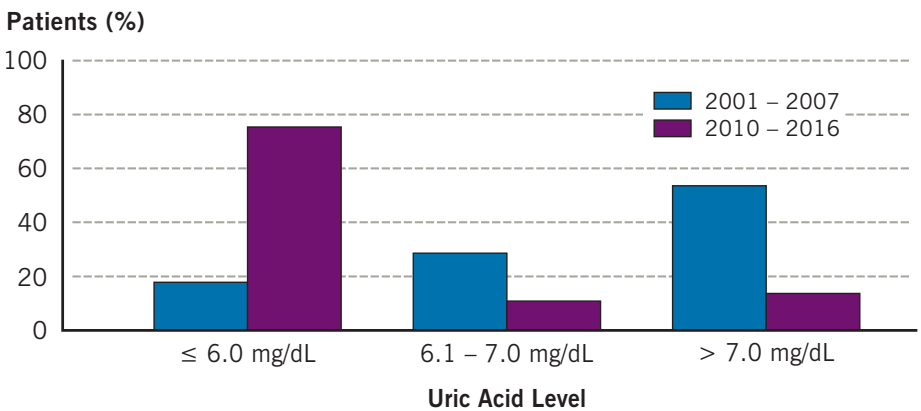

| | | | |
|---|---|---|---|
| 2001 – 2007 | 53.1% | 19.0% | 28.0% |
| 2010 – 2016 | 73.2% | 12.8% | 14.1% |

Patients in this cohort had a diagnosis of gout, had at least 2 visits with a Cleveland Clinic rheumatologist, and were prescribed a uric acid-lowering agent (allopurinol or febuxostat). Two 6-year periods were compared: 2001–2007 and 2010–2016. The recommended target uric acid level was ≤ 6.0 mg/dL. The percentage of patients who achieved a uric acid level of ≤ 6.0 mg/dL increased from 53.1% in 2001–2007 to 73.2% in 2010–2016. In the period 2001–2007, 28% of patients did not achieve a uric acid level < 7.0 mg/dL; in the period 2010–2016, fewer patients (14.1%) did not achieve a uric acid level < 7.0 mg/dL.

The percentage of patients who achieved target plus acceptable uric acid levels increased in the period 2010–2016, although more than 1 in 10 did not achieve target uric acid levels of < 7.0 mg/dL. Substantial numbers of patients do not achieve target uric acid levels and are undertreated with urate-lowering therapy. Defined systems approaches will be needed to improve treatment in gout patients.

## Percentage of Tophaceous Gout Patients Treated With Urate-Lowering Therapy Who Reached Target Uric Acid Level (N = 166)

2001 – 2016



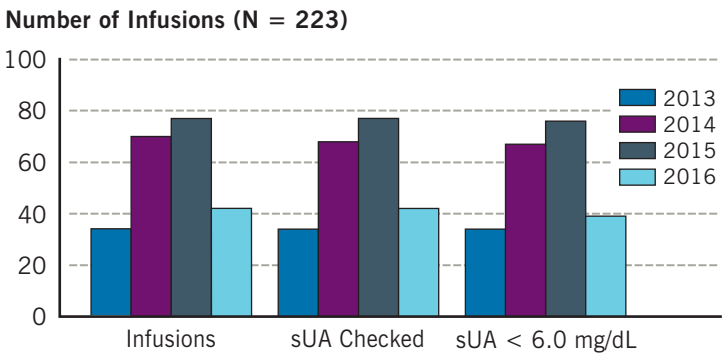

| | | | |
|---|---|---|---|
| 2001 – 2007 | 17.9% | 28.6% | 53.6% |
| 2010 – 2016 | 75.4% | 10.9% | 13.8% |

Patients in this cohort had a diagnosis of tophaceous gout, had at least 2 visits with a Cleveland Clinic rheumatologist, and were prescribed a uric acid-lowering agent (allopurinol or febuxostat). The recommended target uric acid level was ≤ 6.0 mg/dL. Two 6-year periods were compared: 2001–2007 and 2010–2016. The percentage of patients who achieved a uric acid level of ≤ 6.0 mg/dL increased from 17.9% in 2001–2007 to 75.4% in 2010–2016. In the period 2001–2007, 53.6% of patients did not achieve a uric acid level < 7.0 mg/dL; in the period 2010–2016, fewer patients (13.8%) did not achieve a uric acid level < 7.0 mg/dL.

The percentage of patients who achieved target plus acceptable uric acid levels increased in the period 2010–2016, although more than 1 in 10 did not achieve target uric acid levels of < 7.0 mg/dL. Improvement in the percentage of patients who achieved target uric acid levels in 2010–2016 may be related to the release of febuxostat in 2009 and pegloticase in 2010, as well as more emphasis on treatment to target.

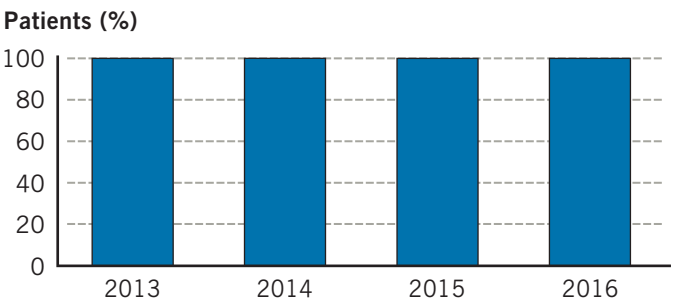
## Number of Gout Patients Treated With Pegloticase Who Reached Target Uric Acid Level

2013 – 2016




sUA = serum uric acid

## Number of Gout Patients Treated With Pegloticase Who Had G6PD Testing (N = 21)




G6PD = glucose-6-phosphate dehydrogenase

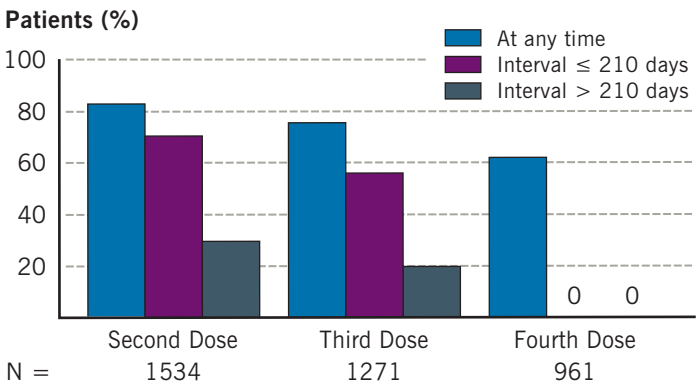
Glucose-6-phosphate dehydrogenase (G6PD) levels should be checked prior to pegloticase infusion because of the risk for hemolysis in G6PD-deficient patients; 100% of patients in 2013, 2014, 2015, and 2016 had G6PD testing.

Pegloticase (Krystexxa®) is a pegylated uricase indicated for the treatment of chronic gout in adult patients resistant to conventional therapy. It is given as an IV infusion every 2 weeks. Anaphylaxis and immune reactions can occur and are based on formation of antibodies. The antibodies result in a loss of effect of the drug, which has been shown to precede the reactions in 91% of cases. Typically, uric acid levels fall below 1 mg/dL; with loss of effect, uric acid levels are higher. This has led to the recommendation that a uric acid level be checked before each infusion. Treatment should be discontinued if uric acid rises to 6.0 mg/dL or higher on 2 consecutive tests.

In 2013, 34 pegloticase infusions were performed in 5 patients; serum uric acid was checked prior to infusion in all cases and was < 6.0 mg/dL in all tests. No infusion reactions occurred. In 2014, 70 pegloticase infusions were performed in 7 patients; serum uric acid was checked prior to infusion in 68 patients, and 66 were < 6.0 mg/dL. In the 2 with uric acid levels > 6.0 mg/dL, pegloticase was discontinued. In 2015, 77 pegloticase infusions were performed in 9 patients; serum uric acid was checked prior to infusion in all patients, and 76 were < 6.0 mg/dL. In the 1 test with uric acid level > 6.0 mg/dL, pegloticase was discontinued. In 2016, 42 pegloticase infusions were performed in 8 patients; serum uric acid was checked prior to infusion in all patients, and 39 were < 6.0 mg/dL. In the 3 tests with uric acid level > 6.0 mg/dL, pegloticase was discontinued.

## Percentage of Osteoporosis Patients Started on Denosumab Who Received Continued Therapy at Specified Intervals

2012 – 2016



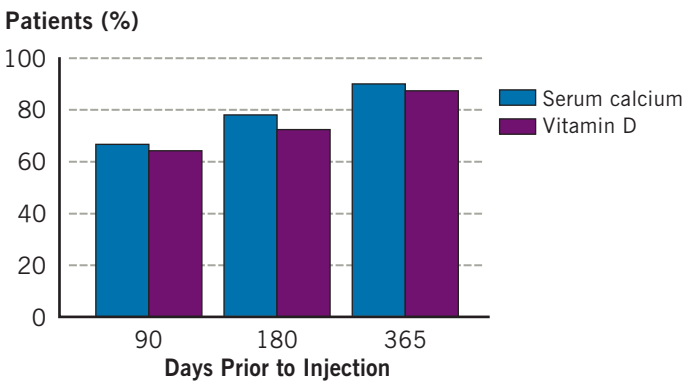

Denosumab (Prolia®) is a medication for patients with low bone mass who are at high risk for fracture. Once treatment is started, current guidelines recommend treatment at 6-month intervals; 17.1% of patients never received a second dose of medication. Doses at intervals > 120 days may be less effective. Of those who received a second dose, 70.5% had a second dose within 210 days of the first (within 90 days of optimal dosing interval of 120 days). Of those who received a third dose, 74.5% had a second dose within 210 days of the first (within 90 days of optimal dosing interval of 120 days). Of all patients who started on denosumab, 62.4% received a fourth dose; 37.4% never received a fourth dose. Only 50% of patients started on alendronate continue after 1 year.[1] Persistence with denosumab is higher but still suboptimal. Systematic methods to monitor drug dosing at recommended intervals are needed to improve compliance with established guidelines.

**Reference**

1. Carr AJ, Thompson PW, Cooper C. Factors associated with adherence and persistence to bisphosphonate therapy in osteoporosis: a cross-sectional survey. *Osteoporos Int.* 2006;17(11):1638-1644.

## Percentage of Patients Treated With Denosumab Who Had Vitamin D and Calcium Testing Prior to Treatment (N = 5960)

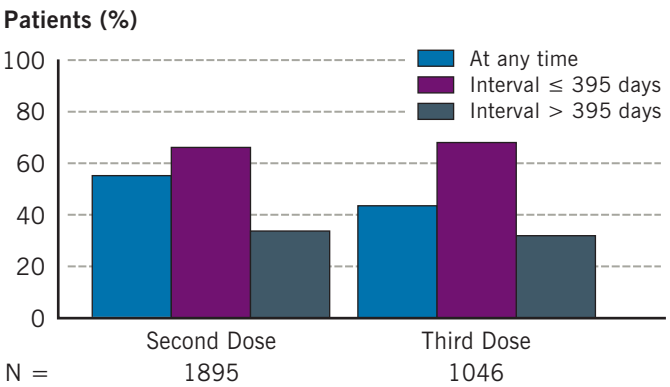
2012 – 2016




Denosumab is a treatment for osteoporosis given as an injection every 6 months. It has been associated with hypocalcemia, which is more common in patients with preinjection hypocalcemia and vitamin D deficiency. Serum calcium and vitamin D testing are suggested within the preceding year to reduce the risk of hypocalcemia: 66.8%, 78.0%, and 90.1% of patients had serum calcium testing in the preceding 90, 180, and 365 days, respectively, while 64.3%, 72.5%, and 87.4% of patients had vitamin D testing in the preceding 90, 180, and 365 days, respectively.

## Percentage of Osteoporosis Patients Started on Zoledronic Acid Who Received Continued Therapy at Specified Intervals

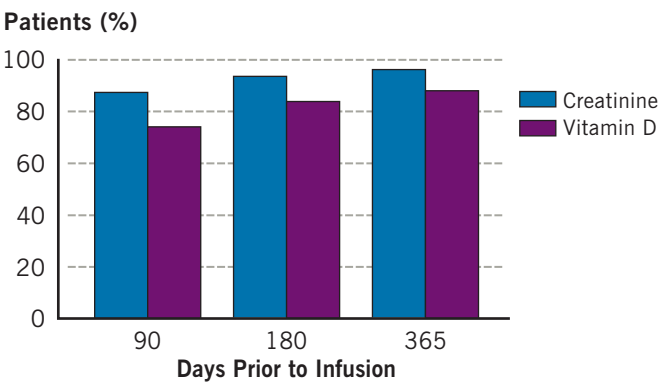
2012 – 2016




Zoledronic acid (Reclast®) is a medication for patients with low bone mass who are at high risk for fracture. Once treatment is started, current guidelines recommend treatment at 1-year intervals. Delays in treatment may result in loss of effect. After initiation of therapy with zoledronic acid, a second dose was administered to 55.2% of patients at any time; 44.8% did not have a second dose. Of those who received a second dose, 66.2% received a dose within 395 days (within 30 days of recommended interval). Of those patients who received a third dose, 68.2% received the dose within 395 days (within 30 days of recommended interval). Only 24.6% of patients who received 1 dose of zoledronic acid received a third dose. Systematic methods to monitor drug dosing at recommended intervals are needed to improve compliance with established guidelines. Of the patients not receiving a second dose of zoledronic acid, approximately 25% were changed to another osteoporosis medication.

## Percentage of Patients Treated With Zoledronic Acid Who Had Renal Function and Vitamin D Testing Prior to Infusion (N = 3919)

2012 – 2016

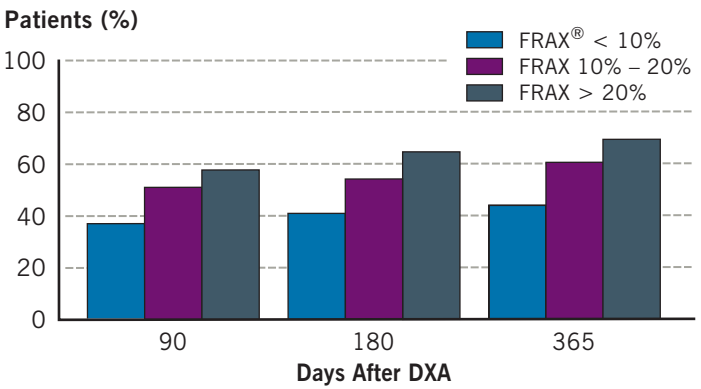



Zoledronic acid infusion for osteoporosis is not recommended for patients with a glomerular filtration rate ≤ 35 mL/min. During the period 2012–2016, 96.3% of patients had renal function testing with a creatinine level and estimated glomerular filtration rate within 365 days prior to infusion. A chart survey of 20 patients who did not have an estimated glomerular filtration rate in the electronic medical record revealed that all 20 had labs done outside Cleveland Clinic, which were documented in the chart prior to zoledronic acid infusion.

Zoledronic acid infusion for osteoporosis may be associated with hypocalcemia after infusion. Patients with hypovitaminosis D are at higher risk for hypocalcemia. Obtaining a vitamin D level is considered standard of care for patients prior to infusion. More than 88% of patients undergoing infusion had a vitamin D level measured within 365 days before infusion.

## Percentage of Patients on Glucocorticoids Treated With Osteoporosis Medications (N = 3006)

2012 – 2016

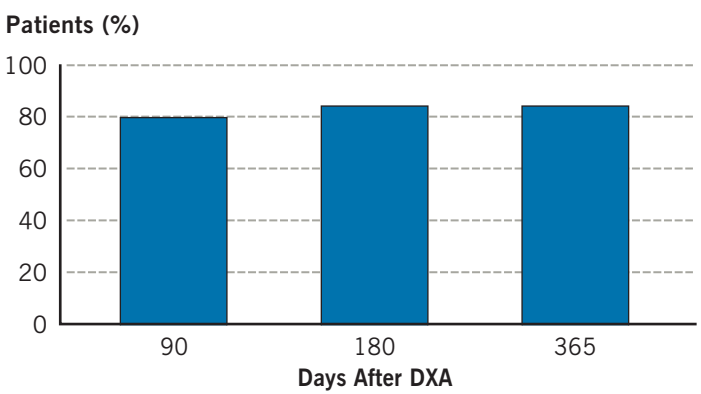



DXA = dual energy x-ray absorptiometry, FRAX = World Health Organization Fracture Risk Assessment Tool

American College of Rheumatology guidelines for glucocorticoid-induced osteoporosis (GIO) recommend treatment based on duration and dose of steroid therapy and absolute fracture risk for major osteoporotic fractures using the FRAX tool (World Health Organization Fracture Risk Assessment Tool). Treatment is recommended for most patients with a 10-year absolute fracture risk of major osteoporotic fractures ≥ 10%. National Osteoporosis Foundation guidelines in the US recommend treatment if the FRAX 10-year risk is ≥ 20%. Patients on glucocorticoids for > 90 days were examined by absolute fracture risk categories for major osteoporotic fractures. In patients with a 10-year risk for fracture ≥ 20%, 57.8%, 64.7%, and 69.7% were on therapy for GIO at 90, 180, and 365 days, respectively.

## Percentage of Patients With Low Bone Mass (T-Score ≤ – 2.5) and High Fracture Risk by FRAX Who Were Treated With Osteoporosis Medications (N = 1646)

2012 – 2016

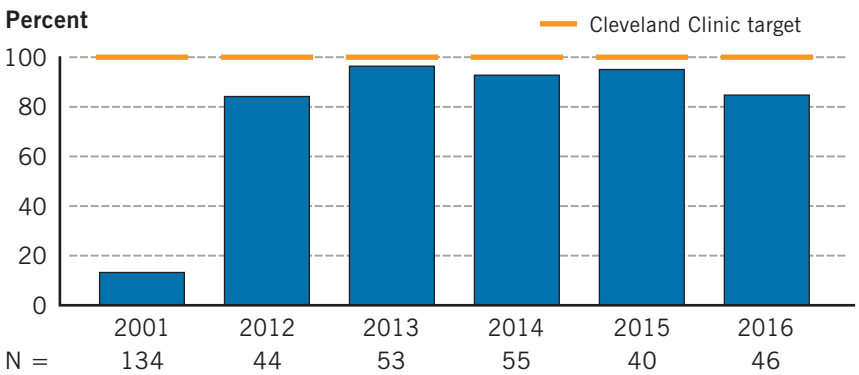



DXA = dual energy x-ray absorptiometry, FRAX = World Health Organization Fracture Risk Assessment Tool

Current guidelines recommend treatment of patients with low bone mass, with a T-score ≤ – 2.5 at the hip or lumbar spine, or patients who have a 10-year absolute fracture risk as calculated by FRAX of ≥ 20% for major osteoporotic fracture or ≥ 3% for hip fracture. Patients were reviewed who were not on treatment at the time of a bone density scan and had low bone mass or high fracture risk, who were then placed on therapy for osteoporosis with medications (bisphosphonates, denosumab, raloxifene, and teriparatide). For the period 2012–2016, 79.9% of patients were placed on medication within 90 days, with 84.3% of patients on treatment at 180 and 365 days. A treatment gap exists since 15.7% of patients at high risk for fracture were untreated 365 days after bone density testing.

## Percentage of Cardiac Transplant Patients Who Had a DXA Scan

2001 – 2016

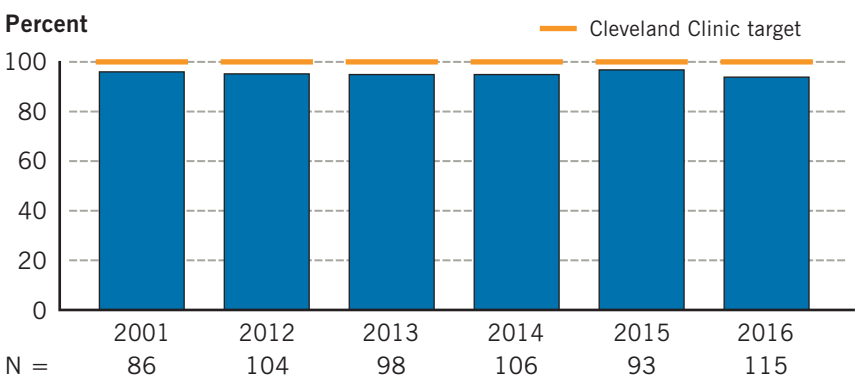



DXA = dual energy x-ray absorptiometry

Glucocorticoid use is associated with bone loss and fractures. The 2010 American College of Rheumatology guidelines on glucocorticoid-induced osteoporosis recommend a dual energy x-ray absorptiometry (DXA) scan for patients on glucocorticoid therapy for 3 months or more. Cardiac transplant recipients receive glucocorticoids for more than 3 months after surgery to prevent organ rejection. Fewer than 15% of transplant patients had DXA scans before or within 6 months after transplant in 2001. Collaboration between the Transplant and Osteoporosis centers since 2001 has markedly improved the frequency of DXA scans in cardiac transplant patients before or within 6 months after transplant surgery. Between 84% and 96% of cardiac transplant patients since 2012 have had bone evaluation with DXA scan.

## Percentage of Lung Transplant Patients Who Had a DXA Scan

2001 – 2016

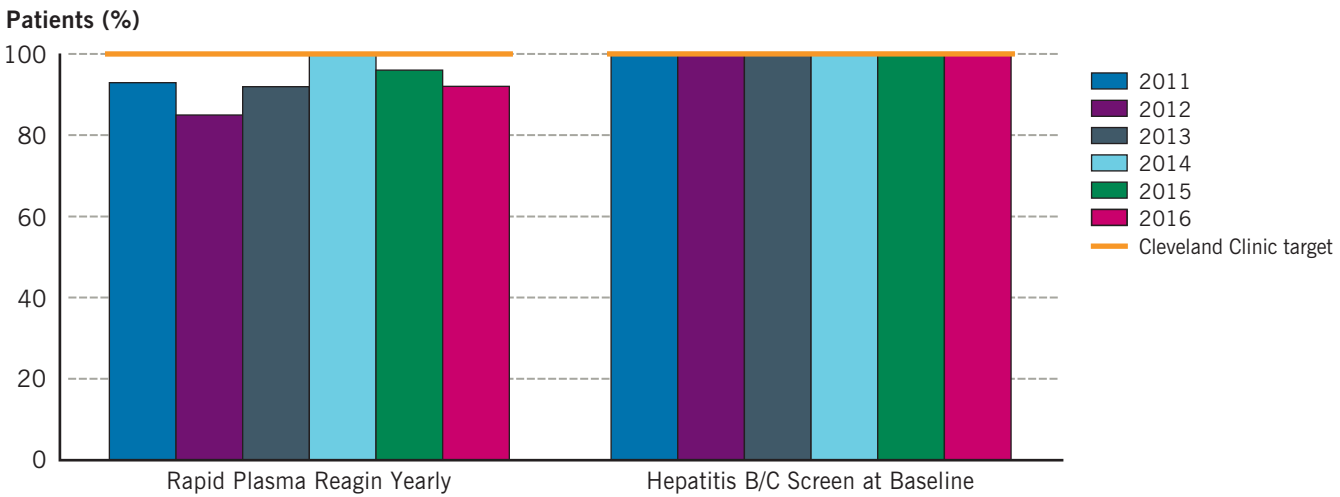



DXA = dual energy x-ray absorptiometry

Lung transplant recipients receive glucocorticoids for more than 3 months after surgery to prevent organ rejection. Collaboration between the Transplant and Osteoporosis centers since 2001 has resulted in a continued high frequency of DXA scans in lung transplant patients before or within 6 months after transplant surgery. Between 95% and 97% of lung transplant patients since 2012 have had bone evaluation with DXA scan.

## Percentage of Patients With HIV/AIDS Who Obtained Lab Tests per Recommended Guidelines (N = 83)

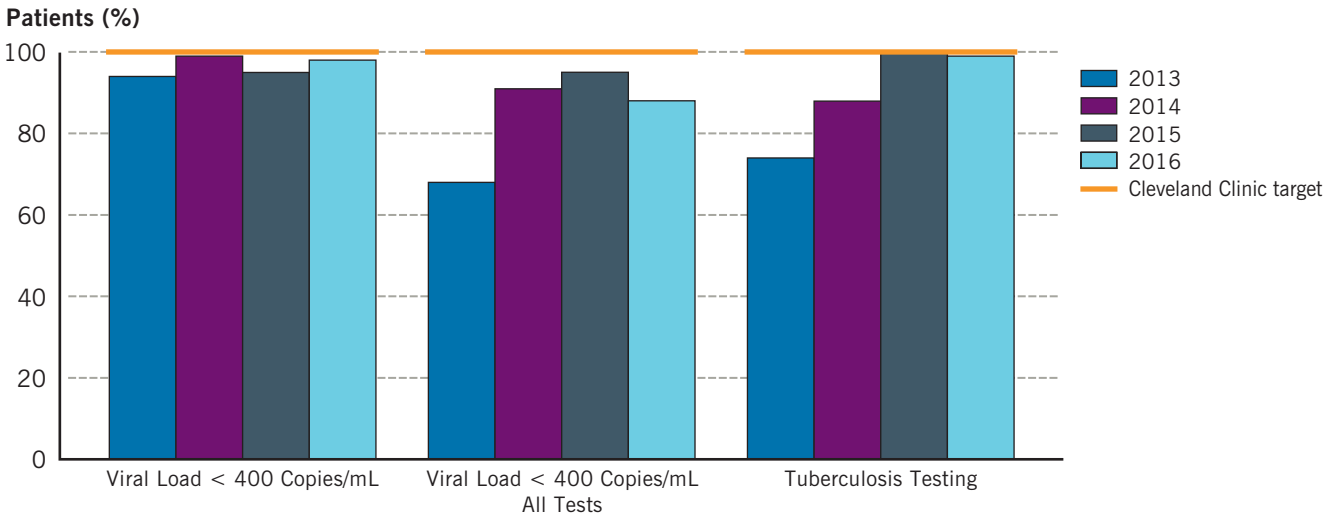
2011 – 2016




Patients with HIV/AIDS should have a rapid plasma reagin for syphilis yearly and screening for hepatitis B and C at the baseline visit. All patients had hepatitis screening at baseline, and 85% to 100% had screening for syphilis during 2011–2016. These outcomes are based on guidelines prepared by the National Committee for Quality Assurance, HIV Medicine Association, Infectious Diseases Society of America, and HIV/AIDS Workgroup, and are the standard of care for HIV patients.

## Percentage of Patients With HIV/AIDS Who Obtained Lab Tests per Recommended Guidelines (N = 83)

2013 – 2016

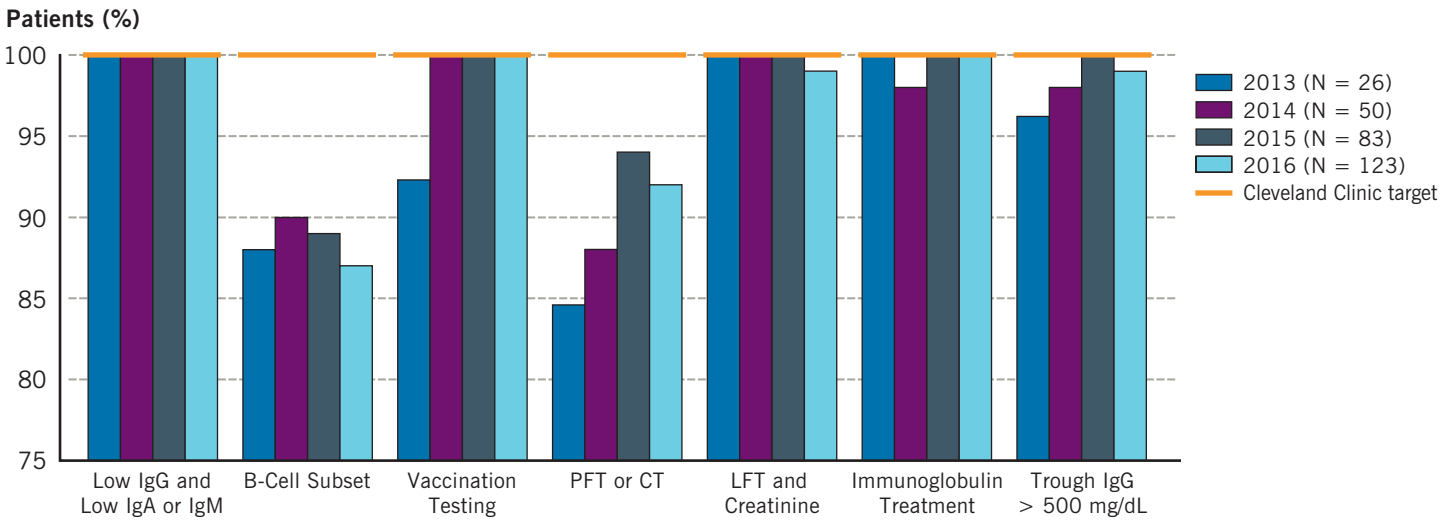



Patients with HIV/AIDS should have testing for tuberculosis at the baseline visit; 74% of patients in the cohort had tuberculosis testing in 2013, 88% in 2014, 100% in 2015, and 99% in 2016. The goal of treatment is viral suppression to a level < 400 copies/mL: 94% of patients had a documented viral load < 400 copies/mL in 2013, 99% in 2014, 95% in 2015, and 98% in 2016; 68% of patients had a viral load < 400 copies/mL on every test in 2013, 91% in 2014, 95% in 2015, and 88% in 2016. Tuberculosis testing and frequent measures of viral load have improved during 2013–2016. These outcomes are based on guidelines prepared by the National Committee for Quality Assurance, HIV Medicine Association, Infectious Diseases Society of America, and HIV/AIDS Workgroup, and are the standard of care for HIV patients.

## Common Variable Immunodeficiency (CVID)

### Percentage of CVID Patients Who Meet Diagnostic, Evaluation, and Treatment Guidelines

2013 – 2016

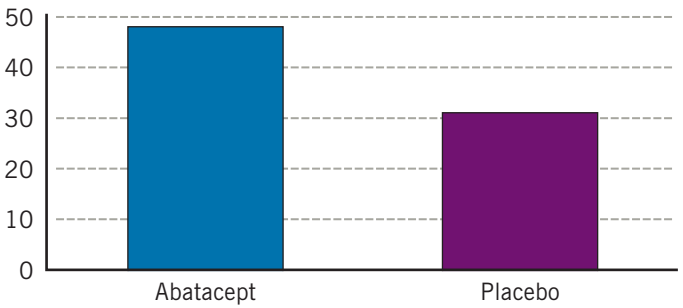



CT = computed tomography, CVID = common variable immunodeficiency, IgA = immunoglobulin A, IgG = immunoglobulin G, IgM = immunoglobulin M, LFT = liver function test, PFT = pulmonary function testing

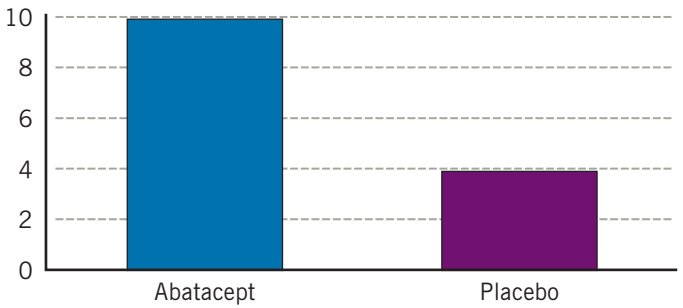
The diagnosis of common variable immunodeficiency requires low levels of IgG plus low IgA or IgM, and poor response to vaccines. Replacement immunoglobulin therapy is recommended regardless of infectious history, and expert consensus suggests that trough IgG levels be > 500 mg/dL to prevent infections. Pulmonary function testing or a computed tomography scan of the chest, liver function tests, and creatinine levels are recommended as yearly follow-up testing. B-cell subsets are recommended at the time of diagnosis because of their value in predicting future clinical course. These current guidelines are based on expert panel recommendations formulated through the Immune Deficiency Foundation as well as published recommendations of experts in the field.

## Abatacept for the Treatment of Giant Cell Arteritis (N = 49)

**Relapse-Free Survival (Remission) at 12 Months, *P* = 0.049 (%)**




**Median Duration of Remission, *P* = 0.023 (Months)**




The objective was to compare the efficacy and safety of abatacept with that of placebo in combination with prednisone for the treatment of giant cell arteritis (GCA). In this multicenter trial, patients with newly diagnosed or relapsing GCA were treated with abatacept 10 mg/kg intravenously on days 1, 15, and 29 and week 8, together with prednisone administered daily. At week 12, patients in remission underwent a double-blind randomization to continue to receive abatacept monthly or switch to placebo. Patients in both study arms received a standardized prednisone taper, with discontinuation of prednisone at week 28.

Forty-nine eligible patients with GCA were enrolled and treated with prednisone and abatacept; of these, 41 reached the week 12 randomization and underwent a blind randomization to receive abatacept or placebo. The relapse-free survival rate at 12 months was 48% for those receiving abatacept and 31% for those receiving placebo ($P = 0.049$). A longer median duration of remission was seen in those receiving abatacept (9.9 months) compared with placebo (3.9 months, $P = 0.023$). There was no difference in the frequency or severity of adverse events in those who received abatacept vs placebo. In patients with GCA, the addition of abatacept to a treatment regimen with prednisone reduced the risk of relapse. This potential for a prednisone-sparing option is clinically meaningful and important in GCA.

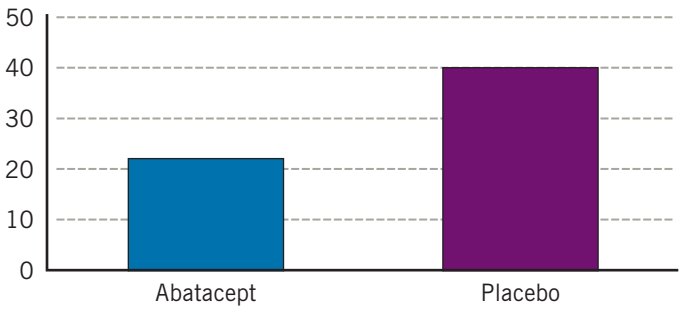
This trial was conducted by the Vasculitis Clinical Research Consortium[1] and funded in whole or in part with federal funds from the National Institute of Arthritis and Musculoskeletal and Skin Diseases, National Institutes of Health, and Department of Health and Human Services, under Contract HHSN2682007000036C.

**Reference**

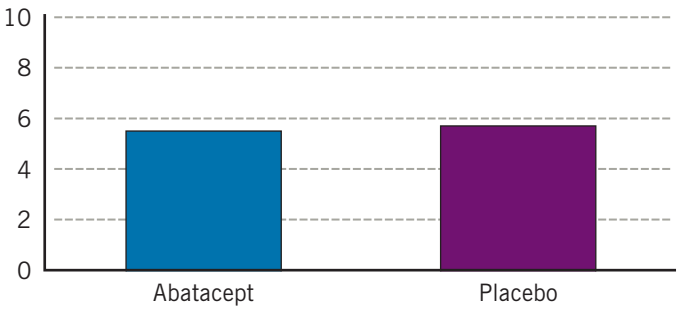
1. Langford CA, Cuthbertson D, Ytterberg SR, Khalidi N, Monach PA, Carette S, Seo P, Moreland LW, Weisman M, Koening CL, Sreih AG, Spiera R, McAlear CA, Warrington KJ, Pagnoux C, McKinnon K, Forbess LJ, Hoffman GS, Borchin R, Krischer JP, Merkel PA; Vasculitis Clinical Research Consortium. A Randomized, Double-Blind Trial of Abatacept (CTLA-4Ig) for the Treatment of Giant Cell Arteritis. *Arthritis Rheumatol*. 2017 Apr;69(4):837-845.

## Abatacept for the Treatment of Takayasu Arteritis (N = 34)

**Relapse-Free Survival (Remission) at 12 Months, *P* = 0.853 (%)**




**Median Duration of Remission, *P* = 0.125 (Months)**




The objective was to compare the efficacy and safety of abatacept with that of placebo in combination with prednisone for the treatment of Takayasu arteritis (TAK). In this multicenter trial, patients with newly diagnosed or relapsing TAK were treated with abatacept 10 mg/kg intravenously on days 1, 15, and 29 and week 8, together with prednisone administered daily. At week 12, patients in remission underwent a double-blind randomization to continue to receive abatacept monthly or switch to placebo. Patients in both study arms received a standardized prednisone taper, reaching a dosage of 20 mg daily at week 12, with discontinuation of prednisone at week 28.

Thirty-four eligible patients with TAK were enrolled and treated with prednisone and abatacept; of these, 26 reached the week 12 randomization. The relapse-free survival rate at 12 months was 22% for those receiving abatacept and 40% for those receiving placebo ($P = 0.853$). Treatment with abatacept in patients with TAK enrolled in this study was not associated with a longer median duration of remission (median duration 5.5 months for abatacept vs 5.7 months for placebo, $P = 0.125$). There was no difference in the frequency or severity of adverse events in those who received abatacept vs placebo. In patients with TAK, the addition of abatacept to a treatment regimen with prednisone did not reduce the risk of relapse. This was the first-ever randomized trial to be conducted in TAK.

This trial was conducted by the Vasculitis Clinical Research Consortium[1] and funded in whole or in part with federal funds from the National Institute of Arthritis and Musculoskeletal and Skin Diseases, National Institutes of Health, and Department of Health and Human Services, under Contract HHSN2682007000036C.

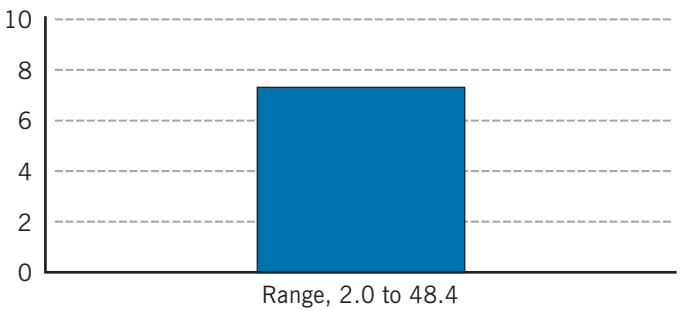
**Reference**

1. Langford CA, Cuthbertson D, Ytterberg SR, Khalidi N, Monach PA, Carette S, Seo P, Moreland LW, Weisman M, Koening CL, Sreih AG, Spiera R, McAlear CA, Warrington KJ, Pagnoux C, McKinnon K, Forbess LJ, Hoffman GS, Borchin R, Krischer JP, Merkel PA; Vasculitis Clinical Research Consortium. A Randomized, Double-Blind Trial of Abatacept (CTLA-4Ig) for the Treatment of Takayasu Arteritis. *Arthritis Rheumatol*. 2017 Apr;69(4):846-853.

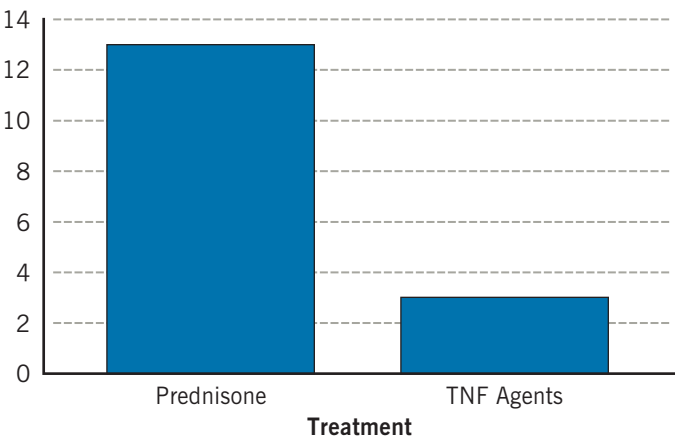
## Adverse Events With Checkpoint Therapy for Cancer (N = 13)

2015 – 2016

**Median Time Onset (Weeks)**

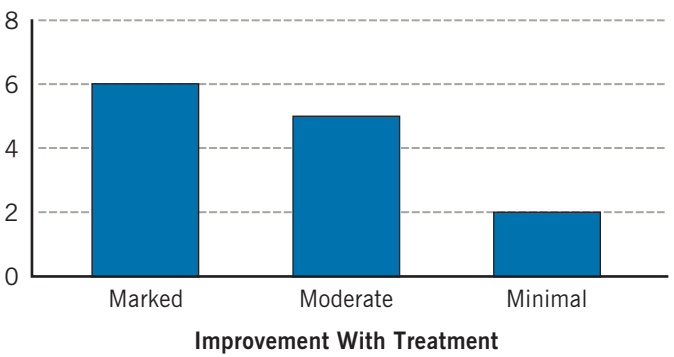


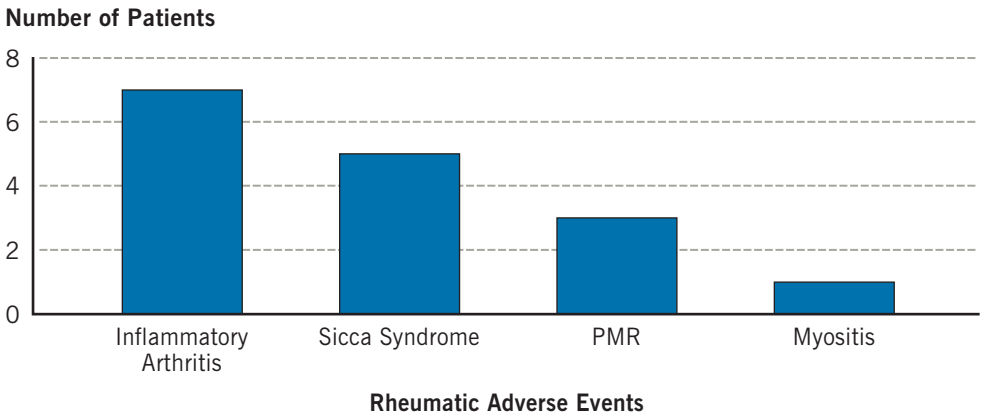

**Number of Patients**




TNF = tumor necrosis factor

**Number of Patients**






PMR = polymyalgia rheumatica

Immunotherapy for cancer with checkpoint inhibitors has been associated with a spectrum of autoimmune and systemic inflammatory reactions known as immune-related adverse events (irAEs). At the time of this study there were 4 FDA-approved drugs: ipilimumab, targeting cytotoxic T-lymphocyte-associated protein 4 (CTLA-4); nivolumab and pembrolizumab, targeting programmed cell death protein 1 (PD-1); and atezolizumab, which targets programmed cell death ligand 1 (PD-L1). Seven patients received combination therapy with ipilimumab and nivolumab (1 patient received tremelimumab followed by durvalumab and 1 patient received ipilimumab followed by pembrolizumab), and the remaining 6 patients received monotherapy with either nivolumab (5) or atezolizumab (1).

Institute experience during an 18-month period with 13 patients: irAEs included inflammatory arthritis, sicca syndrome, polymyalgia rheumatica-like symptoms, and myositis. With the exception of 2 patients who experienced irAEs > 1 year after starting immunotherapy, the median time to onset was 7.3 weeks after initiation of therapy (range, 2.0 to 48.4). All cases required glucocorticoids, and 3 required a biologic agent. Six patients had marked improvement (based on clinician assessment), 5 had moderate, and 2 had minimal improvement. Rheumatic irAEs led to temporary or permanent cessation of immunotherapy in all but 5 patients.

# Patient Experience — Orthopaedic & Rheumatologic Institute

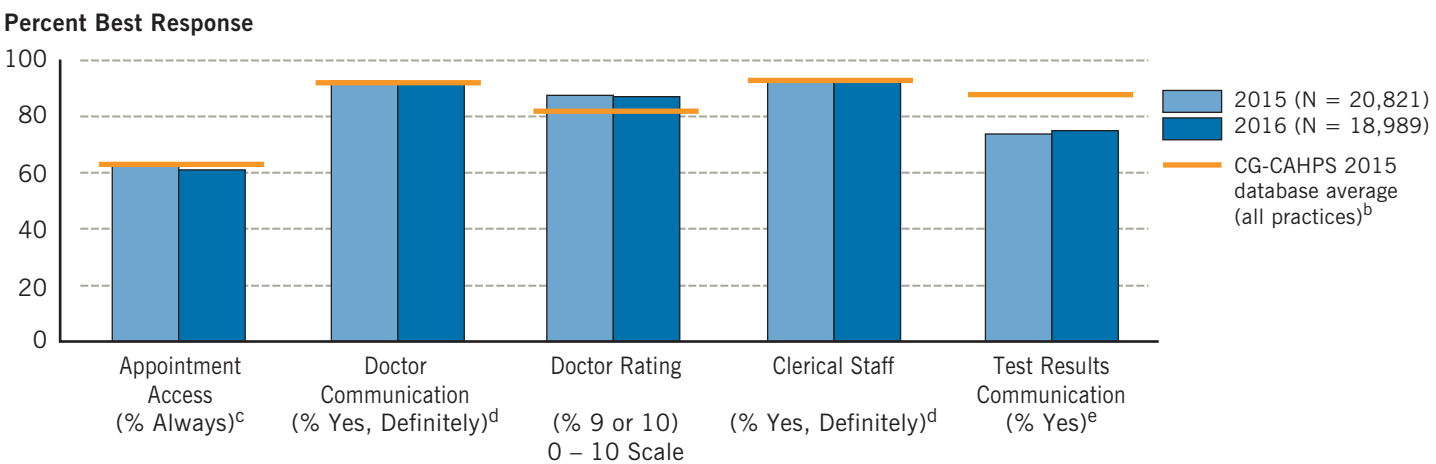
Keeping patients at the center of all that Cleveland Clinic does is critical. Patients First is the guiding principle at Cleveland Clinic. Patients First is safe care, high-quality care, in the context of patient satisfaction, and high value. Ultimately, caregivers have the power to impact every touch point of a patient's journey, including their clinical, physical, and emotional experience.

Cleveland Clinic recognizes that patient experience goes well beyond patient satisfaction surveys. Nonetheless, sharing the survey results with caregivers and the public affords opportunities to improve how Cleveland Clinic delivers exceptional care.

## Outpatient Office Visit Survey — Orthopaedic & Rheumatologic Institute

### CG-CAHPS Assessment[a]

2015 – 2016




[a]In 2013, Cleveland Clinic began administering the Clinician and Group Practice Consumer Assessment of Healthcare Providers and Systems surveys (CG-CAHPS), standardized instruments developed by the Agency for Healthcare Research and Quality (AHRQ) and supported by the Centers for Medicare & Medicaid Services for use in the physician office setting to measure patients' perspectives of outpatient care.
[b]Based on results submitted to the AHRQ CG-CAHPS database from 2829 practices in 2015
[c]Response options: Always, Usually, Sometimes, Never
[d]Response options: Yes, definitely; Yes, somewhat; No
[e]Response options: Yes, No

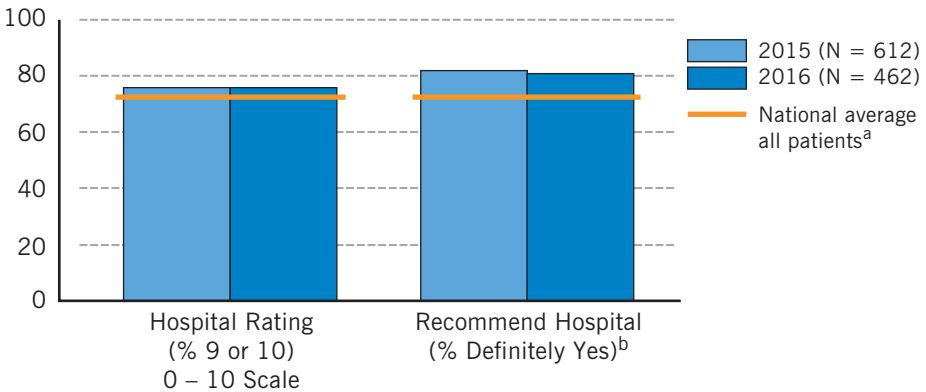
Source: Press Ganey, a national hospital survey vendor

## Inpatient Survey — Orthopaedic & Rheumatologic Institute

### HCAHPS Overall Assessment

2015 – 2016

**Best Response (%)**



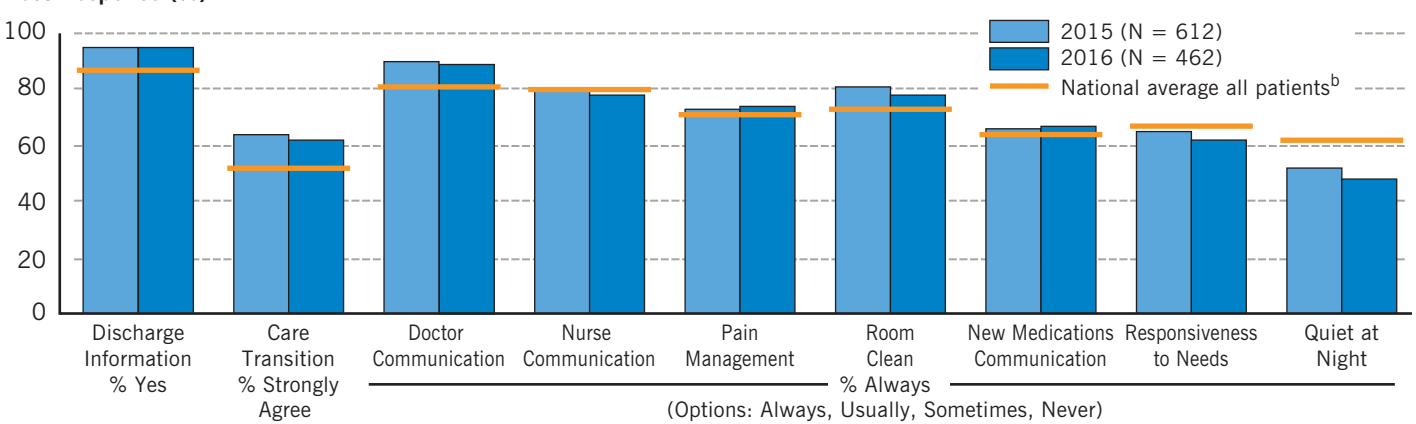

[a]Based on national survey results of discharged patients, January 2015 – December 2015, from 4172 US hospitals. medicare.gov/hospitalcompare
[b]Response options: Definitely yes, Probably yes, Probably no, Definitely no

The Centers for Medicare & Medicaid Services requires United States hospitals that treat Medicare patients to participate in the national Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey, a standardized tool that measures patients' perspectives of hospital care. Results collected for public reporting are available at medicare.gov/hospitalcompare.

### HCAHPS Domains of Care[a]

2015 – 2016

**Best Response (%)**




[a]Except for "Room Clean" and "Quiet at Night," each bar represents a composite score based on responses to multiple survey questions.
[b]Based on national survey results of discharged patients, January 2015 – December 2015, from 4172 US hospitals. medicare.gov/hospitalcompare

Source: Press Ganey, a national hospital survey vendor, 2016

# Cleveland Clinic — Implementing Value-Based Care

## Overview

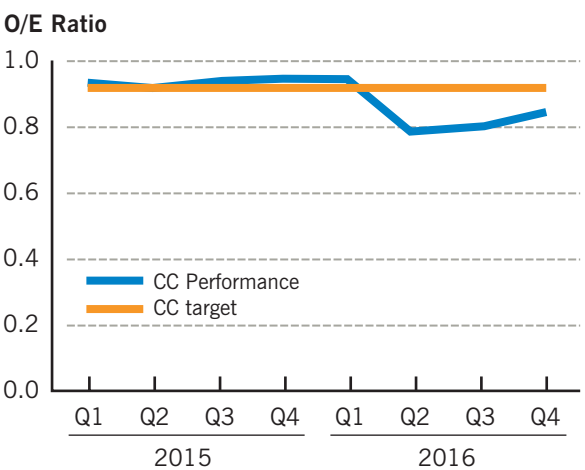
Cleveland Clinic health system uses a systematic approach to performance improvement while simultaneously pursuing 3 goals: improving the patient experience of care (including quality and satisfaction), improving population health, and reducing the cost of healthcare. The following measures are examples of 2016 focus areas in pursuit of this 3-part aim. Throughout this section, "Cleveland Clinic" refers to the academic medical center or "main campus," and those results are shown.

Real-time data are leveraged in each Cleveland Clinic location to drive performance improvement. Although not an exact match to publicly reported data, more timely internal data create transparency at all organizational levels and support improved care in all clinical locations.

## Improve the Patient Experience of Care

### Cleveland Clinic Overall Mortality Ratio

2015 – 2016

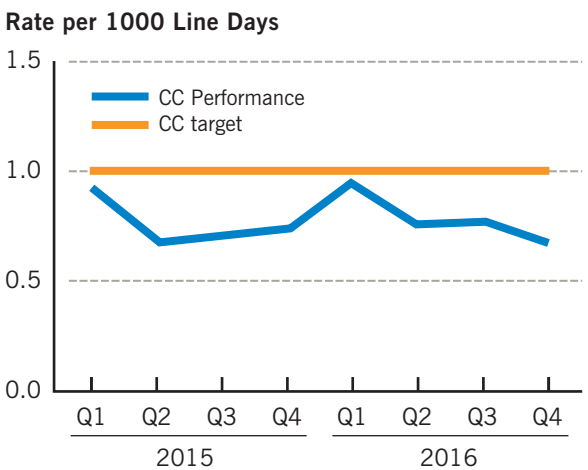



Source: Data from the Vizient Clinical Data Base/Resource Manager™ used by permission of Vizient. All rights reserved.

Cleveland Clinic's observed/expected (O/E) mortality ratio outperformed its internal target derived from the Vizient 2016 risk model. Ratios less than 1.0 indicate mortality performance "better than expected" in Vizient's risk adjustment model.

### Cleveland Clinic Central Line-Associated Bloodstream Infection, reported as Standardized Infection Ratio (SIR)

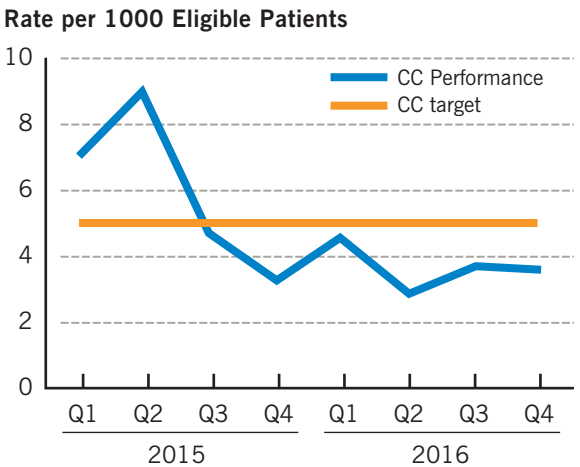
2015 – 2016




Cleveland Clinic has implemented several strategies to reduce central line-associated bloodstream infections (CLABSIs), including a central-line bundle of insertion, maintenance, and removal best practices. Focused reviews of every CLABSI occurrence support reductions in CLABSI rates in the high-risk critical care population.

## Cleveland Clinic Postoperative Respiratory Failure Risk-Adjusted Rate

2015 – 2016

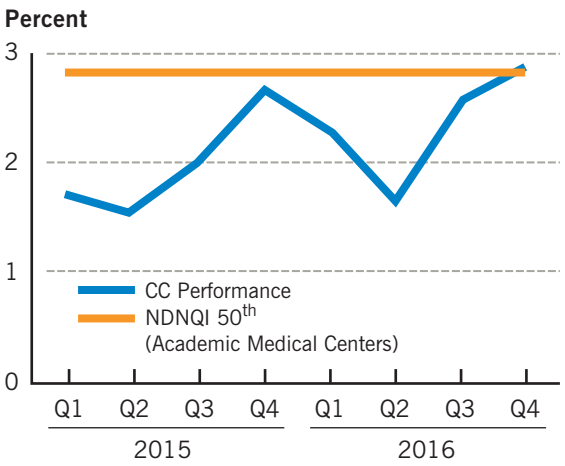



Source: Data from the Vizient Clinical Data Base/Resource Manager™ used by permission of Vizient. All rights reserved.

Efforts continue toward reducing intubation time, assessing readiness for extubation, and preventing the need for reintubation. Cleveland Clinic has leveraged the technology within the electronic medical record to support ongoing improvement efforts in reducing postoperative respiratory failure (AHRQ Patient Safety Indicator 11). Prevention of respiratory failure remains a safety priority for Cleveland Clinic.

## Cleveland Clinic Hospital-Acquired Pressure Ulcer Prevalence (Adult)

2015 – 2016




Source: Data reported from the National Database for Nursing Quality Indicators® (NDNQI®) with permission from Press Ganey.

A pressure ulcer is an injury to the skin that can be caused by pressure, moisture, or friction. These sometimes occur when patients have difficulty changing position on their own. Cleveland Clinic caregivers have been trained to provide appropriate skin care and regular repositioning while taking advantage of special devices and mattresses to reduce pressure for high-risk patients. In addition, they actively look for hospital-acquired pressure ulcers and treat them quickly if they occur.

Cleveland Clinic strategies to mitigate the risk of these pressure injuries include routine rounding to accurately stage pressure injuries, monthly multidisciplinary wound care meetings, and ongoing nursing education, both in the classroom and at the bedside.

# Cleveland Clinic — Implementing Value-Based Care

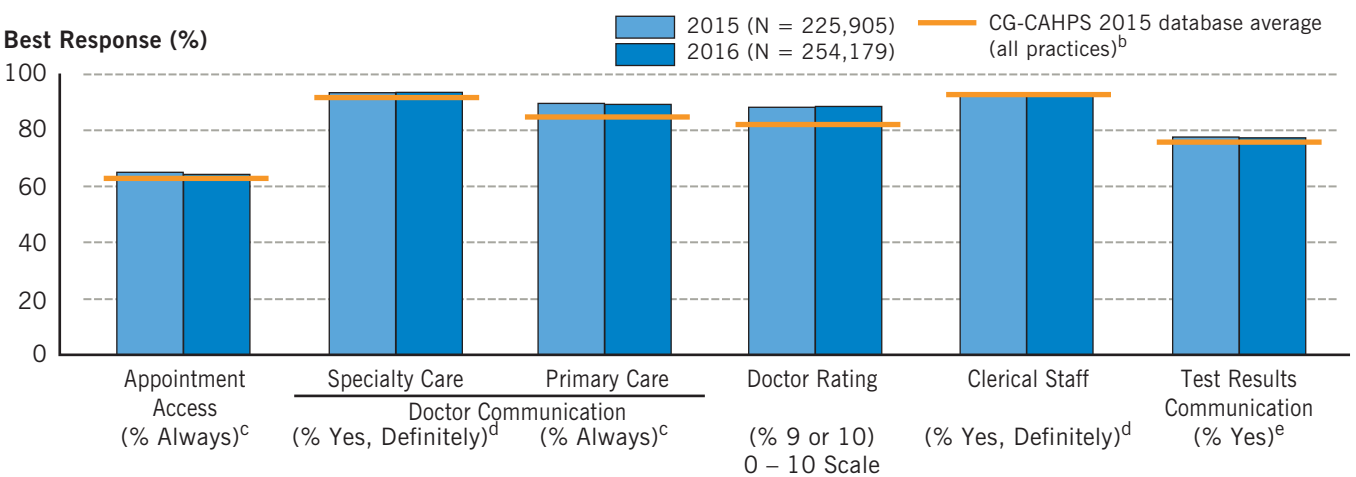
Keeping patients at the center of all that we do is critical. Patients First is the guiding principle at Cleveland Clinic. Patients First is safe care, high-quality care, in the context of patient satisfaction, and high value. Ultimately, our caregivers have the power to impact every touch point of a patient's journey, including their clinical, physical, and emotional experience.

We know that patient experience goes well beyond patient satisfaction surveys. Nonetheless, by sharing the survey results with our caregivers and the public, we constantly identify opportunities to improve how we deliver exceptional care.

## Outpatient Office Visit Survey — Cleveland Clinic

### CG-CAHPS Assessment[a]

2015 – 2016




[a]In 2013, Cleveland Clinic began administering the Clinician and Group Practice Consumer Assessment of Healthcare Providers and Systems surveys (CG-CAHPS), standardized instruments developed by the Agency for Healthcare Research and Quality (AHRQ) and supported by the Centers for Medicare & Medicaid Services for use in the physician office setting to measure patients' perspectives of outpatient care.
[b]Based on results submitted to the AHRQ CG-CAHPS database from 2829 practices in 2015
[c]Response options: Always, Usually, Sometimes, Never
[d]Response options: Yes, definitely; Yes, somewhat; No
[e]Response options: Yes, No

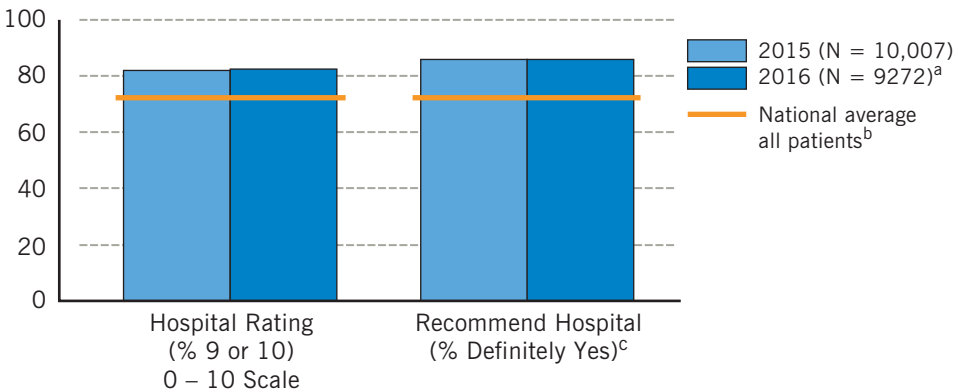
Source: Press Ganey, a national hospital survey vendor

## Inpatient Survey — Cleveland Clinic

### HCAHPS Overall Assessment

2015 – 2016

**Best Response (%)**



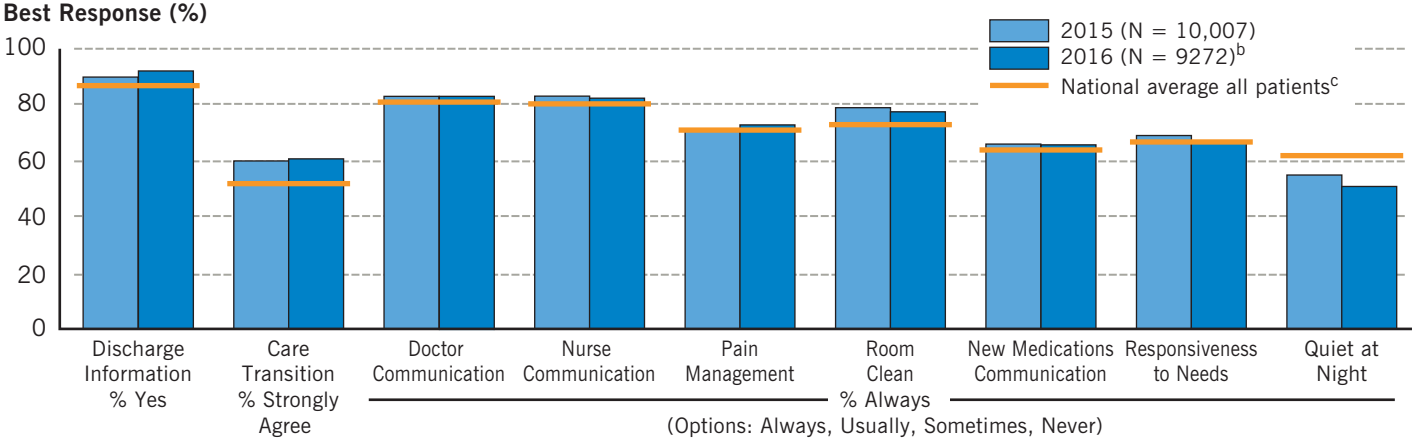

[a]At the time of publication, 2016 ratings have not been reported by the Centers for Medicare & Medicaid Services and ratings are not adjusted for patient mix.
[b]Based on national survey results of discharged patients, January 2015 – December 2015, from 4172 US hospitals. medicare.gov/hospitalcompare
[c]Response options: Definitely yes, Probably yes, Probably no, Definitely no

The Centers for Medicare & Medicaid Services requires United States hospitals that treat Medicare patients to participate in the national Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey, a standardized tool that measures patients' perspectives of hospital care. Results collected for public reporting are available at medicare.gov/hospitalcompare.

### HCAHPS Domains of Care[a]

2015 – 2016

**Best Response (%)**




[a]Except for "Room Clean" and "Quiet at Night," each bar represents a composite score based on responses to multiple survey questions.
[b]At the time of publication, 2016 ratings have not been reported by the Centers for Medicare & Medicaid Services and ratings are not adjusted for patient mix.
[c]Based on national survey results of discharged patients, January 2015 – December 2015, from 4172 US hospitals. medicare.gov/hospitalcompare

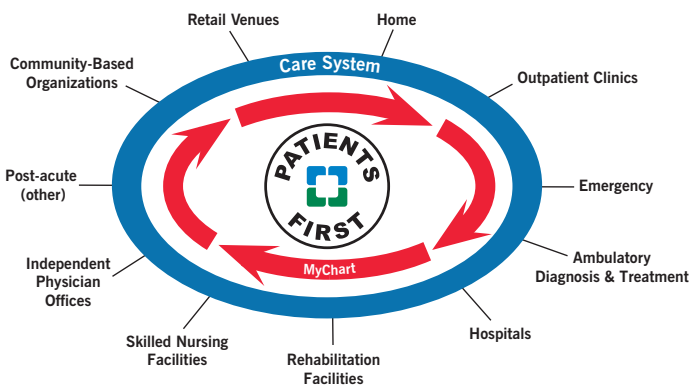
Source: Centers for Medicare & Medicaid Services, 2015; Press Ganey, a national hospital survey vendor, 2016

## Focus on Value

Cleveland Clinic has developed and implemented new models of care that focus on "Patients First" and aim to deliver on the Institute of Medicine goal of **S**afe, **T**imely, **E**ffective, **E**fficient, **E**quitable, **P**atient-centered care. Creating new models of Value-Based Care is a strategic priority for Cleveland Clinic. As care delivery shifts from fee-for-service to a population health and bundled payment delivery system, Cleveland Clinic is focused on concurrently improving patient safety, outcomes, and experience.

What does this new model of care look like?

**Integrated Care Model**




The Cleveland Clinic Integrated Care Model (CCICM) is a value-based model of care, designed to improve outcomes while reducing cost. It is designed to deliver value in both population health and specialty care.

- The patient remains at the heart of the CCICM.
- The blue band represents the care system, which is a seamless pathway that patients move along as they receive care in different settings. The care system represents integration of care across the continuum.
- Critical competencies are required to build this new care system. Cleveland Clinic is creating disease- and condition-specific care paths for a variety of procedures and chronic diseases. Another facet is implementing comprehensive care coordination for high-risk patients to prevent unnecessary hospitalizations and emergency department visits. Efforts include managing transitions in care, optimizing access and flow for patients through the CCICM, and developing novel tactics to engage patients and caregivers in this work.
- Measuring performance around quality, safety, utilization, cost, appropriateness of care, and patient and caregiver experience is an essential component of this work.

## Improve Population Health

### Cleveland Clinic Accountable Care Organization Measure Performance

2016

**National Percentile Ranking**

| | |
|---|---|
| 90th | • Falls Screening<br>• Heart Failure<br>• Ischemic Vascular Disease<br>• BMI Screening<br>• Tobacco Screening |
| 80th | • Coronary Artery Disease<br>• Diabetes<br>• Breast Cancer Screening<br>• Pneumonia Vaccination |
| 70th | • Colorectal Cancer Screening<br>• Influenza Vaccination<br>• Blood Pressure Screening<br>• Hypertension |
| 50th | • Depression Screening |

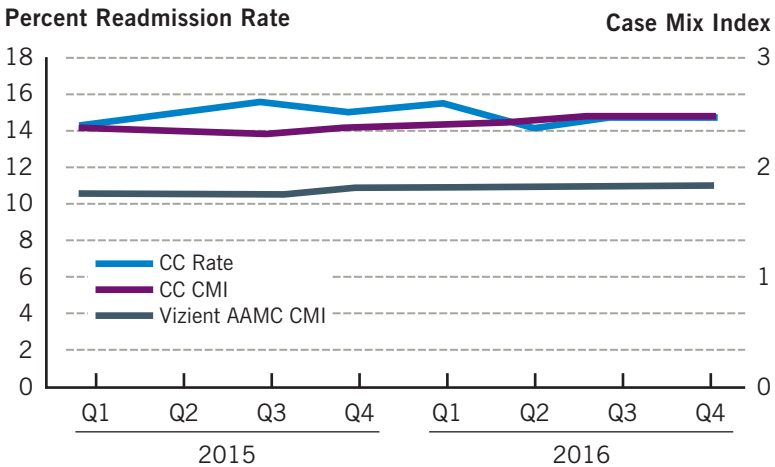
Higher percentiles are better

As part of Cleveland Clinic's commitment to population health and in support of its Accountable Care Organization (ACO), these ACO measures have been prioritized for monitoring and improvement. Cleveland Clinic is improving performance in these measures by enhancing care coordination, optimizing technology and information systems, and engaging primary care specialty teams directly in the improvement work. These pursuits are part of Cleveland Clinic's overall strategy to transform care in order to improve health and make care more affordable.

## Reduce the Cost of Care

### Cleveland Clinic All-Cause 30-Day Readmission Rate to Any Cleveland Clinic Hospital

2015 – 2016

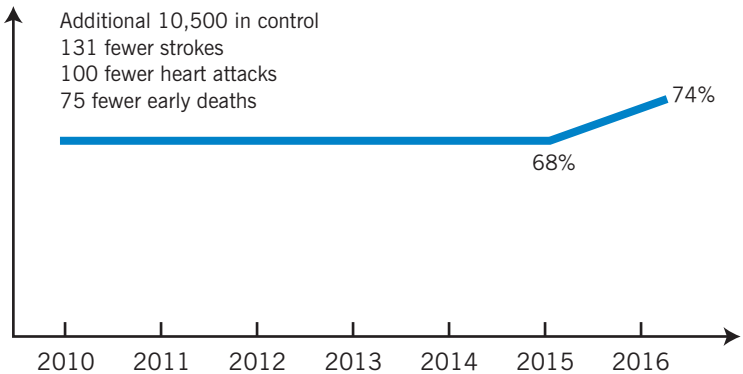



CMI = case mix index

Source: Data from the Vizient Clinical Data Base/Resource Manager™ used by permission of Vizient. All rights reserved.

Cleveland Clinic monitors 30-day readmission rates for any reason to any of its system hospitals. Unplanned readmissions are actively reviewed for improvement opportunities. Comprehensive care coordination and care management for high-risk patients has been initiated in an effort to prevent unnecessary hospitalizations and emergency department visits. Sicker, more complex patients are more susceptible to readmission. Case mix index (CMI) reflects patient severity of illness and resource utilization. Cleveland Clinic's CMI remains one of the highest among American academic medical centers.

## Accountable Care Organization (ACO) Improving Outcomes and Reducing Costs

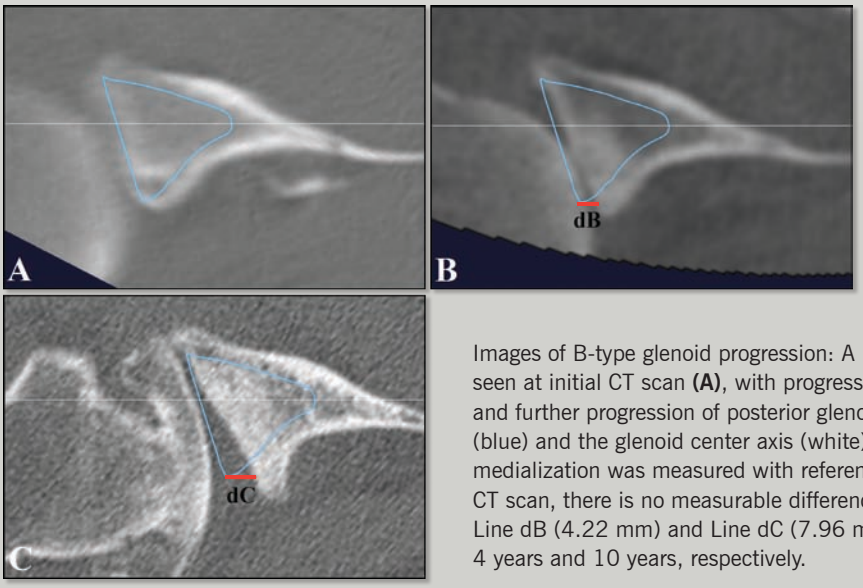



Cleveland Clinic was one of the top performing new ACOs in the United States (for 2015 performance as determined in 2016) due to efficiency, cost reduction, and improvements in effectiveness of chronic disease management such as treating hypertension, reducing preventable hospitalizations through care coordination, and optimizing the care at skilled nursing facilities through its Connected Care program.

For example, a system-wide effort to improve the control of blood pressure for patients with hypertension was begun in 2016 and resulted in an additional 10,500 patients with blood pressure controlled. This will translate to many fewer strokes, heart attacks, and preventable deaths.

## New Developments in Pathologic Wear Patterns, Progression of Pathology, and Association With Rotator Cuff Fatty Infiltration in Glenohumeral Osteoarthritis

Pathologic patterns of glenohumeral osteoarthritis based on glenoid morphology and humeral head subluxation are defined in the Walch classification.[1] However, pathologic progression and the factors that contribute to it are not well defined. Three-dimensional CT (computed tomography) image analysis was utilized to analyze progression, including determining the relationship between arthritic glenoid morphology and rotator cuff fatty infiltration (FI). B-type glenoids were significantly more likely than A-type glenoids to progress in severity with regard to Walch classification ($P < 0.001$), joint line medialization (95% confidence interval [CI], 1.9-29.1), and rate of joint line medialization ($P = 0.048$). Infraspinatus FI was significantly higher in B-type than A-type glenoids at initial ($P < 0.001$) and final ($P = 0.003$) follow-up CT. High-grade posterior rotator cuff FI was present in 55% of B3 glenoids, which were significantly more likely to have supraspinatus ($P = 0.004$) and infraspinatus ($P = 0.006$) FI than B2 glenoids. These findings suggest that initial posterior humeral head translation may be a trigger for the development and progression of posterior glenoid bone loss, with posterior rotator cuff FI further contributing to progression of humeral head posterior subluxation and posterior glenoid bone loss.



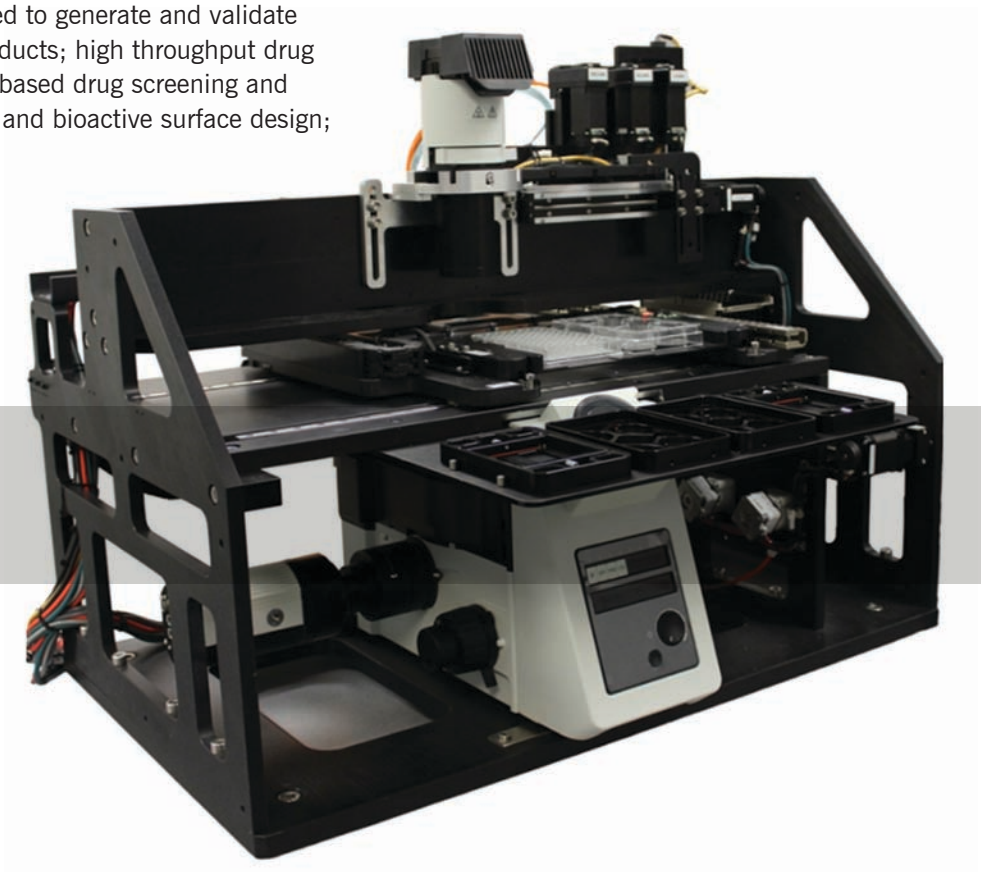

Images of B-type glenoid progression: A B1 glenoid with subluxation of the humeral head is seen at initial CT scan **(A)**, with progression to a B2 glenoid on a 4-year interim CT scan **(B)**, and further progression of posterior glenoid bone loss seen at 10 years **(C)**. The vault model (blue) and the glenoid center axis (white) are depicted. In B-type glenoids, the joint line medialization was measured with reference to the vault model at the posterior glenoid. At initial CT scan, there is no measurable difference between the vault model and the glenoid surface. Line dB (4.22 mm) and Line dC (7.96 mm) show the joint line medialization measurements at 4 years and 10 years, respectively.

**Reference**

1. Walch G, Badet R, Boulahia A, Khoury A. Morphologic study of the glenoid in primary glenohumeral osteoarthritis. *J Arthroplasty*. 1999 Sep;14(6):756-760.

## Cell X™ and Colonyze™ Platform for Cell Therapy Fabrication and Analysis

Cellular therapies may revolutionize how patients are treated for some of the most disabling of chronic illnesses, including osteoarthritis, but only when the sources of cells can be rigorously controlled. George Muschler, MD, Cleveland Clinic orthopaedic surgeon, in collaboration with Parker Hannifin Corporation, developed the Cell X device, which created an integrated platform for analysis of stem cells and the colonies of cells formed by their progeny. Cell X uses a quantitative large field of view image analysis system (Colonyze) and a robotic system for automated manipulation of cells with micron level precision. These features are essential for efficient and reproducible cell source management and quality control. Cell X technology will provide the cell sourcing and management needed to generate and validate the cells needed for new cell therapy products; high throughput drug screening; quantitative personalized cell-based drug screening and diagnostics; optimization of biomaterials and bioactive surface design; and other drug discovery applications.



**Cell X and Colonyze platform for cell therapy fabrication and analysis**

## MyRheum: Patient-Entered Data

Beginning in 2016, Cleveland Clinic's Department of Rheumatology collaborated with a multidisciplinary team to successfully design and launch MyRheum, which records patient-entered data using validated instruments that assess:

1. Physical and mental functions (PROMIS® 10, Patient-Reported Outcomes Measurement Information System)
2. Domains of pain, function, and fatigue (PROMIS CATs, Computer Adaptive Tests)
3. Rheumatoid arthritis disease activity (RAPID3, Routine Assessment of Patient Index Data 3)
4. A complete review of systems
5. Depression (PHQ-2, PHQ-9, Patient Health Questionnaires)

Patients can fill out the questionnaires at home on MyChart, a patient portal, or in the waiting room. MyRheum calculates the scores, shows the results as T-scores or percentiles compared with global patient norms, and transmits the information to the Epic electronic medical record, all before the clinician enters the room. This allows assessment of multiple important domains, which makes the visit more efficient and patient centered. It allows point of care decision-making based on validated measures of physical and mental function, pain, fatigue, and disease activity.

Synopsis, an Epic functionality, allows display in table or graph form, tracking multiple visits to assess change. Dot phrases allow incorporation of the data directly into the patient record.

## Biobanking for the Future of Rheumatology

Cleveland Clinic's Department of Rheumatic and Immunologic Diseases will advance scientific understanding and improve clinical management of systemic rheumatic diseases through biobanking. Physician scientists and other researchers collaborate on a biorepository, or biobank, which stores biologic samples collected longitudinally from patients. During the past 5 years, the biobank has collected about 12,600 biosamples through enrollment of more than 500 patients in 1 of 4 disease-specific repositories.

Benefits of biobanking:

- To investigate mechanisms of disease activity and associated comorbidities related to psoriasis, psoriatic arthritis, systemic lupus erythematosus, inflammatory brain disease and its mimics, and autoinflammatory diseases
- To study quality of life measures through annual questionnaires
- To encourage multidisciplinary collaboration between rheumatologists and other medical specialists to improve patient care and identify a larger population of eligible subjects
- To establish a multicenter biosample and clinical data repository.

# Contact Information

### Orthopaedic & Rheumatologic Institute Appointments

216.444.2606 or
800.223.2273, ext. 42606

### Orthopaedic & Rheumatologic Institute Referrals

855.REFER.123 (855.733.3712)

On the Web at clevelandclinic.org/orthorheum

### Staff Listing

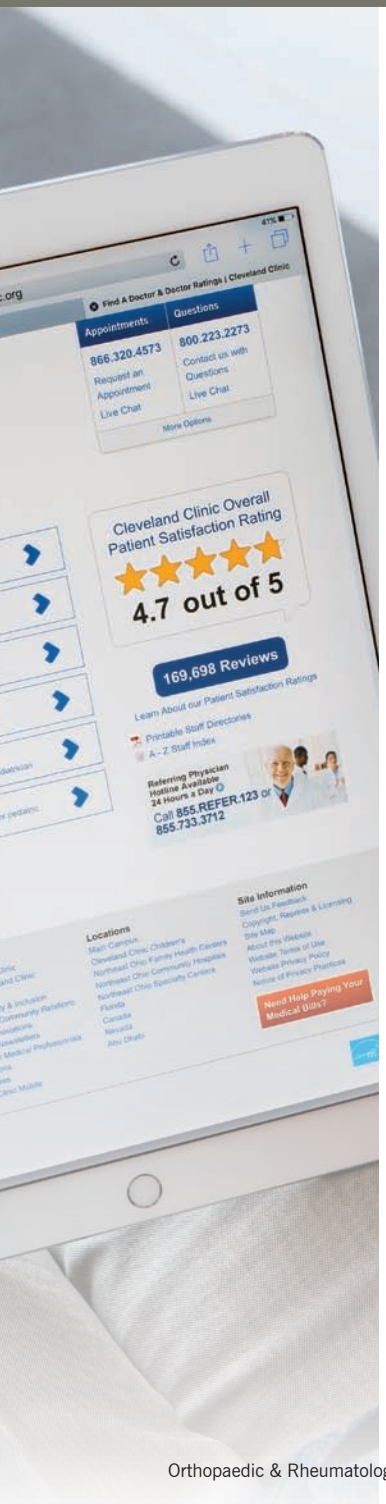
For a complete listing of Cleveland Clinic's Orthopaedic & Rheumatologic Institute staff, please visit clevelandclinic.org/staff.

### Publications

The Orthopaedic & Rheumatologic Institute published ***68*** articles in 2016 as indexed within Web of Science.

### Locations

For a complete listing of Orthopaedic & Rheumatologic Institute locations, please visit clevelandclinic.org/orthorheum.




## Additional Contact Information

### General Patient Referral

24/7 hospital transfers or physician consults

800.553.5056

### General Information

216.444.2200

### Hospital Patient Information

216.444.2000

### General Patient Appointments

216.444.2273 or 800.223.2273

### Referring Physician Center and Hotline

855.REFER.123 (855.733.3712)

Or email refdr@ccf.org or visit clevelandclinic.org/refer123

### Request for Medical Records

216.444.2640 or
800.223.2273, ext. 42640

### Same-Day Appointments

216.444.CARE (2273)

### Global Patient Services/ International Center

Complimentary assistance for international patients and families

001.216.444.8184 or visit clevelandclinic.org/gps

### Medical Concierge

Complimentary assistance for out-of-state patients and families

800.223.2273, ext. 55580, or email medicalconcierge@ccf.org

### Cleveland Clinic Abu Dhabi

clevelandclinicabudhabi.ae

### Cleveland Clinic Canada

888.507.6885

### Cleveland Clinic Florida

866.293.7866

### Cleveland Clinic Nevada

702.483.6000

### For address corrections or changes, please call

800.890.2467

# About Cleveland Clinic

## Overview

Cleveland Clinic is an academic medical center offering patient care services supported by research and education in a nonprofit group practice setting. More than 3500 Cleveland Clinic staff physicians and scientists in 140 medical specialties and subspecialties care for more than 7.1 million patients across the system annually, performing nearly 208,000 surgeries and conducting more than 652,000 emergency department visits. Patients come to Cleveland Clinic from all 50 states and 185 nations. Cleveland Clinic's CMS case-mix index is the second-highest in the nation.

Cleveland Clinic is an integrated healthcare delivery system with local, national, and international reach. The main campus in midtown Cleveland, Ohio, has a 1400-bed hospital, outpatient clinic, specialty institutes, labs, classrooms, and research facilities in 44 buildings on 167 acres. Cleveland Clinic has more than 150 northern Ohio outpatient locations, including 10 regional hospitals, 18 full-service family health centers, 3 health and wellness centers, an affiliate hospital, and a rehabilitation hospital for children. Cleveland Clinic also includes Cleveland Clinic Florida; Cleveland Clinic Nevada; Cleveland Clinic Canada; Cleveland Clinic Abu Dhabi, UAE; Sheikh Khalifa Medical City (management contract), UAE; and Cleveland Clinic London (opening in 2020). Cleveland Clinic is the largest employer in Ohio, with more than 51,000 employees. It generates $12.6 billion of economic activity a year.

Cleveland Clinic supports physician education, training, consulting, and patient services around the world through representatives in the Dominican Republic, Guatemala, India, Panama, Peru, Saudi Arabia, and the United Arab Emirates. Dedicated Global Patient Services offices are located at Cleveland Clinic's main campus, Cleveland Clinic Abu Dhabi, Cleveland Clinic Canada, and Cleveland Clinic Florida.

## The Cleveland Clinic Model

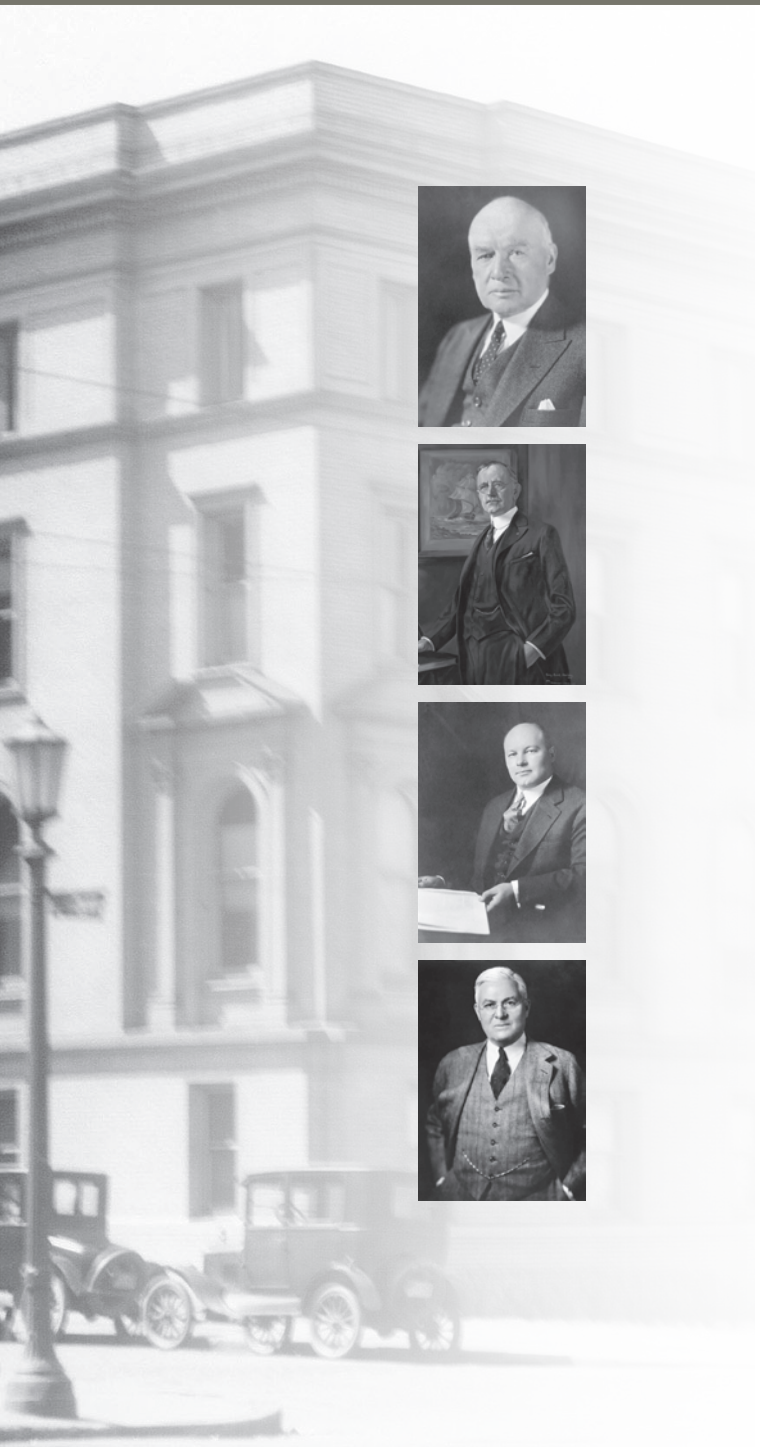
Cleveland Clinic was founded in 1921 by 4 physicians who had served in World War I and hoped to replicate the organizational efficiency of military medicine. The organization has grown through the years by adhering to the nonprofit, multispecialty group practice they established. All Cleveland Clinic staff physicians receive a straight salary with no bonuses or other financial incentives. The hospital and physicians share a financial interest in controlling costs, and profits are reinvested in research and education.

Cleveland Clinic Florida was established in 1987. Cleveland Clinic began opening family health centers in surrounding communities in the 1990s. Marymount Hospital joined Cleveland Clinic in 1995, followed by regional hospitals including Euclid Hospital, Fairview Hospital, Hillcrest Hospital, Lutheran Hospital, Medina Hospital, South Pointe Hospital, and affiliate Ashtabula County Medical Center. In 2015, the Akron General Health System joined the Cleveland Clinic health system.

Internally, Cleveland Clinic services are organized into patient-centered integrated practice units called institutes, each institute combining medical and surgical care for a specific disease or body system. Cleveland Clinic was among the first academic medical centers to establish an Office of Patient Experience, to promote comfort, courtesy, and empathy across all patient care services.

## A Clinically Integrated Network

Cleveland Clinic is committed to providing value-based care, and it has grown the Cleveland Clinic Quality Alliance into the nation's second-largest, and northeast Ohio's largest, clinically integrated network. The network comprises more than 6300 physician members, including both Cleveland Clinic staff and independent physicians from the community. Led by its physician members, the Quality Alliance strives to improve quality and consistency of care; reduce costs and increase efficiency; and provide access to expertise, data, and experience.











## Cleveland Clinic Lerner College of Medicine

Lerner College of Medicine is known for its small class sizes, unique curriculum, and full-tuition scholarships for all students. Each new class accepts 32 students who are preparing to be physician investigators. In 2015, Cleveland Clinic broke ground on a 477,000-square-foot multidisciplinary Health Education Campus. The campus, which will open in July 2019, will serve as the new home of the Case Western Reserve University (CWRU) School of Medicine and Cleveland Clinic's Lerner College of Medicine, as well as the CWRU School of Dental Medicine, the Frances Payne Bolton School of Nursing, and physician assistant and allied health training programs.

## Graduate Medical Education

In 2016, nearly 2000 residents and fellows trained at Cleveland Clinic and Cleveland Clinic Florida in our continually growing programs.

## *U.S. News & World Report* Ranking

Cleveland Clinic is ranked the No. 2 hospital in America by *U.S. News & World Report* (2016). It has ranked No. 1 in heart care and heart surgery since 1995. In 2016, 3 of its programs were ranked No. 2 in the nation: gastroenterology and GI surgery, nephrology, and urology. Ranked among the nation's top five were gynecology, orthopaedics, rheumatology, pulmonology, and diabetes and endocrinology.

## Cleveland Clinic Physician Ratings

Cleveland Clinic believes in transparency and in the positive influence of the physician-patient relationship on healthcare outcomes. To continue to meet the highest standards of patient satisfaction, Cleveland Clinic physician ratings, based on nationally recognized Press Ganey patient satisfaction surveys, are published online at clevelandclinic.org/staff.

# Resources

## Referring Physician Center and Hotline

Call us 24/7 for access to medical services or to schedule patient appointments at 855.REFER.123 (855.733.3712), email refdr@ccf.org, or go to clevelandclinic.org/Refer123. The free Cleveland Clinic Physician Referral App, available for mobile devices, gives you 1-click access. Available in the App Store or Google Play.

## Remote Consults

Anybody anywhere can get an online second opinion from a Cleveland Clinic specialist through our MyConsult service. For more information, go to clevelandclinic.org/myconsult, email myconsult@ccf.org, or call 800.223.2273, ext. 43223.

## Request Medical Records

216.444.2640 or 800.223.2273, ext. 42640

## Track Your Patients' Care Online

Cleveland Clinic offers an array of secure online services that allow referring physicians to monitor their patients' treatment while under Cleveland Clinic care and gives them access to test results, medications, and treatment plans. my.clevelandclinic.org/online-services

Dr**Connect** (online access to patients' treatment progress while under referred care): call 877.224.7367, email drconnect@ccf.org, or visit clevelandclinic.org/drconnect.

**MyPractice Community** (affordable electronic medical records system for physicians in private practice): 216.448.4617.

**eRadiology** (teleradiology consultation provided nationwide by board-certified radiologists with specialty training, within 24 hours or stat): call 216.986.2915 or email starimaging@ccf.org.

## Medical Records Online

Patients can view portions of their medical record, receive diagnostic images and test results, make appointments, and renew prescriptions through My**Chart**, a secure online portal. All new Cleveland Clinic patients are automatically registered for My**Chart**. clevelandclinic.org/mychart

## Access

Cleveland Clinic is committed to convenient access, offering virtual visits, shared medical appointments, and walk-in urgent care for your patients. clevelandclinic.org/access

## Critical Care Transport Worldwide

Cleveland Clinic's fleet of ground and air transport vehicles is ready to transfer patients at any level of acuity anywhere on Earth. Specially trained crews provide Cleveland Clinic care protocols from first contact. To arrange a transfer for STEMI (ST-elevation myocardial infarction), acute stroke, ICH (intracerebral hemorrhage), SAH (subarachnoid hemorrhage), or aortic syndrome, call 877.379.CODE (2633). For all other critical care transfers, call 216.444.8302 or 800.553.5056.

## CME Opportunities: Live and Online

Cleveland Clinic's Center for Continuing Education operates the largest CME program in the country. Live courses are offered in Cleveland and cities around the nation and the world. The center's website (ccfcme.org) is an educational resource for healthcare providers and the public. It has a calendar of upcoming courses, online programs on topics in 30 areas, and the award-winning virtual textbook of medicine, The Disease Management Project.

## Clinical Trials

Cleveland Clinic is running more than 2200 clinical trials at any given time for conditions including breast and liver cancer, coronary artery disease, heart failure, epilepsy, Parkinson disease, chronic obstructive pulmonary disease, asthma, high blood pressure, diabetes, depression, and eating disorders. Cancer Clinical Trials is a mobile app that provides information on the more than 200 active clinical trials available to cancer patients at Cleveland Clinic. clevelandclinic.org/cancertrialapp

## Healthcare Executive Education

Cleveland Clinic has programs to share its expertise in operating a successful major medical center. The Executive Visitors' Program is an intensive, 3-day behind-the-scenes view of the Cleveland Clinic organization for the busy executive. The Samson Global Leadership Academy is a 2-week immersion in challenges of leadership, management, and innovation taught by Cleveland Clinic leaders, administrators, and clinicians. Curriculum includes coaching and a personalized 3-year leadership development plan.
clevelandclinic.org/executiveeducation

## Consult QD Physician Blog

A website from Cleveland Clinic for physicians and healthcare professionals. Discover the latest research insights, innovations, treatment trends, and more for all specialties. consultqd.clevelandclinic.org

## Social Media

Cleveland Clinic uses social media to help caregivers everywhere provide better patient care. Millions of people currently like, friend, or link to Cleveland Clinic social media — including leaders in medicine.

Facebook for Medical Professionals
facebook.com/CMEclevelandclinic

Follow us on Twitter
@cleclinicMD

Connect with us on LinkedIn
clevelandclinic.org/MDlinkedin

Cleveland Clinic

Every life deserves world class care.

This project would not have been possible without the commitment and expertise of a team led by Abby Abelson, MD; Michael A. Mont, MD; Kurt P. Spindler, MD; Chad Deal, MD; William Messner, MS; Robert Overman, MPH; Greg Strnad, MS; and Elizabeth Sosic, BS

Graphic design and photography were provided by Cleveland Clinic's Center for Medical Art and Photography.




9500 Euclid Avenue, Cleveland, OH 44195

clevelandclinic.org

17-OUT-419