

Executive Summary

The purpose of the *Canadian Joint Replacement Registry (CJRR) 2006 Annual Report on Hip and Knee Replacements in Canada* is to characterize hip and knee replacement procedures performed in Canada according to their epidemiology, and by selected clinical and surgical parameters.

Hip and knee replacement procedures are undertaken as a treatment when patients are experiencing severe pain and limited mobility, usually associated with arthritis or another joint disorder. During the procedure an artificial joint replaces the damaged joint. The surgery provides a successful, relatively low risk intervention that can provide significant pain and disability relief by enabling the new joint to move normally. This usually results in considerable improvement in a patient's functional status and quality of life. Arthritis and other joint disorders are correlated with advancing age and so an aging population contributes to an increase in hip and knee replacement procedures. In addition, new technologies are emerging in the surgical treatment of arthritis and arthritis-related disorders. These factors will likely increase the demand for surgery in the coming years.

About the Canadian Joint Replacement Registry (CJRR)

The CJRR is a national registry that collects information on hip and knee replacement surgeries performed in Canada and follows joint replacement patients over time, capturing revisions if they occur. In monitoring patient outcomes after replacement surgery, the CJRR identifies and explores the risk factors that may affect outcomes. The ultimate goal of the CJRR is to improve the quality of care and clinical outcomes of joint replacement recipients in Canada.

Participation in the CJRR has been steadily increasing since orthopaedic surgeons began submitting operative data in May 2001. As of April 2006, 70% of orthopaedic surgeons performing hip and knee replacement surgery in Canada were participating in the registry. On average, CJRR now receives approximately 1,800 forms on a monthly basis from all provinces in Canada.

Methodology

Findings in this report were obtained from two sources: the Hospital Morbidity Database (HMDB) and the CJRR database, both of which are managed by the Canadian Institute for Health Information (CIHI).

Surgical and orthopaedic implant data in this report are based on a total of 80,215 procedures that were submitted by surgeons participating in the CJRR for surgeries in fiscal years 2002–2003 through 2004–2005. The fiscal year encompasses data from April 1st through March 31st. Overall, data submissions have increased by 18% over the previous year.

All analyses were conducted using the SAS (version 9.1.3, Cary, NC, USA) statistical software package. A p value of <0.05 was used to assess statistical significance.

Hospitalization Statistics

Overall Trends

- There were 58,714 hospitalizations for hip and knee arthroplasty performed in Canada in 2004–2005 on Canadian residents. This represents a ten-year increase of 86.6% (from 31,463 hospitalizations for hip and knee arthroplasty in 1994–1995) and a 9.7% one-year increase (from 53,517 procedures in 2003–2004).
- In 2004–2005, there were 33,590 hospitalizations for knee and 25,124 hospitalizations for hip replacements. Since 1996–1997 the number of knee replacements has annually surpassed the number of hip replacements. This gap between the number of knee replacements over hip replacements has been increasing over time.
 - The number of knee replacements in 2004–2005 has more than doubled since 1994–1995 (an increase of 124.8%) with a 12.5% increase compared to the previous year.
 - The number of hip replacements, on the other hand, increased by 52% compared to 1994–1995, and by 6.1% compared to 2003–2004.

Provincial/Territorial Variations

- Provincial variations in joint replacement rates were observed across the country.
 - Prince Edward Island and Saskatchewan had the highest age-standardized rates of hip replacements (86.6 and 80.7 per 100,000 population, respectively), whereas Newfoundland and Labrador and Quebec had the lowest rates (50.1 and 44.4 per 100,000, respectively).
 - For knee replacements, Saskatchewan, Ontario and Prince Edward Island had the highest rates (120.9, 107.0 and 106.2 per 100,000 population, respectively), while Newfoundland and Labrador and Quebec had the lowest (66.7 and 55.6 per 100,000 population, respectively). Rates from the Territories are not reported due to small numbers.

Patient Demographics

- Females were more likely to undergo hip arthroplasty than males in 2004–2005 (the age-standardized rate for females was 69.7 per 100,000 compared to 62.5 for males). Females also had a higher rate of knee replacements (101.3) compared to males (90.8). Further, the majority of hip (57%) and knee (60%) replacement recipients were female.
- The age distributions of hip and knee replacement recipients were similar in 2004–2005, with the majority of patients being 65 years of age or older (65% of the hip and 68% of the knee replacement recipients). The mean age of patients who underwent hip replacements in Canada was 68 years (69.6 years for females and 65.6 years for males); for knee replacements, the mean age was 68.6 years (68.6 years for females and 68.5 years for males).

- Significant increases in age–sex specific rates for knee arthroplasty have occurred in the last decade (1994–1995 to 2004–2005). The most notable increases were observed in the 45 to 54 year age group, where the rate of knee replacements more than doubled for males (a 125% increase) and almost tripled for females (a 174% increase). However, the highest age–sex specific rate of knee replacements continues to be observed in the 75 to 84 year age group (rates of 510.5 per 100,000 for males and 590.4 per 100,000 for females). The number of knee replacements performed on people aged less than 45 years increased overall by 53% (up from 244 in 1994–1995 to 373 in 2004–2005) over the last 10 years.
- For hip replacement procedures, the highest age–sex specific rate in 2004–2005 was observed in the 75 to 84 year age group (405.2 per 100,000 for males and 532.7 per 100,000 for females). When compared to 1994–1995 age–sex specific rates, the largest increase occurred in the 45 to 54 year age group (53% for males and 41% for females).

Length of Stay in Hospital

- There has been a decrease in average length of stay for these procedures between 1994–1995 and 2004–2005. For hip replacements, the average length of stay decreased by 36% from 14 to 9 days, while for knee replacements, the average length of stay decreased by 42% from 12 to 7 days for the same period. The average length of stay includes both primary and revisions for hip and knee replacements.

Inter-Provincial/Territorial Movements

- With the exception of Yukon Territory and Nunavut, the majority of patients had their hip or knee arthroplasty procedures performed in their home province. Following Yukon Territory and Nunavut, residents of the Northwest Territories and Prince Edward Island were most likely to have their hip replacements performed in another province.

In-Hospital Mortality

- Post-operative in-hospital mortality is a relatively rare event among recipients of hip or knee replacements. Overall, the mortality rate of hip and knee replacement patients was 0.8% and 0.2%, respectively, with the highest mortality observed in the 85-year and older age group (4.9% after hip and 1.4% after knee arthroplasty).

Surgical and Clinical Characteristics (From the CJRR)

Overall Trends and Patient Demographics

- Of the 33,178 submissions to the CJRR for hip and knee replacement surgeries performed in 2004–2005, just over half (57%) were related to knee replacements and just under half were for hip replacements (43%). The last two years have seen significant increases in the number of submissions: a 49% increase between 2002–2003 and 2003–2004, and 18% from 2003–2004 to 2004–2005.
- In 2004–2005, females accounted for significantly ($p < 0.0001$) more hip and knee replacements than males (56% and 59%, respectively). The highest proportion of replacements was performed in the 65 to 74 year age group (30% of hip and 37% of knee replacements), followed by the 75 to 84 year age group (27% of hip and 28% of knee replacements, respectively).

Indications for Surgery and Previous Operations

Among all hip replacements in 2004–2005, 88% were primary surgeries and 12% were revisions. Among knee replacements, 94% were primary surgeries, while 6% were revision procedures.

- Degenerative osteoarthritis was the most common diagnosis indicated for both primary hip replacements (81%) and primary knee replacements (93%). The next most common diagnoses were osteonecrosis (6%) for hip and inflammatory arthritis (4%) for knee replacements.
- The leading reason recorded for revision of hip replacements was aseptic loosening (54%), followed by osteolysis (28%), poly wear (24%) and instability (16%). For the knee replacement revisions, the most common reason for revision reported was aseptic loosening (35%), followed by poly wear (30%), osteolysis (18%) and instability (13%).
- Of the primary hip and knee replacements recorded in 2004–2005, 94% and 74%, respectively, had no previous operation recorded. Among knee replacement recipients in which a previous operation was recorded, arthroscopic debridement was most commonly reported (16%), followed by arthroscopic meniscectomy and open meniscectomy (6% and 5% of all procedures, respectively).

Types of Surgery

- The vast majority of hip replacements in general (and primary hip replacements in particular) were total arthroplasty procedures (87% and 92%, respectively).
- Unicompartamental knee replacement (UKA) usage has remained consistent over the past three years (7%–8% of all knee replacements were unicompartamental procedures). UKA comprised 1% or less of revision knee replacements. At a provincial level, patients are twice as likely to undergo UKA in Western provinces than in the Eastern ones.

Surgical Approach

- Surgical approach patterns have remained largely unchanged over the past three years. In 2004–2005, the direct lateral was the most common approach (41%) used for hip replacements, followed by the posterolateral and the anterolateral approaches (28% and 25%, respectively). The Smith/Peterson and two-incision approaches were used in less than 1% of surgeries, respectively.
- The medial parapatellar approach was the surgical approach utilized in the vast majority (90%) of knee replacement procedures, with the intravastus, subvastus and lateral parapatellar approaches used in about 5%, 1% and < 1% of cases, respectively.

Components Replaced

The term “components replaced” can refer to either components replacing the natural bone as in the case of primary procedures, or to components replacing existing artificial implants, as in the case of revision procedures.

- Regardless of joint, all components were significantly more likely to be replaced during primary procedures.
- For primary hip replacements, components were replaced over 90% of the time. For hip revisions, the femoral head was replaced 95% of the time, the acetabular insert 85%, acetabular component 78% and the femoral stem 69% of the time. Larger femoral heads were used significantly more for hip revisions than primary procedures.
- For primary knee replacements, the patellar component was replaced 73% of the time, while the femoral and tibial components were replaced in over 99% of cases. For knee revisions, the tibial component was most likely to be replaced (81%), followed by the femoral (76%) and patellar (51%) components.

Fixation Method

- Among all hip replacement procedures reported in the CJRR, the most common fixation method was cementless (62%), followed by hybrid (26%) and cemented (9%). Over the past three years, increases were seen in the proportion of procedures using a cementless fixation method (from 53% to 62%).
- For knees, the cemented technique was most commonly used (82%), followed by hybrid (12%) and cementless (4%). Over the past three years, increases were seen in the proportion of procedures using a cemented fixation method (from 75% to 82%).
- For both hip and knees, fixation methods used were similar for both primary and revision surgeries.

Bearing Surfaces

- Although various combinations of femoral head and acetabular liner materials were used in hip replacements, the most common bearing surface was metal-on-plastic (69%). The overall pattern of bearing surfaces has not changed over the past three years.

Bone Graft Use

- Overall, bone grafts were more frequently used for revision than for primary replacements, regardless of joint (40% versus 8% for hip and 22% versus 7% for knee replacements).

Body Mass Index (BMI)

- BMI distributions were found to be significantly different ($p < 0.0001$) between patients having hip replacements versus those having knee replacements. Patients with knee replacements were more likely to be overweight or obese compared to hip replacement patients (87% versus 74% combined). Both hip and knee replacement patients were rarely underweight.

Deep Vein Thrombosis (DVT) Prevention

- DVT prevention therapy was utilized in 97% of cases of hip and knee replacement in the CJRR.

Minimally Invasive Surgery (MIS)

- The use of a MIS approach increased from the previous fiscal year, being recorded in 12% of hip replacements and 8% of the knee replacements. The highest increase was in the use of MIS for hip replacements (an increase of more than 33%), while for the knee replacements the increase was smaller (7%).
- The vast majority of joint replacements for which MIS was used were primary procedures, with only about 1% of MIS performed for both hip and knee being used for revision joint replacements.
- Male patients were more likely to undergo MIS than females (for hip—OR of 1.12 and CI of 1.02–1.24; for knee—OR of 1.16 and CI of 1.04–1.3).
- The use of MIS for hip replacements did not vary much with age; for knee replacements, the MIS use decreases steadily in age groups older than 55 years.
- After adjusting for sex and age differences, for each hip and knee replacements, overweight and obese patients were less likely to undergo MIS.

Copies of the 2006 report can be purchased through the CIHI Order Desk at www.cihi.ca. Copies of the annual report, media release and recent bulletins can be downloaded free of charge from the CJRR website (www.cihi.ca/cjrr). Queries regarding this report may be addressed to cjrr@cihi.ca.