Data Quality Documentation for Users: Canadian Joint Replacement Registry, 2011–2012 Data

Standards and Data Submission

Canadian Institute for Health Information
Institut canadien d'information sur la santé

Our Vision

Better data. Better decisions.
Healthier Canadians.

Our Mandate

To lead the development and maintenance of comprehensive and integrated health information that enables sound policy and effective health system management that improve health and health care.

Our Values

Respect, Integrity, Collaboration, Excellence, Innovation

Table of Contents

Purpose of the Report

The primary intent of this document is to provide users with sufficient information to assess whether the quality of the information presented by the Canadian Joint Replacement Registry (CJRR) fits their intended use. This document contains information on coverage, non-response, collection processes, data quality control, methodological changes and revision history. It is restricted to the known limitations of CJRR for 2011–2012 (that is, data for surgical procedures that took place between April 1, 2011, and March 31, 2012).

Canadian Joint Replacement Registry

Overview

CJRR is a Canada-wide registry that collects clinical, demographic, administrative and prostheses information on hip and knee replacement procedures performed in Canada.

The registry was formed as a collaborative effort between CIHI and orthopedic surgeons. The goals of the registry are to collect, process and analyze data on hip and knee replacements performed in Canada; to support evidence-based decision-making to improve the quality of care for joint replacement recipients; and to conduct analyses pertaining to orthopedic devices and surgical techniques. The hip and knee data collection forms and a list of the registry's data elements can be downloaded from CIHI's website at www.cihi.ca/cjrr.

For the 2011–2012 data year, CJRR data was submitted by orthopedic surgeons primarily on a voluntary basis after obtaining consent from patients prior to or at the time of surgery. Effective 2012–2013, CJRR data submission has become mandatory for all hip and knee replacement cases in British Columbia and Ontario.

In 2011–2012, CJRR supported three different modes of data submission:

- Electronic submission;
- Web submission through the CJRR Web-Based Data Submission and Reports Tool; and
- Paper data collection forms.

For the 2011–2012 reporting period, 41,865 records were received, of which 10,598 (25%) were submitted through electronic submission, 688 (2%) were submitted through the web-based application and 30,579 (73%) were submitted via paper forms.

Users

Primary users of CJRR data include orthopedic surgeons, health policy-makers and health care administrators. Other users include allied health care clinicians, researchers and the general public.

Core Data Elements and Concepts

For 2011–2012, CJRR collected information on hip and knee replacements, specifically patient demographics, type of replacement (primary or revision procedure), surgical approach, fixation mode and comprehensive implant details. Effective April 1, 2012, CJRR streamlined its list of data elements by implementing a new minimum data set (MDS) that is aligned with the standards established by the International Society of Arthroplasty Registries (ISAR).

It is important to note that in CJRR bilateral procedures are recorded as two separate procedures, one for each side (left and right), which may differ from other CIHI data holdings.

Coverage

CJRR Populations and Frame

The population of interest is all hip and knee replacement procedures performed by all surgeons in Canada between April 1, 2011, and March 31, 2012. All orthopedic surgeons who perform hip or knee replacement procedures are considered eligible. CJRR uses CIHI's Discharge Abstract Database (DAD) and Hospital Morbidity Database (HMDB) as sources of reference, as they collect data on all hospitalizations in public facilities.

For the purpose of this data quality assessment, the frame units are CJRR-registered orthopedic surgeons who perform hip and knee replacement procedures, and the units of analysis are those orthopedic surgeons as well as the joint replacement procedures submitted to CJRR.

Procedure-Based Coverage

Procedure-based coverage can be assessed by comparing the HMDB with CJRR. The HMDB captures a finite set of administrative, clinical and demographic information on hospital inpatient events, including primary and revision joint replacement procedures. The HMDB and the DAD are recognized as the only databases that are comparable with CJRR for validation purposes. Using 2011–2012 data, the distribution of various elements was compared between CJRR and the HMDB: patient age, gender, postal code of residence, type of joint replacement (type of intervention) and reason for primary joint replacement. We found that the data distribution across these elements was comparable between the two databases.

Procedure-Based Under-Coverage

Although all jurisdictions except for Prince Edward Island reported to CJRR in 2011–2012, reporting hip and knee procedures to CJRR was voluntary during that time period. When compared with the HMDB, CJRR captured approximately 42% of all hip and knee replacement procedures reported in the HMDB (Table 1). Sources of procedure under-coverage include procedures from non-participating surgeons and procedures not reported by participating surgeons. It should also be noted that private facilities can report to CJRR but that they do not report to the HMDB, resulting in a source of under-coverage in the HMDB.

Table 1: Hip and Knee Replacements in CJRR as a Percentage of Replacements in the HMDB, by Jurisdiction, 2011–2012

Jurisdiction	Hip and Knee Replacements in CJRR	Hip and Knee Replacements in CJRR (Private Facilities Excluded)	Hip and Knee Replacements in HMDB	Percentage Coverage of CJRR†
British Columbia	5,983	5,983	13,906	43%
Alberta	6,434	6,420	10,799	59%
Saskatchewan	2,890	2,890	3,635	80%
Manitoba	3,578	3,578	4,043	88%
Ontario	9,067	9,003	41,438	22%
Quebec	8,846	8,689	18,460	47%
New Brunswick	2,031	2,031	2,644	77%
Nova Scotia	2,504	2,504	3,253	77%
Prince Edward Island	0	0	484	0%
Newfoundland and Labrador	525	525	1,602	33%
Territories*	7	7	36	19%
Total	**41,865**	**41,630**	**100,300**	**42%**

Notes

* Territories include Yukon, the Northwest Territories and Nunavut; they are combined due to small values.

† Coverage was calculated as the number of hip and knee replacements in CJRR from public facilities divided by the number of hip and knee replacements in the HMDB.

Source

Canadian Joint Replacement Registry, 2011–2012, Canadian Institute for Health Information.

Procedure-Based Over-Coverage

There are a few sources of potential over-coverage in CJRR. Duplicate entries result when a data provider submits multiple records for the same procedure. The CJRR system rejects patient or procedure records that have an exact duplicate; however, records that are similar may be accepted.

Procedures carried out in private facilities are not considered to be in CJRR's population of reference; therefore, any procedures submitted from private facilities to CJRR are considered over-coverage. The over-coverage rate is a minor issue for CJRR, amounting to less than 1% for potential duplicate records and private facility procedures combined.

Surgeon-Based Coverage

The surgeon participation rate is difficult to ascertain, as there is no definitive single source that lists the number of orthopedic surgeons in Canada who are actively performing hip and knee replacement procedures. However, with the assistance of the CJRR Advisory Committee and the Canadian Orthopaedic Association, CJRR estimates that in 2011–2012, the surgeon coverage rate was approximately 42%.

Surgeon over-coverage is not an issue in CJRR. Prior to submitting data, all surgeons must first register with CJRR. Only practising orthopedic surgeons are included in the population of reference.

Non-Response

Procedure Unit Non-Response

Procedure unit non-response is defined as the number of hip and knee procedures not submitted by participating surgeons to CJRR. This non-response cannot be readily calculated, as we do not currently have a method of linking surgeon-level data between the HMDB and CJRR.

Surgeon Unit Non-Response

In CJRR, the surgeon unit non-response rate can be defined as the number of CJRR-participating surgeons who did not submit data in 2011–2012 (the numerator) divided by the total number of registered and active surgeons in CJRR (the denominator). Table 2 shows the participating surgeon response rate, by jurisdiction. The overall surgeon unit response rate was 55%.

Table 2: Participating Surgeon Response Rate, by Jurisdiction, CJRR, 2011–2012

Jurisdiction of Participating Surgeon	Number of Surgeons Who Submitted to CJRR During the Reporting Period (Numerator)	Number of Registered and Active Surgeons in CJRR* (Denominator)	Unit Response Rate
British Columbia	59	96	61%
Alberta	56	57	98%
Saskatchewan	29	29	100%
Manitoba	32	35	91%
Ontario†	74	190	22%
Quebec	113	137	82%
New Brunswick	31	28	100%
Nova Scotia	28	30	93%
Prince Edward Island	0	0	N/A
Newfoundland and Labrador	7	11	64%
Territories‡	2	2	100%
Total	**419**	**768**	**55%**

Notes

* Surgeon's status as of the end of the reporting period.

† One facility in Ontario submitted data without surgeon information; this facility's data was excluded.

‡ Territories include Yukon, the Northwest Territories and Nunavut; they are combined due to small values.

N/A: not applicable.

For the purposes of this table, if a surgeon reported a procedure from more than one jurisdiction, the procedure was counted only once.

Source

Canadian Joint Replacement Registry, 2011–2012, Canadian Institute for Health Information.

Item (Partial) Non-Response

Item non-response is defined as the magnitude with which received records have blank data elements. As of April 2005, CJRR permits missing data for optional data elements only. Therefore, the current CJRR database has 100% completion for all mandatory data elements. Item non-response rates for optional data elements in CJRR are presented in tables 3 to 5. Data from two facilities in Ontario was excluded, as they submitted data files that did not include all mandatory CJRR data elements.

Table 3: Item Response Rate for Optional CJRR Data Elements (Demographic, Administrative, Surgical and Clinical Information), 2011–2012

Optional Data Element	Number of Records With Missing Data Element	Total Number of Records	Item Response Rate
Patient Height	13,039	38,498	66%
Patient Weight	12,754	38,498	67%
Surgical Approach	743	38,498	98%
Antibiotic Use (Flag)	1,003	38,498	97%
Antibiotic Duration	631	37,426	98%
Minimally Invasive Surgery (Flag)	7,436	38,498	81%
Deep Vein Thrombosis Prevention (Flag)	539	38,498	99%
OR Environment	872	38,498	98%
Referral Date	30,652	38,498	20%
Date of First Consult	29,125	38,498	24%
Date of Decision for Surgery	16,997	38,498	56%

Note
Data from two facilities in Ontario was excluded, as they submitted data files that did not comply with CJRR data submission standards.
Source
Canadian Joint Replacement Registry, 2011–2012, Canadian Institute for Health Information.

Parts and Prostheses Information

In 2011–2012, all parts and prostheses fields were optional, given the variety of prosthesis combinations possible. Therefore, it was difficult to ascertain whether missing information was truly missing or not applicable. Tables 4 (for hip procedures) and 5 (for knee procedures) show the item non-response rate for parts and prostheses information.

Table 4: Item Response Rate for Optional Parts and Prostheses Data Elements (Hip Procedures), 2011–2012

Optional Data Element	Number of Records With at Least One Element Missing (Manufacturer, Catalogue or Lot Number)	Total Number of Records	Item Response Rate
Femoral Component	1,087	14,625	93%
Femoral Head	230	15,649	99%
Acetabular Component	855	14,272	94%
Acetabular Insert/Liner	622	13,991	96%
Ring/Cage	5	76	93%
Cement	236	2,647	91%

Source

Canadian Joint Replacement Registry, 2011–2012, Canadian Institute for Health Information.

Table 5: Item Response Rate for Optional Parts and Prostheses Data Elements (Knee Procedures), 2011–2012

Optional Data Element	Number of Records With at Least One Element Missing (Manufacturer, Catalogue or Lot Number)	Total Number of Records	Item Response Rate
Femoral Component	321	22,297	99%
Tibial Component	1,269	22,515	94%
Patellar Component	450	14,449	97%
Modular Stem*	105	993	89%

Note

* Includes both femoral stem and tibial stem. A record is deemed to have missing information if a modular stem was used (either femoral or tibial), and neither femoral nor tibial stem information (manufacturer, catalogue number and lot number) was complete.

Source

Canadian Joint Replacement Registry, 2011–2012, Canadian Institute for Health Information.

Issues of Bias and Reliability

Procedure under-coverage and surgeon under-coverage in CJRR are major sources of bias. However, the extent of these biases is difficult to evaluate. With mandated participation in two provinces as of 2012–2013 and continued efforts to expand mandatory reporting nationwide, over time it is expected that biases due to under-coverage will be reduced. In terms of other sources of bias, there may be some degree of inconsistency due to coding variation, such as varying clinical interpretations and definitions.

Data Quality Control Processes

All captured data was subject to CJRR database validity, logic, allowable range and consistency checks. The following specific quality control measures were applied:

- For paper forms, the raw data was entered into the CJRR database according to standardized data entry rules and validity checks.
- Paper forms that failed validity checks were set aside for follow-up with the data provider.
- Verification of samples of entered paper forms was performed for the 2011–2012 data. This task was performed by a staff member who did not enter the original paper form.
- For data submitted via paper forms or the web data entry tool, entered data was subjected to automated logic edits to ensure that mandatory fields were completed and logic conditions were met.
- For electronic submission files, validation checks were applied prior to capture in the database. These checks are outlined in the *CJRR Electronic Data Submission Requirements*.
- Errors in electronic submission data fell into two categories: severe and non-severe errors. Both types of errors were flagged in error reports that were sent to the data suppliers; however, data that had severe errors was rejected and not saved in the CJRR database.

Methodological Changes and Revision History

Compared with the previous year (2010–2011), no major changes were made to CJRR in 2011–2012 that affected the data quality.

CJRR has accepted data for a fiscal year beyond the reporting period deadline; thus there may be slight variations in reported trends over time (for example, in CJRR analytical reports). As previously noted, CJRR underwent major changes as of 2012–2013, through the adoption of the new MDS standard and increased reporting from British Columbia and Ontario. CJRR is also retiring paper data submission. Collectively, these initiatives will substantially improve the data quality of CJRR, supporting its goal to provide data to improve outcomes for Canadians receiving hip and knee replacements.

Contact Information

For more information, please visit CJRR's web page at www.cihi.ca/cjrr or contact us at cjrr@cihi.ca.

Production of this report is made possible by financial contributions from Health Canada and provincial and territorial governments. The views expressed herein do not necessarily represent the views of Health Canada or any provincial or territorial government.

Canadian Institute for Health Information
495 Richmond Road, Suite 600
Ottawa, Ontario K2A 4H6

Phone: 613-241-7860
Fax: 613-241-8120
www.cihi.ca
copyright@cihi.ca

Cette publication est aussi disponible en français sous le titre *Documentation sur la qualité des données à l'intention des utilisateurs : Registre canadien des remplacements articulaires, données de 2011-2012*.

Talk to Us

CIHI Ottawa
495 Richmond Road, Suite 600
Ottawa, Ontario K2A 4H6
Phone: 613-241-7860

CIHI Toronto
4110 Yonge Street, Suite 300
Toronto, Ontario M2P 2B7
Phone: 416-481-2002

CIHI Victoria
880 Douglas Street, Suite 600
Victoria, British Columbia V8W 2B7
Phone: 250-220-4100

CIHI Montréal
1010 Sherbrooke Street West, Suite 300
Montréal, Quebec H3A 2R7
Phone: 514-842-2226

CIHI St. John's
140 Water Street, Suite 701
St. John's, Newfoundland and Labrador A1C 6H6
Phone: 709-576-7006

www.cihi.ca
At the heart of data

Canadian Institute
for Health Information

Institut canadien
d'information sur la santé