



Data Quality Documentation, Hospital Morbidity Database—Multi-Year Information

Types of Care



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Abbreviations

CCI	Canadian Classification of Health Interventions
CIHI	Canadian Institute for Health Information
CSR	Client Service Representative
DAD	Discharge Abstract Database
FSA	Forward Sortation Area
HCN	Health Care Number
HMDB	Hospital Morbidity Database
ICD-9	International Statistical Classification of Diseases and Related Health Problems, 9th Revision
ICD-9-CM	International Statistical Classification of Diseases and Related Health Problems, 9th Revision, Clinical Modification
ICD-10-CA	International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada
ICFMI	Institutional Care Facility Master Inventory
MSSS	Ministère de la Santé et des Services sociaux
NACRS	National Ambulatory Care Reporting System
PCCF	Postal Code Conversion File

1 Introduction

1.1 Purpose

CIHI's Data Quality Framework was introduced to provide a common, objective approach to assessing the data quality of all CIHI's databases and registries. It also standardizes information on data quality for users and helps to identify priority issues, which in turn lead to continuous improvements.

This report, *Data Quality Documentation, Hospital Morbidity Database—Multi-Year Information*, is an important output of CIHI's Data Quality Framework. It is intended to provide information about the quality of the data contained in the Hospital Morbidity Database (HMDB) to help users decide whether the information fits their needs. While this report is produced on an ad hoc basis, the associated report *Data Quality Documentation, Hospital Morbidity Database—Current-Year Information*¹ is published annually with each release of the HMDB.

1.2 An Overview of the Hospital Morbidity Database

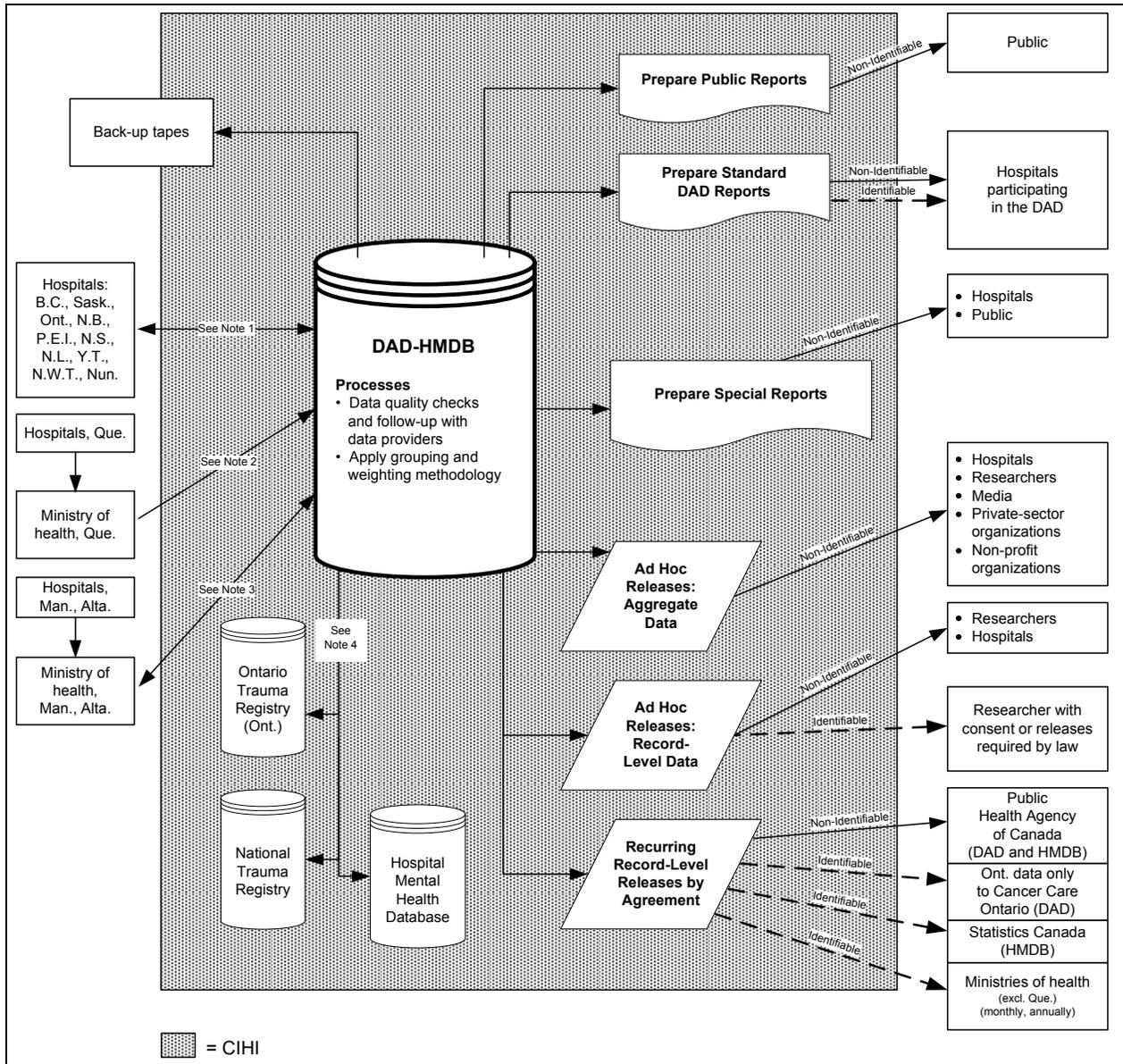
The HMDB is a national data holding that captures administrative, clinical and demographic information on inpatient separations from acute care hospitals. Discharge data is received from all acute care facilities across Canada.

The mandate of the HMDB is to collect, process and analyze national discharge data from Canadian acute care hospitals. The purposes of the HMDB are to

- Facilitate hospital, regional, provincial/territorial and national comparative reporting;
- Support management decision-making at the hospital, regional and provincial/territorial levels;
- Provide data to federal departments such as the Public Health Agency of Canada/Health Canada; and
- Support related approved analysis and research.

Figure 1 depicts data flow from institutions to the Discharge Abstract Database (DAD) and the HMDB.

Figure 1: Discharge Abstract Database—Hospital Morbidity Database Data Flow Diagram



Notes

1. Data submission/correction via the DAD.
2. Data submission via the HMDB.
3. Data submission/correction via the DAD (Manitoba and Alberta).
4. Registry-/database-specific subset of data. Data load for the Ontario Trauma Registry and National Trauma Registry was discontinued as of 2012–2013.

2 Coverage

2.1 Population of Reference for the HMDB

The population of reference includes all separations from acute inpatient hospitals in Canada (excluding stillbirths and cadaveric donor cases) from April 1 to March 31 of the given fiscal year. All acute care data except that from Quebec is submitted to the DAD; Quebec's acute care data is submitted via Quebec's ministère de la Santé et des Services sociaux (MSSS) once per year and is included in the HMDB. Detailed information about the DAD can be found in *Data Quality Documentation, Discharge Abstract Database*.^{2,3}

The population of reference for the HMDB is usually defined by the Analytical Institution Type Code. This is a CIHI-defined data element that is assigned when the Institution Type assigned to an Institution Number is known to differ from the type of care provided. The Analytical Institution Type Code was introduced to minimize the impact of differences between level-of-care definitions across provinces/territories and to facilitate comparative reporting across Canada.

2.2 The HMDB Frame

The frame for the HMDB is an inventory of institutions that is used to ensure the collection of all units in the population of reference. Since the provinces and territories determine which institutions will be included in the HMDB and all Institution Numbers are identified in advance, the HMDB frame is validated by individual provinces and territories. If data is not received from a particular institution, that institution is contacted by CIHI if necessary.

3 Data Collection and Standards

3.1 Data Collection

DAD data collection and capture procedures apply to DAD-submitting facilities in the HMDB. The DAD discharge abstract is completed by health records professionals and is submitted to CIHI on a monthly basis throughout the year. If errors are found during processing, the facility receives a detailed report describing all errors found, and it is requested to submit a correction. In the case of Quebec, the MSSS submits a single annual file of its hospital separations following the closure of its provincial database. This data has been edited, validated and corrected prior to being submitted to CIHI for inclusion in the HMDB.

3.1.1 Abstracting and Data Submission

DAD Data Submission

The DAD abstract is a record of hospital activity that is completed for each instance of a hospital separation (discharge, death, sign-out or transfer of the patient to another facility). The data collected on each abstract includes coded diagnostic, intervention and patient demographic and administrative information.

For DAD-submitting facilities, the *DAD Abstracting Manual*⁴ provides data element definitions, collection instructions, valid data values, validation rules and edits. The manual is available as a PDF from CIHI's website through CIHI's Core Plan service package and is used by clients, researchers and abstracting software vendors.

Adherence to the data submission and abstracting standards described in the manual helps to ensure that CIHI's data accurately reflects the institution's activities. Adherence is enforced through the application of hard and soft edits, education sessions and ongoing client support.

The format of the DAD abstract was changed in 2001–2002 to accommodate the adoption of the ICD-10-CA and CCI classification systems and *Canadian Coding Standards*, which were phased in across provinces and territories over a period of time. The International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada (ICD-10-CA) is an enhanced version of ICD-10 developed by CIHI for morbidity classification in Canada. The Canadian Classification of Health Interventions (CCI) is the Canadian standard for classifying health care interventions.

Since 2004–2005, all provinces and territories except Quebec have submitted data to the DAD using the ICD-10-CA and CCI classification systems. As of 2006–2007, Quebec started submitting data using the ICD-10-CA and CCI classification systems. In 2007, the DAD abstract and the standard suite of reports were modified to support the new Case Mix Group methodology, CMG+. This methodology is designed to aggregate acute care inpatient cases with shared clinical and resource-utilization characteristics and was designed to take advantage of the increased clinical specificity of ICD-10-CA and CCI. Section 3.3.1 provides additional detail on the implementation of ICD-10-CA and CCI across the country.

Quebec Data Submission

Demographic, clinical and administrative information for inpatient acute care, day surgery, and some rehab, chronic and psychiatric facilities is captured in the Quebec database MED-ÉCHO. The MSSS in Quebec submits an annual file to CIHI. The file format is not the same as the DAD file format; however, many of the data elements are the same. Although Quebec adopted ICD-10-CA and CCI for coding clinical information as of 2006–2007, full adoption of the *Canadian Coding Standards* did not occur. The MSSS issued the *Quebec Coding Directives*, which are comparable to the *Canadian Coding Standards* with some exceptions, most notably those related to the different concepts of Diagnosis Type in the DAD and Diagnosis Characteristic in MED-ÉCHO. To enable pan-Canadian reporting and provincial comparisons, CIHI, with the input of the Quebec ministry, maps the available Quebec data elements to the DAD data elements where applicable.

3.1.2 Data Submission Timeline

All data must be submitted to the DAD prior to the year-end deadline. The published submission deadline is July 31, which is four months after the end of the reference period (March 31).

MED-ÉCHO data is submitted once a year. The data is usually received by CIHI in the fall.

3.2 Data Quality Control

Extensive quality control measures support the collection of high-quality data in the HMDB. Highlights are provided below.

3.2.1 Comparability

There were fundamental differences in the way data was processed in the DAD versus the HMDB prior to the creation of the merged DAD-HMDB, that is, when the DAD and HMDB were two distinct databases. In particular, edit rules, manipulation of the data and the way errors were handled differed between the two databases. The merged DAD-HMDB resulted in streamlining HMDB data processing rules and edits with those of the DAD, thereby eliminating these differences.

3.2.2 DAD Data Submission

More than 900 data element edits are applied to each abstract as it is processed at CIHI to ensure that the data in each field is in the expected format, falls within a specific range of values and has a logical relationship to other data elements. For most data elements, when errors are detected, a standard default value of Z is substituted into the data field (for hard errors), or the field is flagged with a warning message (for soft errors). For some data elements, blanks or numeric values are used to represent missing or invalid data. The client receives an electronic report that provides the details of all abstracts and fields that were defaulted or flagged and is asked to submit corrections. The correction and editing steps are repeated until either the client successfully corrects the abstracts or the database closes at the year-end deadline. Before the end of the fiscal year, clients can submit previously missing abstracts or delete duplicate abstracts. Any uncorrected hard errors that remain in the database can be identified by the standard default value of Z.

In addition to verifying individual data elements, the editing process checks a number of inter-relationships. Clients may receive an error message in a field when the reported value is valid but violates certain logical relationships with the data in other fields.

To ensure relevance and consistency, edits are reviewed and updated each year as new data elements are added, changes are made to the database or *Canadian Coding Standards*, or new data quality issues are uncovered.

For information on the DAD, such as DAD abstracting software, the annual database change cycle, advisory groups, client support representatives, CIHI's education program and special studies, please refer to the document *Data Quality Documentation, Discharge Abstract Database—Multi-Year Information*.³

3.2.3 Quebec Data Submission

Many data quality control measures are applied to the Quebec data.

MSSS control measures: Data quality control measures exist at the source of data collection, as required by the MSSS. The MED-ÉCHO data file is subjected to Quebec-specific validity and edit checks prior to database closure. The ministry also performs data quality checks prior to sending the data files to CIHI. For example, Health Care Numbers (HCNs) are validated against source data such as patient birthdate and sex.

CIHI: Quebec data is further processed once at CIHI. Staging tables are produced in preparation for processing, and the counts in these staging tables are checked against counts obtained from the source file. Checks are also performed to confirm the number of records and diagnosis and procedure counts between stages.

To ensure the integrity and fitness for use of Quebec data, a solution was put in place that allowed MED-ÉCHO data to be validated such that a data element that failed a DAD edit was not systematically replaced with a Z. Instead, the record that failed the edit was flagged and linked to a look-up table, the Quebec discrepancy log, which provides the details of the edit failure. Analysts are encouraged to review Quebec data carefully, consult with CIHI's Quebec office and make decisions to include or exclude Quebec records from a given analysis on an analysis-by-analysis basis.

3.2.4 Quebec Data Mapping

Quebec facilities do not submit to the DAD. As such, these facilities do not follow DAD abstracting guidelines. With the input of the Quebec ministry, CIHI maps Quebec data to DAD values to enable comparative analysis, including pan-Canadian reporting and meaningful provincial comparisons. The HMDB team at CIHI, in partnership with the Quebec office and MSSS representatives, developed and continues to update the mapping rules and documents for Quebec data. The annual updates are based on changes to the Quebec data, changes to DAD abstracting and uncovered data quality issues. Mapping rules are rigorously tested to assess their robustness. Once the data has been mapped, the mapped values are compared with the original data to confirm the accuracy of the mapping.

3.3 Standardization

3.3.1 Classification Systems

Classification systems in health care provide a standard mechanism for the capture and coding of diagnoses and interventions. ICD-10-CA replaced the earlier ICD-9 and ICD-9-CM classifications. CCI was developed and is maintained by CIHI. It contains a comprehensive list of diagnostic, therapeutic and support interventions and replaced the CCP and ICD-9-CM intervention codes. The ICD-10-CA and CCI classification systems were implemented in a staggered fashion across the country. Please see Table 1 below for details.

Table 1: Year of ICD-10-CA/CCI Implementation, by Province/Territory

Province/ Territory	2001–2002	2002–2003	2003–2004	2004–2005	2006–2007
Newfoundland and Labrador	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI
Prince Edward Island	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI
Nova Scotia	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI
British Columbia	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI
Yukon	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI
Saskatchewan	ICD-10-CA/CCI (Partial)	ICD-10-CA/CCI (Full)	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI
Ontario	ICD-9/CCP and ICD-9-CM	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI
Alberta	ICD-9-CM	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI
Northwest Territories	ICD-9-CM	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI
Nunavut	ICD-9-CM	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI
New Brunswick	ICD-9-CM	ICD-9-CM	ICD-10-CA/CCI	ICD-10-CA/CCI	ICD-10-CA/CCI
Manitoba	ICD-9-CM	ICD-9-CM	ICD-9-CM	ICD-10-CA/CCI	ICD-10-CA/CCI
Quebec	ICD-9/CCP	ICD-9/CCP	ICD-9/CCP	ICD-9/CCP	ICD-10-CA/CCI

The data year 2006–2007 was the first year of full adoption of the ICD-10-CA and CCI classification systems in all provinces and territories. The classification change resulted in a number of challenges for users wishing to trend data over time. Data users are strongly advised to analyze the data using the classification system in which the data was collected.

ICD-10-CA and CCI codes are reviewed regularly, and codes may be added or deactivated as required. Further information, including a description of these changes and an indication of when the changes occurred, may be found in CIHI's *ICD-10-CA and CCI Evolution Tables*.⁵

3.3.2 Mandatory/Optional Status

The collection of a data element can be mandatory, optional or vary in definition across facilities, depending on the decisions made by the provincial/territorial ministries of health. Response rates are typically low for non-mandatory fields. Users should be aware of these variations when conducting data analyses.

3.4 Linkage

3.4.1 Postal Code

Postal code is a common variable in CIHI's databases. If it is used along with the Postal Code Conversion File (PCCF) from Statistics Canada, any standard geographic classification can be located, and the information can be compared across databases.

With the exception of Quebec, all provinces and territories submit postal codes at the full six-digit level to CIHI. The forward sortation area (FSA)—that is, the first three digits of a postal code—is typically the lowest level of aggregation available to external users under CIHI's *Privacy Policy on the Collection, Use, Disclosure and Retention of Personal Health Information and De-Identified Data, 2010*. The release of information for small geographic areas may also be restricted to ensure confidentiality. Special requests must be approved by CIHI's Privacy, Confidentiality and Security Committee. Note that for rural areas that use post office box numbers, postal code data does not necessarily provide an accurate picture of patient residence. This is because box numbers can point to a region different from the place of residence. In addition, when rural postal codes include more than one enumeration area, it becomes more difficult to determine a specific place of residence.

Since 2006–2007, patient geographic information submitted by Quebec consists of a mini-postal code (a two-letter code identifying a Canadian province or territory of residence) and a ministry-assigned administrative region code for Quebec residents. While this data can be used to group Quebec residents by region and Canadian residents by province or territory of residence, it is not at a sufficient level of granularity to distinguish an FSA.

3.4.2 Time Frame

The standard time frame for the HMDB is the fiscal year (the period from April 1 of one year to March 31 of the following year). Within the HMDB, a number of variables—the fiscal year, admission date/time and discharge date/time—give the flexibility of specifying abstracts that belong to a specific time period, such as the calendar year. This flexibility is especially useful when making comparisons with registries, which tend to be cumulative rather than separate databases for discrete years.

3.4.3 Institution Number

As some institutions close and others merge, a single institution can have different numbers over time. Institution number changes need to be accounted for to perform linkages over time.

There are two numbers by which an institution may be identified in the HMDB. The first is the Institution Number, which is assigned by the provincial/territorial ministries of health. In the HMDB, a province/territory prefix is added to the Institution Number to make each Institution Number unique. This is the case for all provinces/territories except Quebec. Institution Numbers submitted by Quebec are originally eight digits long and are truncated to five digits once submitted to the HMDB. When attempting to identify an institution in the HMDB, the Institution Number should be combined with the data element Submitting Province Code to ensure that the correct institution is identified.

The second method is the Institutional Care Facility Master Inventory (ICFMI) number. This number is unique at the provincial or territorial level. Historically assigned by Statistics Canada, the ICFMI number is now assigned to new facilities by CIHI.

In order to prevent potential identification, any requests for institution-identifying information require approval by CIHI's Privacy, Confidentiality and Security Committee.

3.4.4 Health Care Numbers

HCNs are assigned to individuals by provincial ministries of health and territorial governments. The HMDB also captures a variable representing the province or territory that issued an HCN, as the numbers are unique only within the province or territory. It is common practice to combine the two variables with other relevant personal information data fields (such as birthdate, gender and postal code), which allows individuals to be uniquely identified within the HMDB and across databases. The HCNs facilitate linkage to other databases with the same fields.

CIHI applies standardized algorithms to encrypt all HCNs to maintain patients' privacy and, at the same time, to enable linkage. Linkage over time, therefore, can be accomplished only by using the encrypted HCN.

Both encrypted and unencrypted HCNs, birthdates and full postal codes are not normally made available to external users. Access to these restricted data elements and the use of HMDB data for data linkage studies requires prior approval by CIHI's Privacy, Confidentiality and Security Committee. Users should note that patient names and street addresses are **not** part of the HMDB.

4 Major Changes in the HMDB

4.1 Changes to CIHI's Processing of Quebec Data as of 2006–2007

Quebec's adoption of ICD-10-CA and CCI for coding clinical data as of April 1, 2006, provided a unique opportunity for CIHI to enhance the process for integrating MED-ÉCHO data into the HMDB.

The revision of the mapping rules, a joint effort between CIHI and the MSSS, resulted in the ability to populate more data elements in the HMDB than was historically possible for Quebec data. A good example is the ability to populate additional values of the DAD Diagnosis Type data element for MED-ÉCHO data, albeit with important limitations regarding comorbidities present at admission and secondary diagnoses.

4.2 CIHI's Assignment of Diagnosis Type to Quebec Data

While Diagnosis Types are assigned by the submitting institutions for DAD-submitting provinces and territories, Diagnosis Type is not a concept that exists in Quebec. However, there is a data element in MED-ÉCHO that corresponds to Diagnosis Type called "Caractéristique du diagnostic." A new methodology to derive Diagnosis Types was implemented for 2006–2007 and onwards. All assigned Diagnosis Types are consistent with the DAD definitions.

In the DAD, the pre-admission comorbidity definition is consistently applied across all DAD-submitting provinces and territories, and these diagnoses are assigned Diagnosis Type 1 by the submitting institutions. CIHI initially assigned Diagnosis Type 1 to the Quebec data but found that the number of Type 1 diagnoses greatly exceeded the estimated expectations based on comparisons with other provinces and territories. To account for the fact that Diagnosis Type 1s for Quebec may have also included some secondary diagnoses, a new value for Diagnosis Type is assigned to Quebec records only. Diagnosis Type C was created because CIHI cannot distinguish the Diagnosis Type 1s from Diagnosis Type 3s.

In the DAD, Diagnosis Type 0 is restricted to newborn codes only when the Admission Category is N (Newborn). As mentioned, the concept of Diagnosis Type does not exist in MED-ÉCHO, and newborn records can be identified using either Admission Category of N or ICD-10-CA diagnosis codes. Given this, as of 2009–2010, Quebec records do not have a Diagnosis Type 0 associated with any diagnosis codes.

4.3 Changes to CIHI's Mapping of Quebec Data

Changes to the mapping rules for Quebec data have been implemented throughout the years. For details on these changes, please see *Data Quality Documentation, Hospital Morbidity Database—Current-Year Information*.¹

4.4 Manitoba Submissions to the DAD-HMDB

All hospitals in Manitoba began submitting their discharge abstracts directly to the DAD in April 2004. Until the end of 2003–2004 (March 31, 2004), only the Winnipeg region of Manitoba submitted discharge abstracts to the DAD, and Manitoba Health submitted annual data files to the HMDB.

In the HMDB prior to 2004–2005, four Manitoba Institution Numbers were used as pseudo Institution Numbers to track Manitoba residents treated outside of the province. When Manitoba began fully submitting to the DAD in April 2004, these four Institution Numbers were recycled and assigned to DAD-submitting facilities. This issue impacts trending analyses for all fiscal years that include data from these four institutions.

Contact

For more information, please send an email to CIHI at cad@cihi.ca.

References

1. Canadian Institute for Health Information. *Data Quality Documentation, Hospital Morbidity Database – Current-Year Information*. Ottawa, ON: CIHI; 2012. <http://www.cihi.ca>. Accessed on March 18, 2013.
2. Canadian Institute for Health Information. *Data Quality Documentation, Discharge Abstract Database – Current-Year Information*. Ottawa, ON: CIHI; 2012. <http://www.cihi.ca>. Accessed on March 18, 2013.
3. Canadian Institute for Health Information, *Data Quality Documentation, Discharge Abstract Database – Multi-Year Information*. Ottawa, ON: CIHI; 2012. <http://www.cihi.ca>. Accessed on March 18, 2013
4. Canadian Institute for Health Information. *DAD Abstracting Manual*. Ottawa, ON: CIHI; 2013. <http://www.cihi.ca>. Accessed on March 18, 2013.
5. Canadian Institute for Health Information, *Classification and Coding Products – ICD-10-CA and CCI Evolution Tables*. Ottawa, ON: CIHI; 2012. <http://www.cihi.ca>. Accessed on March 18, 2013.

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