



Data Quality Documentation, National Ambulatory
Care Reporting System—Multi-Year Information



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

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Abbreviations

ADT	admission/discharge/transfer
AHP	allied health professional
CACS	Comprehensive Ambulatory Classification System
CC	cardiac catheterization (clinic)
CCI	Canadian Classification of Health Interventions
CIHI	Canadian Institute for Health Information
CSR	client services representative
DAD	Discharge Abstract Database
DI	diagnostic imaging
DS	day surgery
ED	emergency department
EDIS	emergency department information system
eNACRS	NACRS Electronic Comparative Reports
HCN	Health Care Number
ICD-10-CA	International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada
MCR	multiple contact record
MIS FC	Management Information System Functional Centre
MOHLTC	Ministry of Health and Long-Term Care (Ontario)
NACRS	National Ambulatory Care Reporting System
NCAD	National Clinical Administrative Databases (steering committee)
OC	oncology clinic
OMHRS	Ontario Mental Health Reporting System
PCCF	Postal Code Conversion File (Statistics Canada)
PDF	portable document format
PHAC	Public Health Agency of Canada
RD	renal dialysis clinic
RIW	Resource Intensity Weight

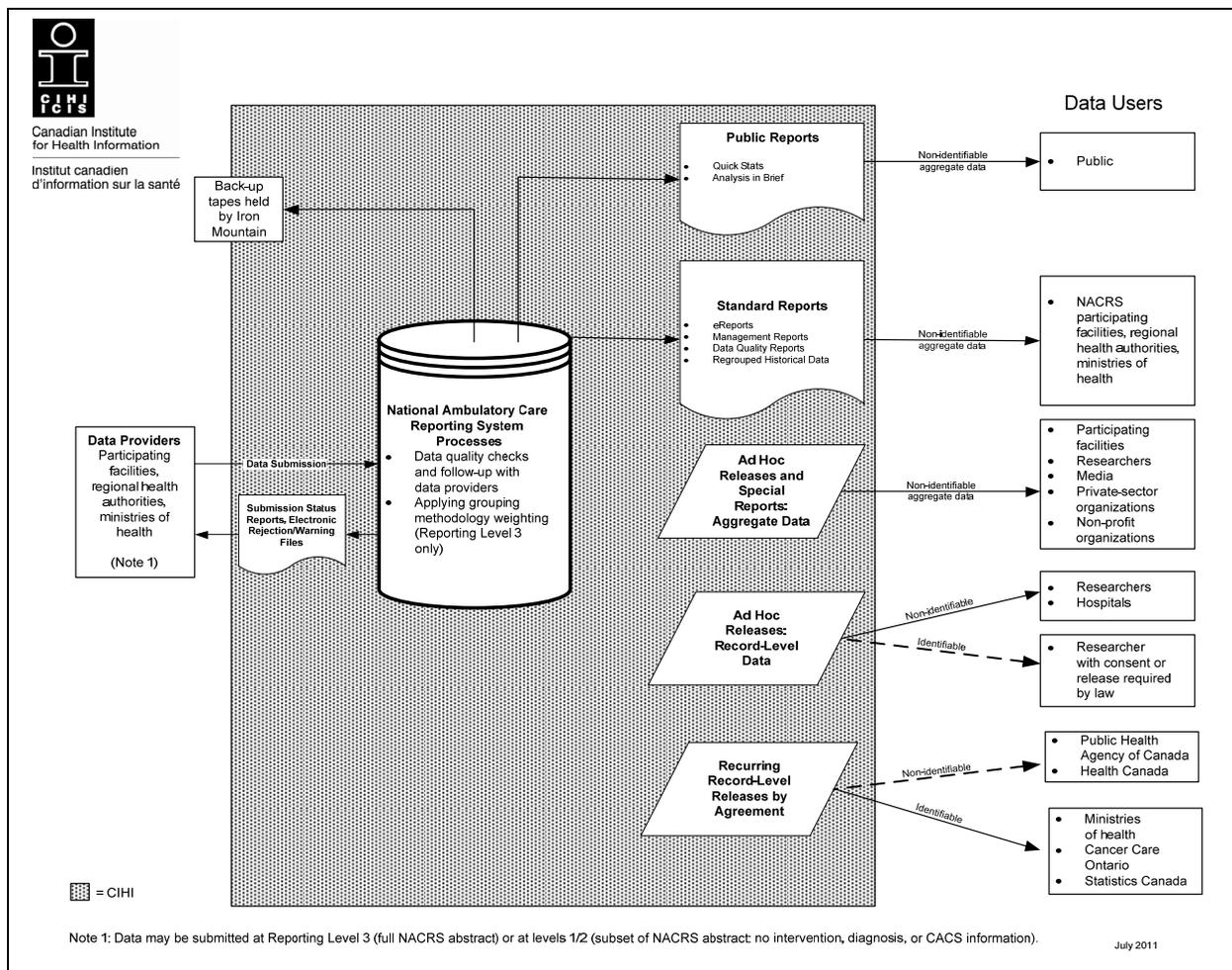
1 Introduction

1.1 An Overview of the National Ambulatory Care Reporting System

The National Ambulatory Care Reporting System (NACRS) at the Canadian Institute for Health Information (CIHI) is a national database designed to capture information on client visits to facility- and community-based ambulatory care. Data about visits is collected at the time of service in participating facilities. Data elements in NACRS can be grouped according to five categories—demographic, clinical, administrative, financial and service-specific—with information on discharges, deaths and transfers within a fiscal year (April 1 to March 31). Over time, NACRS has been used to capture not only emergency department (ED) visits but also day surgery (DS) procedures, diagnostic imaging (DI) visits and numerous clinic visits, including renal dialysis (RD), cardiac catheterization (CC), oncology (OC) and mental health (MH).

Figure 1 illustrates the flow of data in NACRS and the uses of NACRS information.

Figure 1: National Ambulatory Care Reporting System Data Flow Diagram



2 Coverage

2.1 Population of Reference for NACRS

The population of reference (the population for which statements can be made) for NACRS includes ambulatory care visit activity with a date of registration between April 1 and March 31 from all submitting facilities in Canada.

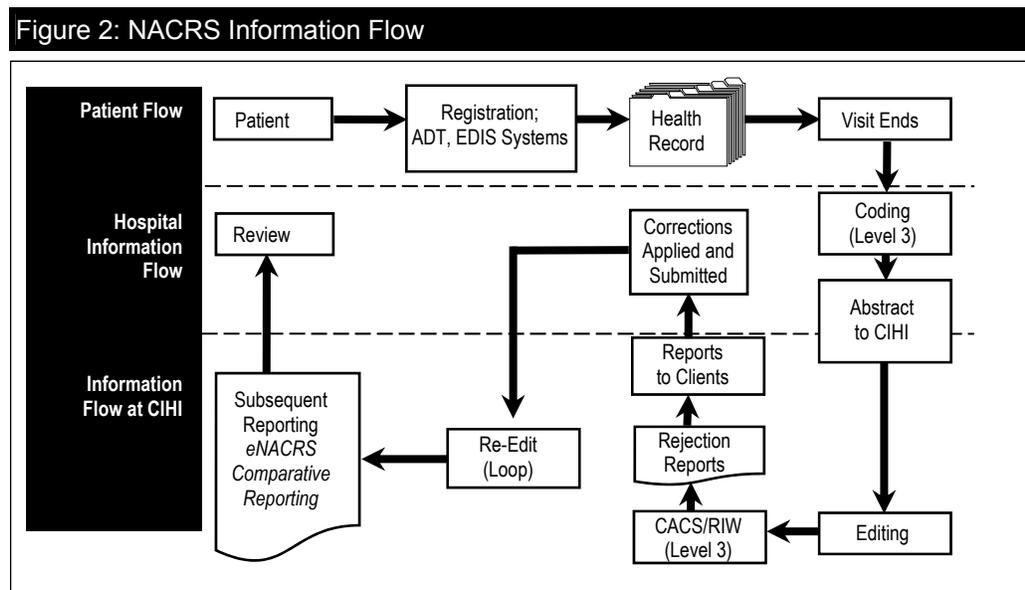
2.2 The NACRS Frame

The frame for NACRS is an inventory of facilities that is used to ensure the collection of all units in the population of reference. Since the provinces and territories determine which facilities will be included in NACRS and all facility numbers are identified in advance, the NACRS frame is validated by individual provinces and territories. If data is not received from a particular facility, that facility is contacted by CIHI if necessary. For a listing of provincial/territorial participation in NACRS, please refer to Appendix A (tables 1 and 2) in *Data Quality Documentation, National Ambulatory Care Reporting System—Current-Year Information*.

3 Data Collection and Standards

3.1 Data Collection

The NACRS data capture and collection process and information flow are summarized below, in Figure 2.



3.1.1 Abstracting and Data Submission

The NACRS abstract is a tool designed to capture ambulatory care visit activity; it contains relevant data elements to be submitted to CIHI's NACRS database. The NACRS abstract completed for each patient visit uses a variety of sources—including admission/discharge/transfer (ADT) systems, emergency department information systems (EDIS), patient records, physician notes, and laboratory and diagnostic imaging results—to create a complete picture of a patient's visit, as depicted by the "Health Record" section in Figure 2. In other words, each abstract is associated with a patient visit and is submitted to the NACRS database from the facility. If a patient visits an ambulatory care setting on multiple occasions within the fiscal year, multiple abstracts are submitted.

Prior to 2006–2007, a multiple contact record (MCR) was created when an allied health professional (AHP) provided care or treatment outside of the mandated Management Information System Functional Centre (MIS FC) in which the visit occurred. MCRs were discontinued in the 2006–2007 reporting year. Clients were instructed to record information on AHP care on the main visit abstract, using an additional data element, MIS FC Account Code. This, as well as the data element Service Provider, allows for multiple MIS FCs to be identified. In other words, there is one abstract submitted per visit, even if during that visit a patient is seen by several physicians, clinicians and AHPs in different MIS FCs. As of 2010–2011, the province of Alberta submits all ambulatory care visits to NACRS. Alberta's emergency and day surgery abstracts conform to CIHI's NACRS abstract creation submission requirements; no MCRs are created. Alberta's ambulatory care clinic visits also, whenever possible, follow the NACRS abstract creation process, though some facilities submitted MCRs for Alberta mental health and other clinic visits.

The *National Ambulatory Care Reporting System Manual* is available as a PDF on CIHI's website through CIHI's Core Plan service package. The manual provides data element definitions, collection instructions, valid data values, validation rules and edits. The manual 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 reports accurately reflect the facility's ambulatory care client activity. Adherence is obtained through the application of hard and soft edits, education sessions and ongoing client support.

3.1.2 Data Submission Timeline

All data must be submitted to NACRS 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).

3.1.3 Completeness of Data Submissions

NACRS has introduced a set of cumulative data quality reports at the facility and provincial levels. These reports provide information on the number of records with unknown/missing values for specific time-related data elements. Using these reports, facilities and provinces can identify where data collection practices could be improved.

Period closure is important in communicating the completeness of data submission to CIHI and is indicated by a data element called Ready for Reports Flag in a data submission. Once the period closure is submitted and accepted, NACRS assumes that facilities have sent in all their data for that period. Each period within a fiscal year must be closed regardless of whether or not NACRS data was submitted for that period. The presence of a period closure in the absence of data will convey that the facility had no activity for that period (for example, if the unit closed in July) or that the facility closed within that fiscal year.

3.2 Data Quality Control

In addition to the above, quality control for NACRS also occurs through the following channels:

3.2.1 CIHI Production System Edits and Correction Process

The comprehensive NACRS edit structure is designed to identify or flag inconsistencies. More than 750 data element edits and warnings are applied to NACRS. Since NACRS accepts only error-free abstracts, an error detected by the edit system results in the rejection of the entire abstract; the client is asked to correct and resubmit the abstract. Abstracts receiving only a warning message are not rejected and are accepted into NACRS. The correction and editing steps must be repeated for a rejected record until it is successfully corrected.

All submission, deletion, correction and editing of abstracts for the fiscal year must be completed prior to the closure of the NACRS database on July 31. After that time, no additional abstracts or changes can be accepted. Edits are reviewed and updated each year as new data elements are added, and changes to the database are made to ensure relevance and consistency. Test cases and specifications are created according to internal guidelines for all new edits to ensure that they function correctly.

3.2.2 Abstracting Software

In order to standardize and ensure accurate data collection, CIHI's clients hire external software vendors to install any software required for data submission. CIHI publishes data submission and edit specifications for vendors annually. To be licensed, vendors must submit successful test files to CIHI. Facilities are also required to submit test files before data is moved into production. CIHI provides ongoing support to both vendors and facilities in identifying and solving issues. The vendor products add value by providing data-capture quality-control measures, such as edit checks, visual verification pop-ups by data field and cross-logic checks based on CIHI's specifications.

Although vendors must meet CIHI's submission specifications, differences do exist among vendor software, which could introduce errors in the data. For example, a vendor may customize a client's software to include data variables that are not part of the NACRS data set. CIHI works with vendors to ensure compliance with NACRS data submission specifications while respecting their proprietary freedom of software design.

3.2.3 Annual Database Change Cycle

Every year, enhancements are made to the database to address emerging health care issues, address client needs and improve data quality. Refinements and suggested enhancements to data elements and edits in NACRS are communicated to CIHI in several ways, including

- Routine communication from clients (both internal and external) to NACRS client services representatives;
- Input from advisory committees; and
- Formal submissions for data element additions or deletions from key stakeholders.

Appendix B in *Data Quality Documentation, National Ambulatory Care Reporting System—Current-Year Information* outlines the mandatory and optional data elements. Appendix C in the same document outlines the evolution of data elements over time.

3.2.4 Advisory Groups

The National Clinical Administrative Databases (NCAD) Steering Committee has national representation from ministries of health, Statistics Canada and the Public Health Agency of Canada (PHAC). This committee assists in the annual database change cycle by providing feedback on requested changes, such as proposals for new data elements and edits, as well as revisions to current data elements and edits. The feedback helps to ensure national comparability.

NACRS also has an ED Ad Hoc Advisory Committee that has representation from the Canadian Association of Emergency Physicians. This advisory group meets when required to discuss ED-specific issues as they relate to data collection and reporting for NACRS.

3.2.5 Client Services Representatives

CIHI has assigned client services representatives (CSRs) to provide direct client support for NACRS products; assist in the development and delivery of education programs; provide data-quality expertise; and build relationships with provincial and territorial data consultants, health organizations and data users.

3.2.6 CIHI Education Program

Existing clients and clients in jurisdictions considering NACRS are provided with education sessions on NACRS implementation, data collection and submission, as well as on the use of NACRS products and reports, including the Comprehensive Ambulatory Classification System/Resource Intensity Weight (CACS/RIW) methodology and eNACRS reports. These sessions are a way of standardizing coding practices and adherence to CIHI's data submission and collection requirements.

CIHI's eQuery tool gives users a mechanism for obtaining answers to common questions about data collection, data submission, data elements and edits. eQuery can also assist in such matters as ICD-10-CA and CCI coding standards and case-mix methodologies. Bulletins on the web or sent by email also inform clients about NACRS issues and/or new NACRS products.

3.2.7 Special Studies

CIHI occasionally completes reabstraction and data-quality assessment studies. The last reabstraction study on NACRS data was released in January 2008 and was completed for 2004–2005 data. The study involved returning to the original source of information (client charts), reabstracting the data and comparing results with the data originally submitted to NACRS. Results of these studies can help focus data quality efforts.

3.3 Standardization

3.3.1 Classification System

Classification systems in health care provide a standard mechanism for the capture and coding of diagnoses and interventions. As of 2002–2003, all facilities submitting to NACRS use the International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada (ICD-10-CA) and the Canadian Classification of Health Interventions (CCI) coding standards. **For years prior to this, users are strongly advised to analyze data using the original classification scheme.**

3.3.2 NACRS Pick-Lists

Pick-lists are standardized lists from which predefined words or phrases can be selected. The use of these lists allows structured input to be received and variation in data collection to be minimized, which facilitates comparative reporting. The NACRS pick-lists are designed to be completed by ED clinical staff (a physician or nurse) at the time of service.

The Presenting Complaint List (PCL) consists of approximately 165 common initial complaints received from patients entering the ED.

The Canadian Emergency Department Diagnoses Shortlist (CED-DxS) consists of a subset of more than 800 diagnoses derived from a complete list of more than 17,000 ICD-10-CA codes used to capture diagnostic information on acute and ambulatory care patients in Canada.

3.3.3 National Management Information System Functional Centre Account Codes

Prior to 2009–2010, all abstracts sent to NACRS contained a provincial/territorial Management Information System Functional Centre (MIS FC) Account Code. As of 2010–2011, a National MIS FC Account Codes list was introduced. NACRS no longer accepts provincial/territorial MIS FC variations and will accept only abstracts submitted with National MIS FC Account Codes. As such, all abstracts sent to NACRS must contain a National MIS FC Account Code to represent the statistical and financial reporting related to the services provided (see the *NACRS Abstracting Manual*, Appendix D—National MIS Standards Functional Centre Account Codes to Ambulatory Care Group Mapping Table).

3.3.4 Mandatory/Optional Status

Submission of a data element may be mandatory, optional or mandatory if applicable. As a national database, a large number of NACRS data elements are mandatory, regardless of the geographic location of submitting facilities, even though a particular data element may not have been mandated for reporting by a province or territory. All other data collected in NACRS may be either optional or mandatory if applicable, depending upon decisions of individual provinces or territories to mandate the reporting of a particular data element. Response rates for optional data elements vary and are typically low. For an overview of data elements' mandatory/optional status, consult Appendix B in *Data Quality Documentation, National Ambulatory Care Reporting System—Current-Year Information*, as well the *NACRS Manual*.

In performing analyses over time or across provinces and territories, users should note that data element specifications can change between fiscal years. For example, some data elements that were optional in 2001–2002 might have been mandatory in 2002–2003. For an overview of data element evolution over time, please consult Appendix C in *Data Quality Documentation, National Ambulatory Care Reporting System—Current-Year Information*, as well as the *NACRS Manual*.

3.4 Linkage

3.4.1 Postal Code

Postal Code is a common variable in CIHI databases. If it is used along with the Postal Code Conversion File (PCCF) from Statistics Canada, any standard geographical classification can be located, and the information in databases can be compared. The forward sortation area (FSA)—that is, the first three digits of a postal code—is the lowest level of aggregation normally available to external users under CIHI's privacy and confidentiality policy. The release of information for small geographical 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 other than 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.

3.4.2 Time Frame

The standard time frame for NACRS is the fiscal year (the period from April 1 of one year to March 31 of the following year). Within NACRS, a number of variables—the fiscal year, registration date/time and disposition date/time—give the flexibility of specifying records 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 Facility-Unique Identifier

The facility-unique identifier is the ambulatory care number assigned by provincial ministries of health and territorial governments. Each province or territory has the autonomy to determine how the facility ambulatory care number is assigned. As some facilities close and others merge, a single facility can have different numbers. A frame of ambulatory care number changes is required to perform linkages by ambulatory care number over time.

Users should also be aware that the facility identifier numbers for the reporting of DS visits are not the same in NACRS as they are in the Discharge Abstract Database (DAD). When conducting trend analyses, mappings must be performed between the DAD DS Institution Numbers and the NACRS ambulatory care facility numbers.

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

3.4.4 Health Care Numbers

Health Care Numbers (HCNs) are assigned to individuals by provincial ministries of health and territorial governments. NACRS also captures a variable representing the province or territory that issued an HCN, as the numbers are unique only within the province or territory. Combining the two variables with other relevant personal information data fields (such as Birth Date, Gender and Postal Code) allows individuals to be uniquely identified within NACRS. 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. Health Care Number, Birth Date and full Postal Code are not normally made available to external users. Access to these restricted data elements and the use of NACRS 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 NACRS.

3.5 Equivalency

3.5.1 Day Surgery

Day surgery visits are submitted to either the DAD or NACRS. Over the years, more facilities/ jurisdictions have made the switch from reporting day surgery visits to the DAD to reporting them to NACRS. There are differences between the DAD and NACRS for day surgery reporting with respect to day surgery definition, data elements and valid values, which can make it difficult to compare information between the two databases and across different fiscal years. Work is under way to align these databases for day surgery reporting. **Users are strongly advised to be aware of these differences when doing historical analysis and provincial comparisons.**

4 Major Changes to NACRS

4.1 Historical Comparability

4.1.1 NACRS Re-Engineering (2002–2003)

The re-engineering of the NACRS database in 2002–2003 resulted in a database-wide move to ICD-10-CA/CCI coding. Other changes in the re-engineering consisted of a new record layout, electronic rejection reports and additional data fields.

4.1.2 NACRS Multiple Submission Level Implementation (2009–2010 and 2010–2011)

During 2008–2009, CIHI undertook a special project to enhance the NACRS database to address the burden of data collection, improve timeliness and functionality of reporting and increase coverage across the country. As of April 1, 2009, the NACRS database was modified to allow for different levels of data submission for ED visits. These are referred to as data submission levels 1, 2 and 3. As a result, facilities submitting to the NACRS database under submission levels 1 and 2 report a subset of the full NACRS data set. Facilities that have been reporting the full NACRS data set are categorized as submission Level 3. **Users are strongly advised to take into consideration the data submission level information when performing their analysis.**

General details regarding submission levels 1, 2 and 3, available in NACRS as of 2010–2011, are as follows:

Level 1 (ED Only):

- Introduced in 2009–2010.
- Is applicable to ED records only.
- Is a subset of the full NACRS data set, with approximately 30 mandatory data elements.
- Includes data elements required for ED wait times indicators, such as Time of Registration, Time of Triage, Time of Discharge and Triage Level.
- Data is readily available via ADT/EDIS interface to the NACRS abstract (real time or within a few days of month end).
- Fully coded diagnosis (ICD-10-CA) and intervention (CCI) information is not available.
- Completion of the NACRS pick-lists (PCL and CED-DxS) data elements is optional. These pick-lists provide some diagnostic information without a facility being required to submit the fully coded ICD-10-CA diagnoses. (See Section 3.3.2 above.)
- CACS grouped data is not available.

Level 2 (ED Only):

- Option became available in 2010–2011.
- Level 2 data submission contains the same data elements as Level 1, except completion of at least one of the NACRS pick-lists is mandatory.
- CACS grouped data is not available.

Level 3:

- Applicable to all ambulatory care, such as ED, DS and outpatient clinics.
- Contains the full NACRS data set, which includes all mandatory and optional data elements, as well as the fully coded diagnosis (ICD-10-CA) and intervention (CCI) information.
- CACS grouped data is available.

Multi-Level Submission (ED Only):

- Introduced in 2010–2011.
- Facilities submitting multiple levels can submit a preliminary Level 1 or Level 2 file for a reporting period to gain access to more timely reports and then submit a final Level 3 file for access to the CACS grouped data. When a period of Level 3 ED data is accepted into the NACRS database, the previously submitted Level 1 or Level 2 data for that period is archived and the Level 3 data populates the database.

4.1.3 Comprehensive Ambulatory Classification System Grouper

CACS is a national grouping methodology for ambulatory care patients that includes EDs, clinics and day surgery. Patients are grouped according to principal procedure, main diagnosis and visit disposition data collected via NACRS. CACS places patient visits into groups that are clinically and resource homogenous. Some of the variables that assign clients to groups are Diagnosis, Intervention, Anaesthetic Technique, Visit Disposition, Mode of Visit, Client Age and Gender.

With the release of each year of data, the most recent version of the CACS grouping methodology is used.

4.1.4 Historical Trend Comparability

- **ECT volumes:** There was an increase in electroconvulsive therapy (ECT) treatment volumes from 2005–2006 to 2006–2007 (from 3,467 to 5,299 cases). The main reason for this is that, prior to 2006, ECTs were collected in inpatient abstracts and were reflected in the DAD. Only outpatient ECTs were registered in NACRS. However, since the introduction of the Ontario Mental Health Reporting System (OMHRS) in 2006, a NACRS abstract has been created for the ambulatory component (ECT treatment) of the visit, as OMHRS does not have a component to capture the ECT intervention.

- **MIS FCs:** Prior to 2010–2011, provincial MIS FCs were used in NACRS. With the implementation of the National MIS FC, some records may have shifted from one visit type to another, as the provinces and territories may have been defining visit types differently based on their provincial MIS FCs.
- **Pneumonia and stroke:** The number of pneumonia and stroke cases presented in EDs as the Main Problem increased from 2007–2008 to 2008–2009. Pneumonia increased by 16% and stroke increased by 26%. The main reason for this increase is the introduction of the new valid CIHI code Q (Suspected Conditions/Query/Uncertain Diagnosis) in the Main Problem prefix in 2008–2009. Prior to 2008, only the symptoms of the actual condition were coded and not the diagnosis.

4.1.5 Historical References

The *NACRS Manual* and the *Comprehensive Ambulatory Classification System Directory* are updated annually. Users should consider both the fiscal year and classification scheme when referring to NACRS documentation.

- *NACRS Manual*
- *CACS Directory*
- CIHI's NACRS bulletins

The *Canadian Coding Standards for ICD-10-CA and CCI* are available by year as PDF documents on CIHI's website.

5 General Data Query Guidelines

In general, a well-defined research question and analytical plan will help make the process of working with NACRS less complex. As such, the extensive nature of NACRS requires a number of general data considerations before the data can be used in analyses. Included below are several considerations that may be useful in an analysis of NACRS data:

- NACRS includes several types of ambulatory care visit types. Each type, including ED, DS, DI and clinics (for example, RD, CC, OC and MH), can be identified by multiple MIS FCs (see Appendix D of the *NACRS Manual*).
- Day surgery or clinic visits can occur in the ED MIS FC. These may be identified for exclusion in analyses pertaining to true emergency type visits with the data element Emergency Department Visit Indicator.
- A main diagnosis and main intervention are coded in NACRS along with up to nine additional diagnoses and interventions. Therefore, analyses may consider only the main diagnosis and intervention or other diagnoses and interventions as well.
- There is known measurement error in NACRS. Therefore, it is suggested that record-level database samples or subsets be analyzed at the facility level for larger-than-expected proportions of data occurring in data element codes.

- Understanding variation in NACRS data by facility size or a rural/urban designation, for example, may indicate groupings to help analyze the data. The known variation by these groupings in ambulatory care services provided is reflected in data. It includes, but is not limited to, ED Visit Indicator, types of service providers and visit dispositions (such as transfers).

Other data exclusions and inclusions may need to be considered for specific analyses. A review of the *NACRS Manual* is recommended so that the data elements and the information collected can be understood.

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