Executive Summary:

Database Background and General Data Limitations Documentation

National Ambulatory Care Reporting System (NACRS)

FY 2006–2007

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Abbreviations

ACCS	Ambulatory Care Classification System
AHP	Allied Health Professional
BC	British Columbia
CACS	Comprehensive Ambulatory Classification System
CC	Cardiac Catheterization Clinic
CCI	Canadian Classification of Health Interventions
CCO	Cancer Care Ontario
CCP	Canadian Classification of Diagnostic, Therapeutic, and Surgical Procedures
CIHI	Canadian Institute for Health Information
CL	Clinic
CSRs	Client Services Representatives
CTAS	Canadian Triage Acuity Scale
DAD	Discharge Abstract Database
ED	Emergency Department
eNACRS	NACRS Electronic Comparative Reports
FY	Fiscal Year
ICD-10CA	International Statistical Classification of Diseases and Related Health Problems 10th Revision, Canada
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
LOS	Length of Stay
MED D/N	Medical Day/Night Care
MCR	Multiple Contact Record
MIS FC	Management Information System Functional Centre Account Code
MOH/LTC	Ministry of Health and Long-term Care (Ontario)
NACRS	National Ambulatory Care Reporting System
NCAD	National Clinical Administrative Databases Steering Committee
NS	Nova Scotia
OC	Oncology Clinic
ON	Ontario
PCCF	Postal Code Conversion File (Statistics Canada)
PCTAS	Pediatric Canadian Triage Acuity Scale
PDF	Printable Document Format
PE	Prince Edward Island
RD	Renal Dialysis Clinic
SARS	Severe Acute Respiratory Syndrome
SURG D/N	Surgical Day/Night Care
TADB	Therapeutic Abortions Database
YT	Yukon Territory

1. An Overview of the National Ambulatory Care Reporting System (NACRS)

Ambulatory care in Canada, as in many other developed countries, comprises a significant portion of the health care delivered. As such, the need for quality, reliable, and timely data in this sector of the healthcare industry is paramount. It is for this reason the Canadian Institute for Health Information (CIHI) developed the NACRS. This reporting system is designed to provide valuable information to assist with the evaluation of the management of ambulatory care services in Canadian health care facilities.

When CIHI identified a need for collecting information on ambulatory care, they used Alberta's Ambulatory Care Classification System (ACCS) product as a model. The NACRS product was first released for use in 1997. In fiscal year (FY) 2002–2003, the product was re-engineered to respond to the Canadian implementation of the International Classification of Diseases, 10th Revision and the Canadian Classification of Health Interventions (ICD-10CA/CCI). The table below describes briefly the evolution of the NACRS:

NACRS Evolution	
1997 Apr	• NACRS launched • 1st BC facility adopts emergency department (ED) reporting
2000 Jul	• ON adopts ED reporting
2001 Apr	• The Comprehensive Ambulatory Classification System (CACS) and Ambulatory Cost Weights (ACW) launch
2002 Apr	• 2nd BC facility adopts ED reporting • Implementation of ICD10 CA/CCI, the NACRS re-engineered
2003 Apr	• ON adopts surgical day/night care (SURG D/N) reporting • 3rd BC facility adopts ED reporting • 1 NS facility adopts ED reporting
2003 Jul	• 1 PE facility adopts ED reporting
2003 Oct	• ON adopts clinic reporting, specifically renal dialysis (RD), cardiac catheterization (CC) and oncology (OC) clinics • 2 NS facilities adopt SURG D/N reporting • 3 NS facilities adopt ED reporting
2004 Apr	• 1 Yukon facility adopts ED reporting
2005 Apr	• 1 NS facility adopts ED and SURG D/N reporting
2006 Apr	• CACS/DPG Redevelopment • First re-abstraction study of the NACRS data sets

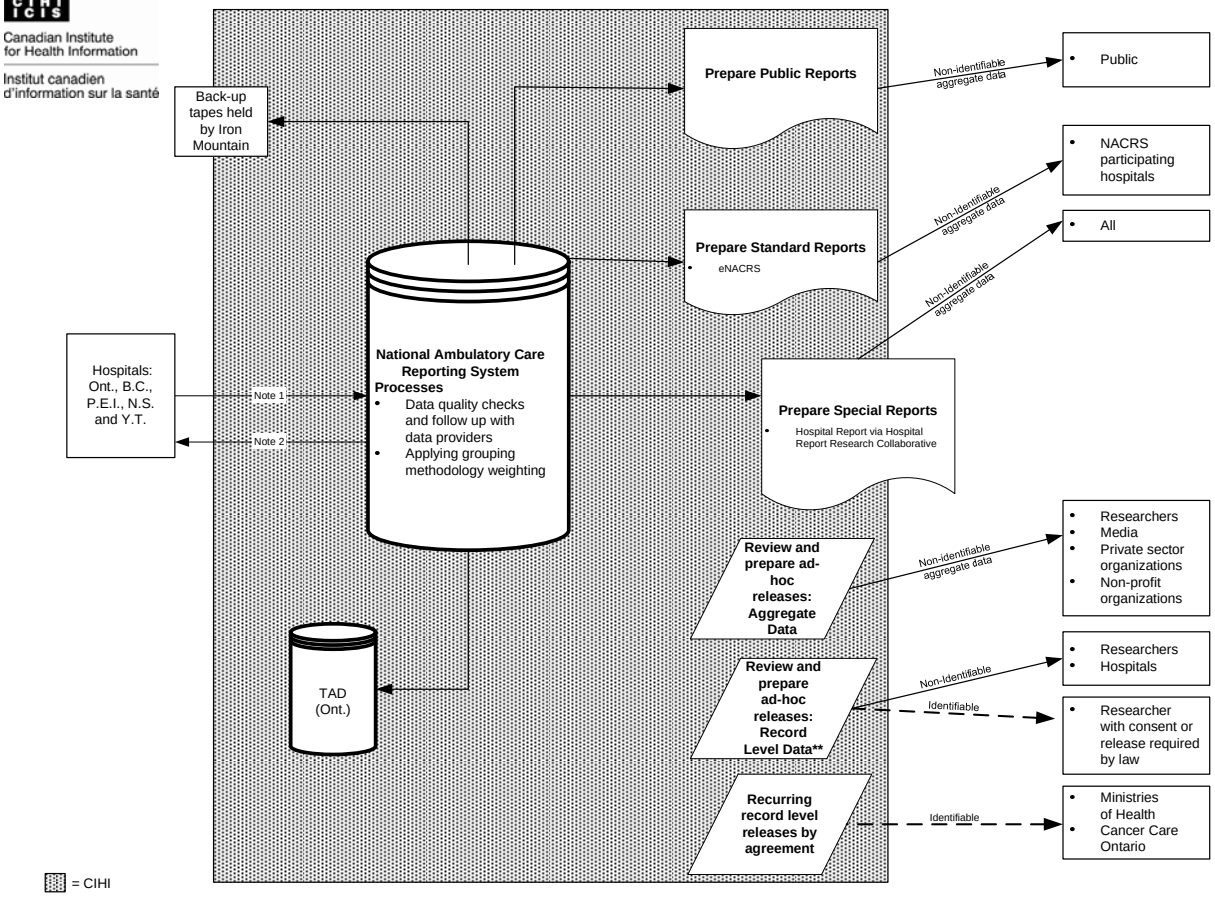
2. Purpose and Uses of NACRS

The NACRS is a data collection tool designed to capture information on client visits to facility and community based ambulatory care. Client visit data are collected at the time of service in participating facilities. The database includes: demographic data, clinical data, administrative data, financial data, and service-specific data elements.

Information from the NACRS is used by a variety of agencies and facilities for planning and evaluation. Facilities use the data to support facility-specific utilization management decisions, administrative research, and costing and clinical outcomes research. Governments use the data for policy development, system planning and evaluation. Universities and other academic institutions use the data for research purposes. NACRS data is also used for quality and risk management, report cards and status reports. The NACRS is one of the core clinical administrative databases at CIHI and is currently one source for records that comprise the Therapeutic Abortions Database (TADB).

The data flow diagram below represents the uses of NACRS information:

National Ambulatory Care Reporting System (NACRS) 2006–2007 Data Flow Diagram



This document includes the NACRS background information and describes general data limitations that may have an impact on analyses using the NACRS. Both the background and general data limitations chapters are organized into sections based on criteria outlined in CIHI's Data Quality Framework (June 2005). To create an operational definition of data quality, CIHI defined five dimensions of data quality to divide fitness for use into distinct components including accuracy, timeliness, comparability, usability and relevance. For analytical purposes, the dimensions of accuracy and comparability are most important. This document therefore includes the relevant information for each of these dimensions. The accuracy dimension refers to how well information in or derived from the database reflects the reality it was designed to measure and the comparability dimension refers to the extent to which the database is consistent over time and uses standard conventions.

3. Background Information

3.1 Accuracy

3.1.1 Coverage

Population

The population of reference (the population for which statements can be made) for the NACRS includes: ambulatory care activity with a date of registration/visit between April 1st, 2006 and March 31st, 2007 from all NACRS participating facilities in Canada. For FY 2006–2007, this includes:

- All ON facilities ED, SURG D/N, RD, OC and CC clinic visits
- 3 BC facilities ED visits
- 1 PE facility ED visits
- 5 NS facilities ED visits and 3 of the 5 NS facility's SURG D/N visits
- 1 YT facility ED visits

Appendix A outlines visit Management Information System Functional Centre Account Codes (MIS FC) by these ambulatory care types (i.e. ED, SURG D/N, RD, OC and CC).

In FY 2006–2007, 9,692,460 abstracts were submitted to the NACRS as of the published year-end deadline of July 31st, 2007. A detailed breakdown of all visits by province/territory and ambulatory care type is summarized in Table 1.

Table 1. Summary of All Visits for NACRS 2006–2007, by Province and Ambulatory Care Type

Prov.	ED	SURG D/N	CC	RD	OC	Other*	Totals
P.E.I	30,126	0	0	0	0	34	30,160
N.S.	80,007	11,070	0	0	0	28,189	119,266
Ont.	5,301,449	1,178,965	42,007	1,088,329	1,786,578	68,854	9,466,182
B.C.	51,024	0	0	0	0	779	51,803
Y.T.	25,049	0	0	0	0	0	25,049
Total	**5,487,655**	**1,190,035**	**42,007**	**1,088,329**	**1,786,578**	**97,856**	**9,692,460**

Note: *Other includes all visits with an MIS FC other than those listed in Appendix A.

Source: NACRS 2006, as of July 31st, 2007.

In comparison, 9,743,258 abstracts were submitted to the NACRS 2005–2006 as of the published year-end deadline of July 31st, 2006. Table 2 represents changes in the volume of NACRS abstracts between fiscal years.

Table 2. Percent change in Volume of NACRS From 2005–2006 and 2006–2007, by Province and Ambulatory Care Type

Prov.	ED	SURG D/N	CC	RD	OC	Other*	Totals
P.E.I.	-1.1%	0.0%	0.0%	0.0%	0.0%	-83.9%	-1.6%
N.S.	-19.6%	-0.8%	0.0%	0.0%	0.0%	-1.8%	-14.4%
Ont.	1.1%	-0.4%	6.3%	8.3%	1.4%	-72.3%	-0.2%
B.C.	-18.1%	0.0%	0.0%	0.0%	0.0%	-44.0%	-18.7%
Y.T.	-4.1%	0.0%	0.0%	0.0%	0.0%	-100.0%	-4.4%
Total	**0.4%**	**-0.4%**	**6.3%**	**8.3%**	**1.4%**	**-64.9%**	**-0.5%**

Note: *Other includes all visits with an MIS FC other than those listed in Appendix A (NACRS 2005–2006 included multiple contact records).

Source: NACRS 2005–2006 and 2006–2007.

A comparative analysis between FY 2005–2006 and FY 2006–2007 reveals that the reduction in volume of abstracts submitted to the database year over year is likely explained by the elimination of multiple contact records (MCRs) captured within the NACRS database. Additionally, one facility in Nova Scotia submitted 8 periods in FY 2005–2006 and only one period in FY 2006–2007. Finally, in British Columbia one facility reported a reduction in submissions due to staffing issues.

The NACRS Frame

The frame for the NACRS is a list of institution numbers that is used to ensure that all units in the population of reference are collected. Since the provinces/territories determine the institution inclusion criteria in the NACRS and all institution numbers are identified in advance, the NACRS frame is validated by the individual province/territory. If data are not received from a particular institution, the Provincial/Territorial Ministry of Health or CIHI, if necessary, contacts that institution.

The FY 2006–2007 NACRS population of reference includes 194 facilities in Canada:

Table 3. The Number of Institutions Submitting to Each Ambulatory Care Type in the 2006–2007 NACRS

Prov.	ED	SURG D/N	CC	RD	OC	Other*	Total
P.E.I.	1	0	0	0	0	1	1
N.S.	5	3	0	0	0	4	5
Ont.	176	153	21	53	88	59	184
B.C.	3	0	0	0	0	2	3
Y.T.	1	0	0	0	0	0	1
Total	**186**	**156**	**21**	**53**	**88**	**66**	**194**

Note: *Other includes all visits with an MIS FC other than those listed in Appendix A.

Source: NACRS 2006, as of July 31st, 2007.

In comparison, the FY 2005–2006 NACRS population of reference includes 196 facilities in Canada:

Table 4. The Number of Institutions Submitting to Each Ambulatory Care Type in the 2005–2006 NACRS

Prov.	ED	SURG D/N	CC	RD	OC	Other*	Total
P.E.I.	1	0	0	0	0	1	1
N.S.	5	3	0	0	0	4	5
Ont.	180	156	21	52	85	130	186
B.C.	3	0	0	0	0	2	3
Y.T.	1	0	0	0	0	1	1
Total	**190**	**159**	**21**	**52**	**85**	**138**	**196**

Note: *Other includes all visits with an MIS FC other than those listed in Appendix A as well as multiple contact records.

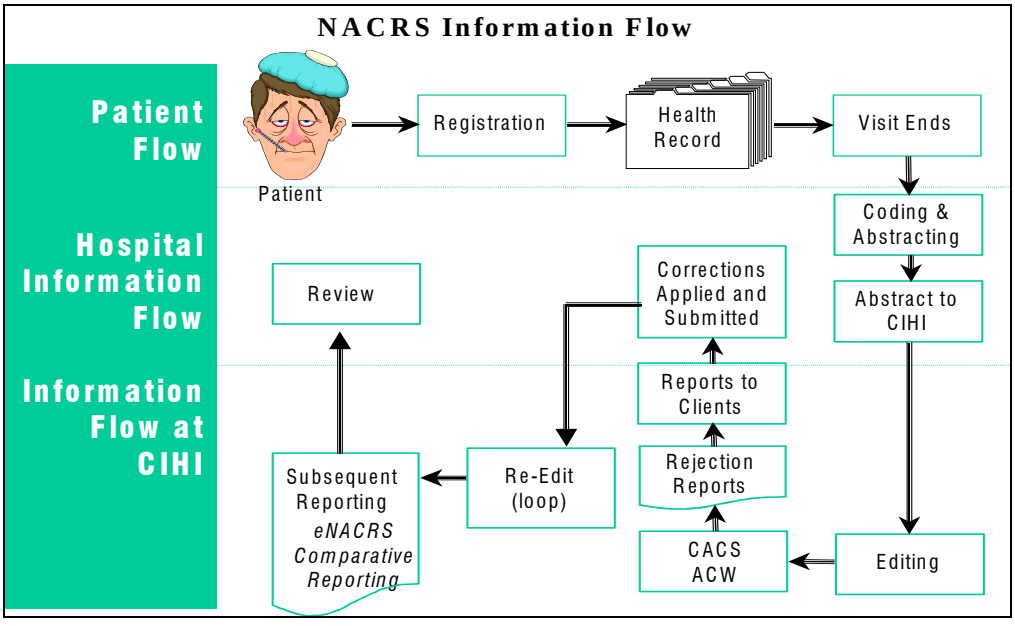
Source: NACRS 2005, as of July 31st, 2006.

Changes in the NACRS frame between FY 2005–2006 and 2006–2007 are a result of a series of transfer of services and closures of facilities in the Ontario. Namely, the transfer of services from a large facility that discontinued their ambulatory care and therefore retired their ambulatory care number. These services are reported for FY 2006–2007 by a new and an existing ambulatory care number from Ontario facilities.

3.1.2 Capture and Collection

Data Collection

The NACRS data capture and collection process and information flow is summarized below:



Abstracting and Data Submission

The *NACRS Abstract* is the record of ambulatory care visit activity that is submitted to CIHI's NACRS database from each facility. Each abstract is associated with a client visit and contains a list of the relevant data elements to be submitted to the NACRS for that client visit.

All abstracts sent to the NACRS contain an MIS FC to determine the functional centre the activity occurred in (Appendix A). Prior to 2006–2007, a multiple contact record (MCR) was created when an Allied Health Professional (AHP) outside of the mandated MIS FC in which the visit occurred provides care and/or treatment. MCRs were discontinued in the 2006–2007 reporting year. Clients were instructed to collect AHP care on the main visit abstract.

The *NACRS Manual* is the abstracting reference tool provided to clients and may be purchased in PDF format on CIHI's website for submitting facilities under CIHI service packages called Core Plans. The manual is used to guide the clients through the abstracting process of demographic, administrative, and clinical data elements collected on each episode of care. Whether a data element is optional or mandatory to submit could depend on the:

- Province of submission
- Specific ICD-10CA/CCI codes
- Ambulatory care type (Visit MIS FC groupings, i.e. ED, SURG D/N, etc.)

For each data element, the manual contains a data element definition, valid data, examples and corresponding edits. In addition to clients, researchers and abstracting software vendors also use the manual.

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 enforced through the application of edits, educational sessions and ongoing client support.

Data Submission to CIHI's data holdings, including the NACRS, is facilitated through service packages called Core Plans. The Core Plan provides facilities access to CIHI's national data holdings including services related to data quality and processing, client support, access to data; national health information standards; selected publications and reports; and basic education. Subscribers to the Core Plans also have access to NACRS electronic comparative reports (eNACRS). Provincial and Territorial Ministries of Health purchase these packages on behalf of their facilities and mandate submission to various CIHI databases.

Completeness of Data Submissions

NACRS Record Status Reports were used to monitor the number of abstracts submitted by period and by ambulatory care type (Visit MIS FC groupings, i.e. ED, SURG D/N, etc.) for each institution. This report was used to identify deficiencies in data submissions during the submission year.

Data Submission Timeline

All data must be submitted to the NACRS prior to the year-end deadline. The published submission deadline for the FY 2006–2007 NACRS was July 31, 2007.

Data Quality Control

Quality control for the NACRS occurs via several different channels:

- **Abstracting Software and Role of External Software Developers (Vendors)**

In order to standardize and ensure accurate data collection, CIHI's respective data suppliers hire external software vendors to install the necessary software infrastructure to enable data submission. These products offer 'value-add' by providing data capture quality control measures such as data capture edit checks, visual verification pop-ups by data field, and cross-logic checks. Vendors submit annual test files to CIHI prior to the participating site's data submission and receive support from CIHI for the interpretation of the coding/abstracting standards. CIHI also provides ongoing support in order to provide updates to specifications, identify issues and provide feedback encountered during the transmission of data from client sites.

The Information Technology and Operations Department at CIHI offers the vendor support and assists with the annual release of vendor specifications and vendor testing. Abstracting system vendors receive detailed specifications describing valid fields and proper formatting. The first period of data submission from clients is accepted as a test submission to ensure adherence to CIHI data submission requirements. A "vendor's only" section is also available on CIHI's website to ensure consistent communication between CIHI and vendors.

Systemic differences in vendor software exist, although all vendors must meet CIHI submission specifications. These differences 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 terminology while respecting their proprietary freedom of software design.

- **CIHI Education Program**

Education sessions are provided to clients on data collection and submission, CACS/RIW methodology and planning and implementation for jurisdictions considering the NACRS. These sessions are one mechanism to ensure standardized coding practices and adherence to CIHI's data submission and collection requirements. The CIHI eQuery tool provides users a mechanism to obtain answers to questions relating to ICD-10CA/CCI, case mix, data elements, etc.

- **CIHI Production System Edits and Correction Process**

The NACRS edit structure is comprehensive and is designed to identify or flag inconsistencies. More than 400 data element edits and warnings are applied to the NACRS 2006–2007. Since the NACRS only accepts error free abstracts, an error detected by the edit system results in the rejection of the entire abstract. The client is subsequently asked to re-submit the corrected abstract. An abstract receiving a warning message only will not be rejected and will be accepted in the NACRS. The correction and editing steps for resubmitting a rejected record repeat until the client successfully corrects the abstract(s) or the database closes at the year-end deadline. Prior to the closure of the fiscal year, clients can also submit additional abstracts if previously missing at the time of submission of a period or delete duplicate abstracts when detected through subsequent analysis.

Edits are reviewed and updated each year as new 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.

- **Client Services Representatives (CSRs)**

CIHI has assigned CSRs to provide direct client support related to NACRS products, assist in the development and delivery of education programs, provide data quality expertise, and build relationships with provincial/territorial data consultants, health organizations and data users.

- **Special Studies**

CIHI has finalized a special NACRS Re-Abstraction and Data Quality Assessment Study Report that evaluates the accuracy of coding in the NACRS and identifies best practices (i.e. facility policies and processes) that may be associated with "high" data quality. The study involved returning to the original source of information (i.e. client charts) and comparing this source with what exists in the NACRS database for fiscal year 2004–2005. An additional component to the study included a data quality survey of the study facilities that obtained information on coding and abstracting processes and policies and data collection methods thought to be associated with "poor" data quality indicators. The report is scheduled for release in October 2007.

- **Data Element Changes**

Refinements and suggested enhancements to data elements in the NACRS are communicated to CIHI in several ways. These include:

- routine communication from clients (both internal and external) to NACRS CSRs;
- input from advisory committees; and
- formal submissions for data element additions or deletions from key stakeholders.

The NACRS National Advisory Committee was disbanded in October 2003 and folded into the National Clinical Administrative Databases Steering Committee (NCAD) with an enhanced mandate to advise on the NACRS. The NCAD discusses suggestions and considers whether proposed data elements are appropriate for inclusion and whether their collection ought to be mandatory (to ensure national comparability), optional or a provincial variation (specific only to selected provinces/territories). This committee has national representation from Ministries of Health, Statistics Canada and Health Care Canada/Public Health Agency of Canada (PHAC). It was through this committee that changes to the data elements appeared in the FY 2006–2007 NACRS database.

Appendix B outlines the mandatory and optional data elements in the FY 2006–2007 NACRS.

3.2 Comparability

3.2.1 Standardization

Classifications systems in health care provide a standard mechanism for the capture and coding of diagnoses and interventions. The enhanced ICD-10-CA replaces the earlier 9th Revision of the International Statistical Classification of Diseases (ICD-9). The Canadian Classification of Health Interventions (CCI) contains a comprehensive list of diagnostic, therapeutic, and support interventions, and replaces the Canadian Classification of Diagnostic, Therapeutic, and Surgical Procedures (CCP) and ICD-9-Clinical Modification (ICD-9-CM) intervention codes.

The initial version of the ICD-10-CA and CCI Coding Standards was released in 2001. These guidelines are reviewed, amended and enhanced annually by a Pan-Canadian Committee representing the provinces and territories. The 2006 Standards are available in printable document format (PDF) on the CIHI web site and may be downloaded free of charge.

In FY 2002–2003, NACRS was re-engineered to collect diagnosis and intervention related information solely in the ICD-10-CA/CCI coding system. The FY 2001-2002 NACRS diagnosis and intervention coding was classified using the ICD-9-CM/CCP classification system. Since then, all clinical data submitted to the NACRS has been coded in ICD-10-CA/CCI (Appendix D). In an effort to produce comparable data, CIHI created conversion tables that standardize ICD-10-CA diagnoses and CCI Interventions back to ICD-9/CCP for users. ***Users are strongly advised to analyze data using the original classification scheme***.

3.2.2 Linkage

- The postal code is a common variable on almost all CIHI databases. Along with the PCCF (Postal Code Conversion File), any standard geographical classification can be obtained, making it possible to compare with other databases. The forward sortation area (first three digits of a postal code) is typically 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 require approval by the CIHI Privacy, Confidentiality, and Security Team.

- The standard time frame for the NACRS is the FY (April 1st to March 31st). Within the NACRS, the FY, Registration Date/Time and Date/Time Visit Complete variables give the flexibility of specifying records that belong to a specific time period (e.g. the calendar year). This flexibility is especially useful in comparison with registries, which tend to be cumulative rather than separate databases for discrete years.

- The facility unique identifier is the Ambulatory Care Number assigned to facilities by the provincial ministries of health or territorial governments. Each province/territory has the autonomy to determine how the facility ambulatory care number is assigned. Due to closures and mergers over time, the same facility can have different numbers. A frame of Ambulatory Care Number changes is required to perform linkages by Ambulatory Care Number over time. Requests for institution-identifying information require approval by the CIHI Privacy, Confidentiality, and Security Team.

- Health Care Numbers are assigned to individuals by their respective provincial ministry of health or territorial government. The NACRS also captures a variable representing the province/territory that issued the health care number, as the numbers are unique only within the province/territory. Combining the two variables with other relevant person fields such as Birth Date, Gender, and Postal Code allows for persons to be uniquely identified within the NACRS. Since the NACRS is event-based, a unique visit for a particular individual can be determined by using the institution and admit/intervention date fields. The encrypted and unencrypted Health Care Numbers facilitate linkage to other databases with the same fields. However, Health Care Number, Birth Date and full Postal Code are not normally made available to external users. Access to restricted data elements and the use of the NACRS data for data linkage studies require prior approval by the CIHI Privacy, Confidentiality, and Security Team. Users should note that client names and street addresses are *not* part of the NACRS.

3.2.3 Equivalency

Beginning April 1, 2003 Ontario SURG D/N cases were reported in the NACRS. Prior to this date, Ontario day surgery cases were reported in the Discharge Abstract Database (DAD). Also beginning April 1, 2003 the Ministry of Health and Long Term Care (MOHLTC) changed Ontario's definition of day surgery. These changes will have an impact on longitudinal analyses by making it difficult to compare Ontario's SURG D/N cases in the NACRS with Ontario's day surgery cases in the DAD. See Appendix A of this document and the *FY 2002–2003 DAD Abstracting Manual* for more information on day surgery definitions.

3.2.4 Historical Comparability

NACRS Reengineering

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

Additional data elements and changes to data elements as a result of the reengineering are listed in Appendix C.

NACRS Grouper

For any FY of submissions to which a CACS methodology is to be applied, the most recent version of the methodology is used. Therefore, for the current fiscal year of the NACRS (2006–2007), the CACS 2006 is applied and released with the data.

Historical References

The following NACRS-related products are updated annually. Users should consider both the fiscal year and classification scheme when referring to the NACRS documentation.

- *NACRS Manual, 2006–2007*
- *NACRS Manual, 2005–2006*
- *NACRS Manual, 2004–2005*
- *NACRS Manual, 2003–2004*
- *NACRS Manual, 2002–2003*
- *NACRS Manual, 2001–2002*
- *CACS 2003 version 3 Directory*
- *CIHI NACRS Bulletins*

Future Changes

Future changes to the NACRS database are outlined in Appendix C.

4. General Data Limitations

This section describes general data limitations that may have an impact on analyses using the NACRS. Variation in abstracting and coding practices, changes over time in submissions from various facilities and data collection methods that may vary by facility, all impact the quality of the NACRS data. When working with record-level data in particular, users should embark on a plan to conduct basic descriptive analyses of the data to aid in their understanding of the underlying patterns present in the sample they are working with.

4.1 Accuracy

4.1.1 Coverage

Under- or over-coverage occurs when there is a difference between the population of reference and the frame. Under-coverage occurs when part of the population of reference is not included on the frame that is used. Over-coverage occurs when units that are not part of the population of reference (that is, that are out of scope) are included on the frame or when duplicate records appear in the database.

Under-Coverage

CIHI and the provincial or territorial ministries of health monitor participation by receiving monthly reports of submission status for each facility. There was reported under-coverage in the NACRS, as only one period of data was submitted by one facility in FY 2006–2007, compared to eight periods submitted for the previous FY 2005–2006 by the same facility. All non-ON facilities mentioned in the population of reference are in the frame, and based on this does contribute to this under-coverage.

Over-Coverage

Duplicates

A source of over-coverage on the NACRS is duplicate records. A number of data quality issues for FY 2006–2007 resulted in duplicate records appearing in the NACRS.

- For FY 2006–2007, "True" duplicate records were identified by matching all data elements except for 3 data elements (Appendix D). There are 8,502 "True" duplicate records and Table 5 illustrates the number of 'true' duplicates on the NACRS for fiscal year 2006–2007, with the proportion of these records that are ED and OC and the proportion they represent in the entire NACRS.

Table 5. NACRS "True" Duplicates

Fiscal Year	"True" Duplicates (N)	Emergency N (%)	Oncology N (%)	Proportion of NACRS
2006–2007	8,502	80 (0.94)	8,412 (98.94)	0.08%

- Table 6 below presents the number of potential duplicates observed on the NACRS for fiscal years 2003–2004 to 2005–2006, with the proportion of these records that are ED and OC and the proportion they represent on the entire NACRS. These potential duplicates are identified by a data quality 'matching' procedure that matches NACRS records on
  26 data elements (Appendix D).

Table 6. NACRS Potential Duplicates

Fiscal Year	Potential Duplicates (N)	Emergency N (%)	Oncology N (%)	Proportion of NACRS
2003–2004	15,036	2165 (14.4)	12,164 (80.9)	0.19%
2004–2005	11,287	486 (4.3)	10,306 (91.3)	0.12%
2005–2006	3,725	1579 (42.4)	1,639 (44.0)	0.04%

Source: NACRS 2003–2004, 2004–2005, and 2005–2006.

- FY 2006–2007 a different method of identifying potential duplicates was used which matches NACRS records on only 4 data elements (Appendix D). Table 7 below presents the number of potential duplicates observed on the NACRS FY2006–2007 using this new methodology, with the proportion of these records that are ED and OC and the proportion they represent on the entire NACRS.

Table 7. NACRS Potential Duplicates

Fiscal year	Potential Duplicates (N)	Emergency N (%)	Oncology N (%)	Proportion of NACRS
2006–2007	109,086	569 (0.52)	106,982 (97.7)	1.1%

Source: NACRS 2006–2007.

4.1.2 Capture and Collection

Data capture quality control measures are defined as, the use of consistent data capture and collection methods across all data suppliers. Adherence to the data submission and abstracting standards is enforced through the application of edits, educational sessions and ongoing client support. CIHI also provides the NACRS edit standards and submission specification to all vendors.

- Although data capture quality control measures exist for the NACRS, it is important to note that abstracting standards and guidelines included in the manual may be open to interpretation and in that way the data supplied to CIHI may not be consistent across all data suppliers.

- All vendors incorporate the NACRS submission specifications into their proprietary software systems, however, there is no standard protocol used. At this time it cannot be determined if all clients utilize suitable data capture control measures.

As part of the ongoing data quality assessment of the NACRS data, analyses are conducted to identify facility specific variations in data collection practices. Those identified as having a significant impact on the quality of the NACRS data are reported within this document.

4.1.3 Non-Response

Unit Non-Response

Unit non-response refers to data that are not submitted from facilities in the frame. These incomplete submissions should not be confused with the under-coverage, where a facility in the population of reference is not in the frame. Additional unit non-response may occur with any outstanding rejected records that are not re-submitted during the data collection period. The following summarizes unit non-response:

- None of the submitting facilities have indicated or have been found, by investigation of their total number of submissions, to have any significant unit non-response related to the initial submission of all abstracts.

- Overall, no significant non-response was observed due to outstanding rejected records for the NACRS mandated reporting (i.e. ED, SURG D/N, OC, RD and CC clinic visits). The overall non-response rate was found to be less than 0.10%.

Item Non-Response

Item non-response or partial non-response refers to record-level missing or unknown information within data elements. Table 8 below summarizes the level of unknown information reported for several mandated data elements.

Table 8. The Proportion of Unknown Data Reported for Certain NACRS Mandatory Data Elements

Element Number	Element	Unknown Value	Proportion NACRS When Applicable (%)	Definition
02	HCN	0, 1	1.24	Health care number not available
05	Postal code	2-digit alpha code or invalid code	1.9	Client is a resident of Canada and the postal code is unknown or postal code is invalid
09	Birth date estimated	Y	0.02	Birth date unknown or partial
30	Time of physician initial assessment	9999	21.37	Unknown
34	Decision to admit time	9999	6.77	Unknown
37	Time visit completed	9999	2.17	Unknown
44	Other problem	U98.9	57.8	Unknown codes for place of occurrence with injuries
100	Glasgow Coma Scale	99	54.62	Not available
101	Seatbelt indicator	99	14.74	Unknown
102	Helmet indicator	99	42.97	Unknown

Source: NACRS 2006–2007.

It is important to note that the proportion of unknown data may vary considerably by facility. For example, the proportion of unknown time for physician initial assessment has been found to range from 0% to over 90% of a facility's emergency department data. Facilities with high proportions of unknown data may need to be excluded from analyses using this information. Analyses including any of the above data elements should consider facility variation in the completeness of the information submitted to CIHI.

Item non-response or partial non-response cannot be calculated for all NACRS data elements. For example, several mandated data elements do not allow for the coding of an unknown value (reference NACRS Manual for Fiscal 2006–2007) and in this way item non-response cannot be accurately calculated. This may also affect the reporting of these data (see Section 4.1.4 Measurement Error).

4.1.4 Measurement Error

CIHI's data quality framework indicates that data measurement error, bias and consistency, combine to give a measure of how well the data were reported. Measurement error occurs when the values reported do not match the values that should have been reported, and may be measured by the number of times a data element is coded incorrectly. Bias is the systematic occurrence of measurement error while consistency is the variation of responses over repeated measurements (i.e. reliability). Consistency may result from differing opinions of data collectors/coders particularly with subjective data elements such as triage level (measured on a scale of 1 to 5), as there is no correct answer. Consistency not only applies to subjective variables, but can also be a factor for data elements where there is an element of measurement error (for example, reporting times).

- CIHI has finalized the NACRS Re-Abstraction and Data Quality Assessment Study Report, which will provide quantitative evidence of measurement error with data elements such as, Main/Other Problem, Main/Other Intervention, date/time fields, HCN, DOB, postal code, and gender. A data quality survey, as part of this study, will link facility-specific information to the re-abstracted data to identify best practices (i.e. facility policies and processes) that may be associated with quality data collection. A study report is scheduled for release October 2007.

- A number of "measurement error" issues associated with the NACRS time elements have been identified and include:
  - *Triage time*. Overall, 24% of ED records have a triage time that is exactly the same as registration time. 17 facilities report triage and registration as the same time in >95% of their data. 7 of these are large facilities (ED visits > 30,000), 5 medium (ED visits between 15,000 and 30,000) and 5 are small facilities (ED visits < 15,000). Several other facilities code > 35% of their data where the time between triage and registration is 1 minute and several others code > 20% of their data where the time between triage and registration is either 2 or 3 minutes. These results indicate default coding for triage time, therefore caution should be used when using these data.

  - *Decision to admit time and Time visit completed*. There appears to be variation in the interpretation and coding of decision to admit time for admitted visits in relation to time visit completed. The NACRS Manual highlights MIS guidelines that indicate, *once a decision to admit a client is made by a physician, the status of the client changes from ambulatory to inpatient status* (i.e. discharged from ED visit). Further, the NACRS Manual defines time visit completed as *the time at which the care provider discharges the client from the service for the current visit*. Therefore, in the case of admitted visits the decision to admit time should be the same time as the time visit completed OR an extremely short time between these two times should

be observed. Overall for Ontario, the decision to admit time equals the time visit completed for 70% of admitted visits, which is correct coding. For PE and NS this is observed for 3% and 52% of their data, respectively and for BC and YT this is observed for 94% and 99.9%, respectively. However, by facility there is a large variation. Where decision to admit time is not equal to the time visit completed (i.e. incorrect coding if timeframe is longer than several minutes), the median minutes between these two times across provinces ranges from 12 to 105 minutes approximately. Again there is a large variation by facility. These results are similar to that observed for FY 2005–2006.

- *Registration/visit time and Time visit completed*. There also appears to be variation in the interpretation and coding of registration time in relation to time visit completed. These 2 time elements can provide an insight calculation of length of stay for visit in the emergency and day surgery. In the ED and Surgery D/N NACRS abstracts, there is 0.02% showing that registration time is the same as time visit completed. Out of this 1,309 abstracts, 39% was discharged home, and 32% was said to be triaged and left before being treated. These results indicate some default coding for registration time and visit completed time, therefore caution should be used when using this data.

- *All time elements.* Distributions of NACRS time elements indicate that the most accurately reported time element is the registration time. This is most likely due to the electronic data collection of these data. Other time elements are subject to some amount of measurement error occurring from manual data collection methods. Measurement error in time elements is indicated by the 'clumping' of data around certain minutes of the day. For example, disproportionate numbers of visits are coded with times that are on the hour or half-hour or quarter to or after the hour (e.g. Time of physician's initial assessment).

- There is an unexpected value with data reported in the main problem prefix. A problem prefix of 'Q' is most often associated with a suspected condition or query diagnosis. This would indicate non-compliance with the ambulatory coding standards on coding suspected conditions. If "Q" is being used for a facility specific purpose, CIHI requests an alternate prefix be selected as soon as possible. However, there are still 4856 out of 8994 (54%) records with main problem prefix coded with 'Q'. 80% of these records are represented by 11 facilities.

- According to the NACRS Manual guidelines, when a patient is transferred or discharged to another acute care institution or an institutional place of residence, it is expected the data element 'institution to' is consistent with the data element "visit disposition". However, when visit disposition is cross-checked against the institution to, only 88% met this criterion for Ontario and Nova Scotia, where this is mandatory to capture.

- There is measurement error identified in the data element "duration of ambulatory intervention". This optional data element is reported in 29.5% of DS interventions (note: one record may account for several interventions). Of the reported durations, 99.6% are less than 200 minutes, and 0.06% is more than 600 minutes (10 hrs) which is questionable. Therefore, caution should be used when using this data element.

- Invalid postal codes occur on the NACRS FY 2006–2007. A number of records include correctly formatted 6-digit postal codes that do not match a postal code provided by Canada Post (i.e. PCCF including current and retired postal codes) (Table 9). This represents 0.68% of records on the NACRS.

Table 9. Sample of Invalid Postal Codes in the 2006–2007 NACRS

Postal Code	Number of Records
X9X9X9	540
X0X0X0	457
A0A0A0	320
P1H2S9	281
N6G0B1	279
N5P0A3	204
L3B6W3	201
K9A4J6	163
M4Z3S1	160
M9M3P1	160
M1J3P7	159
Total	**65,455**

Source: NACRS 2006–2007.

- Measurement error may occur with data that are reported in mandatory data elements that do not allow for the coding of an unknown value (reference NACRS Manual for fiscal year 2006–2007). NACRS requires completion of mandatory data elements upon submission. If mandatory data elements are left blank the record is not included in the NACRS. Therefore in the case where information is not included on the original health record, to ensure the NACRS abstract is included in the database, coders/abstractors may be instructed to code a valid value as a proxy or default for an unknown. This is known to occur for the data element time visit complete (as noted above). Database samples or subsets should be analyzed at the facility level for incidences of larger than expected proportions of data occurring in specific data element code(s).

- Cancer Care Ontario (CCO) data comprises a large proportion (51%) of OC data in the NACRS. Measurement error has occurred with these data for data elements including:
  - *Visit disposition*. CCO does not capture NACRS visit disposition and therefore report all CCO abstracts (100%) with a visit disposition of "discharged home" or '01'.

- *Main Intervention*. Multiple CCI intervention codes on a single abstract are not necessarily prioritized where the most significant intervention code is the main intervention. This is contrary to the definition of main intervention which is, "the procedure/intervention performed and considered by the provider(s) as being the most clinically significant."

- *Service Provider codes*. Physician specialty codes captured by CCO do not necessarily match CIHI Service Provider codes. The majority of CCO abstracts (50%) are coded with the main service provider of which 85% of these records are coded as either Medical Oncologist (26%) or Radiation Oncologist (60%). 27% of CCO abstracts are coded with a "procedural intervention" service provider of which all are coded with either a radiotherapist (75%), registered nurse (23%) or laboratory technician (3%). Almost all abstracts coded with an "other responsible" service provider (23% of all CCO abstracts) are coded as a registered nurse (99%).

- *Registration time*. For clinic visits the reporting of this data element is optional, however, CCO abstracts include this information. Measurement error is observed with registration time of 00:00 where a disproportionate number of abstracts are coded with this time (15.2% of CCO abstracts). CCO indicated to CIHI that they did not capture registration time for chemotherapy visits, nor for unscheduled radiation or minor procedure visits and therefore assign an arbitrary registration time of 00:00 for these abstracts.

- CCO visits can be identified within a host facility's data by abstract id numbers that begin in the 9,000,000 range and an Oncology Clinic MIS FC. (See Appendix A for the list of Oncology Clinic MIS FC).

- Measurement error has occurred with several data elements intended for use with emergency visits only, including:

  - Visit Type
  - Scheduled ED Visit Indicator
  - Triage Date
  - Triage Time
  - Triage Level (CTAS)
  - Glasgow Coma Scale
  - Seatbelt Indicator
  - PCTAS Indicator

- Response bias due to coding variations created through the implementation of the ICD-10-CA and CCI classification systems has been observed in other CIHI databases (see *Coping with the Introduction of ICD-10-CA and CCI: Impact of New Classifications Systems on the Assignment of Case Mix Groups/Day Procedure Groups Using Fiscal 2002–2003 Data*). A study to address these variations entitled "Coding Variations in the Discharge Abstract Database (DAD) Data" has been performed on the DAD. As noted previously, a NACRS re-abstraction study has been released in October 2007.

- There is provincial response bias on the NACRS. In the FY 2006–2007, 97.7% of the data is from Ontario. Due to this fact, no inter-provincial comparisons should be made.

4.2 Comparability

The comparability dimension tells us how well databases meet a common standard and is comprised of: standard data definitions, derived common groupings, common data elements for linkage, correct conversions of data values and data that are comparable over time.

4.2.1 Standardization

- Data element completion may be mandatory, optional, or region specific. The NACRS does not limit the type of data collected to only what is mandated by the province/ territory. Response rates for optional data elements vary and are typically low. For an overview of data element mandatory/optional status consult Appendix B, as well the NACRS Manual 2006–2007.

- In performing analyses over time or across provinces/territories, users should note that between fiscal years, data element specifications could change. For example, data elements that were originally optional for FY 2001–2002 may have been made mandatory for FY 2002–2003. For an overview of the data element evolution over time please consult Appendix C, as well the NACRS Manual 2006–2007.

4.2.2 Linkage

- In the NACRS, postal codes may not accurately reflect a client residence.
  - Through use of the PCCF from Statistics Canada, rural postal codes mapping to more than one enumeration area can be found.
  - The use of P.O. Box number for rural residences may make it difficult to accurately determine a client's residence.

- Users should be aware that the NACRS uses different facility identifier numbers than the DAD did for the reporting of SURG D/N visits. When conducting trend analyses, mappings between the DAD day surgery institution numbers and the NACRS Ambulatory Care Facility numbers need to be performed.

4.2.3 Historical Comparability

- The data element 00G (Primary Abstract ID Number) in FY 2006–2007 was deleted in the NACRS to facilitate deletion of MCRs.

- The new data element 113 (Reason for Visit/Chief Complaint) was added in the NACRS for FY 2006–2007. Previously, reason for visit was collected in the Problem Area through the use of the main or other problem prefix "R". For FY 2006–2007, in 45.7% of the cases, reason for visit was coded the same as the main problem. Whereas in FY 2005–2006 the main problem was identified as the reason for visit in 99.8% of the abstracts. This would suggest a shift in the interpretation of "reason for visit" by submitting facilities to a more strict interpretation of "reason for visit" within the FY 2006–2007 data with the addition of a data element specifically identified as "reason for visit".

- The definition for Triage Level was changed to "initial triage level."

- Admit via Ambulance was changed to mandatory field with valid data: A, G, C, and N.

- Valid code "9999" for unknown value was added for Time Visit Completed. It must be completed where Time Visit Completed is not recorded or unknown. It is known that when the exact time the visit is completed is not available, "23:58" or "23:59" has been used as a proxy value by some facilities prior to FY 2006–2007. Use of default values such as 23:58 or 23:59 must cease and clients are encouraged to run a data quality check to evaluate this. CIHI continues to generate a warning message with 23:59 for FY 2006–2007. There is only 0.13% reported for 23:58 or 23:59 in FY 2006–2007.

- Main and Other Problem Prefix was changed to optional field status for Ontario emergency visits with valid data of any alpha character except "R"

5. General Data Query Guidelines

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

- Included in the NACRS are several types of ambulatory care visit types. Each type including, ED, SURG D/N and MED D/N and Clinics (i.e. RD, CC and OC) can be identified by multiple MIS FC (see Appendix A).

- Surgical day/night care or clinic type 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—"scheduled emergency department visit indicator."

- A main diagnosis and intervention is coded in the 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 the NACRS, therefore it is suggested that record-level database samples or subsets be analyzed at the facility level for incidences of larger than expected proportions of data occurring in data element code(s).

- Understanding variation in the NACRS data by facility size or a rural/urban designation for example may indicate groupings that may provide insight when analyzing the data. There is known variation by these groupings in ambulatory care services provided and is reflected in data including but not limited to, scheduled ED visit indicator, types of service providers, and visit dispositions (i.e. transfers).

Other data exclusions/inclusions may need to be considered for specific analyses; therefore it is recommended that a review of the NACRS Manual be made in order to understand the data elements and the information collected. The NACRS Manual provides similar information to that provided by a formal data dictionary.

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Bibliography

Canadian Institute for Health Information (2005), *The CIHI Data Quality Framework—June 2005 Revision*.

Canadian Institute for Health Information (2005), *Comprehensive Ambulatory Classification System Directory 2003 (CACS)—Version 3.* Available by Order, <http://www.cihi.ca>.

Canadian Institute for Health Information (2006), *National Ambulatory Care Reporting System Manual for Fiscal 2006/2007.* Available by Order, <http://www.cihi.ca>.

Canadian Institute for Health Information (2004), "Data Quality of the Discharge Abstract Database Following the First-Year Implementation of ICD-10-CA/CCI—Executive Summary," <http://www.cihi.ca>.

Canadian Institute for Health Information (2003), *MIS Guidelines, 2003.* Available by Order, <http://www.cihi.ca>.

Canadian Institute for Health Information (2003), *"Coding Variations in the Discharge Abstract Database (DAD) Data"*, <http://www.cihi.ca>

Canadian Institute for Health Information (2003), *"Coping with the Introduction of ICD-10-CA and CCI: Impact of New Classification Systems on the Assignment of Case Mix Groups/Day Procedure Groups"* using 2001/2002 data, <http://www.cihi.ca>.

Canadian Institute for Health Information (2002), "*Privacy and Confidentiality of Health Information at CIHI, 3rd Edition"*, <http://www.cihi.ca>.

Canadian Institute for Health Information (2002), "Quality Assurance Processes in the Discharge Abstract and Hospital Morbidity Databases", <http://www.cihi.ca>.

Canadian Institute for Health Information (1999), *"Improving Timeliness of Discharge Abstract D*atabase Data", <http://www.cihi.ca>.

Ontario Ministry of Health and Long Term Care (2004), "*Ministry of Health and Long-Term Care Master Numbering System*", <http://www.health.gov.on.ca/english/public/pub/ministry_reports/master_numsys/mns_book.pdf>.

Appendix A—Visit MIS Functional Centre Codes

Visit MIS Functional Centre Code Legend.

Ambulatory Care Type	Province	MIS Functional Centre Account Codes
ED		
	ON	7*310 series (* = 1, 2, or 3)
	BC	71310 series
	PE	71310 series
	NS	7*310 series (* = 1, 2, or 3)
	YT	71310 series
SURG D/N		
	ON	7*260**, 7*262, 7*265**, 7*34020, 7*34025**, 7*34055 (* = 1, 2 or 3 ** = series)
	NS	712600000, 722600000, 712602000, 712602500, 712603000, 712604000, 712604500, 712606000, 712606500, 712607000, 712309900, 713402000, 713402500, 713402520, 713403500, 713403700, 713405500
Clinics		
RD	ON	7*34086**, 7*53086 (* = 1, 2 or 3 ** = series)
OC	ON	7*34066**, 7*35066**, 7*466**, 7*53066, 7*51066** (* = 1, 2 or 3 ** = series)
CC	ON	7*41544** (* = 1, 2 or 3 ** = series)
Other		
All non-mandatory	All provinces	All valid codes not included above.

Note: ** = series; The province of NS zero fills visit MIS functional centre account coding to the 9th digit.

For more information refer to:

- Canadian Institute for Health Information (2003), *MIS Guidelines, 2003.* Available by Order, <http://www.cihi.ca>.
- Ontario Healthcare Reporting System (OHRS), Ontario Ministry of Health and Long Term Care (MOHLTC). <http://www.MOHLTCFIM.com>.

Appendix B—FY 2006–2007 Mandatory NACRS Data Elements

This document is intended for use in conjunction with the NACRS Abstracting Manual. Refer to the FY 2006–2007 NACRS Manual for details.

LEGEND	
M	Mandatory
M*	Mandatory if applicable
O	Optional

Data Element ID Number	Data Element Description	Ontario			Nova Scotia			British Columbia			Prince Edward Island		
		ED	SURG D/N	CL	ED	SURG D/N	CL	ED	SURG D/N	CL	ED	SURG D/N	CL
00A	Reporting Facility's Province/Territory	M	M	M	M	M	M	M	M	M	M	M	M
00B	Reporting Facility's Ambulatory Care Number	M	M	M	M	M	M	M	M	M	M	M	M
00C	Submission Fiscal Year	M	M	M	M	M	M	M	M	M	M	M	M
00D	Submission Period	M	M	M	M	M	M	M	M	M	M	M	M
OOE	Abstract Identification Number	M	M	M	M	M	M	M	M	M	M	M	M
OOF	Coder Number	M	M	M	M	M	M	M	M	M	M	M	M
01	Chart Number	M	M	M	M	M	M	M	M	M	M	M	M
02	Health Care Number	M	M	M	M	M	M	M	M	M	M	M	M
03	Province/Territory Issuing Health Care Number	M	M	M	M	M	M	M	M	M	M	M	M
04	Responsibility for Payment	M	M	M	M	M	M	M	M	M	M	M	M
05	Postal Code	M	M	M	M	M	M	M	M	M	M	M	M
06	Residence Code	M	M	M	M	M	M	O	O	O	O	O	O
07	Gender	M	M	M	M	M	M	M	M	M	M	M	M
08	Birth Date	M	M	M	M	M	M	M	M	M	M	M	M
09	Birth Date is Estimated	M	M	M	M	M	M	M	M	M	M	M	M
10	Family Physician flag	M	O	O	M	O	O	O	M	O	O	M	O
11	Ambulatory Registration Number	O	O	O	O	O	O	O	O	O	O	O	O
12	Ambulatory Registration/Encounter Sequence Number	O	O	O	O	O	O	O	O	O	O	O	O
13	Visit MIS FC Acct code	M	M	M	M	M	M	M	M	M	M	M	M
14	Admit via Ambulance	M	M	M	M	M	M	M	M	M	M	M	M
15	Ambulance Call Number	O	O	O	O	O	O	O	O	O	O	O	O
16	Living Arrangement	O	O	O	O	O	O	O	O	O	O	O	O
17	Residence Type	O	O	O	O	O	O	O	O	O	O	O	O

Data Element ID Number	Data Element Description	Ontario			Nova Scotia			British Columbia			Prince Edward Island		
		ED	SURG D/N	CL	ED	SURG D/N	CL	ED	SURG D/N	CL	ED	SURG D/N	CL
18	Visit Type	M	O	O	O	O	O	O	O	O	M	O	O
19	Ambulatory Visit Status	O	O	O	O	O	O	O	O	O	O	O	O
20	Mode of Visit/Contact	M	M	M	M	M	M	M	M	M	M	M	M
21	Highest Level of Education	O	O	O	O	O	O	O	O	O	O	O	O
22	Arrival Date	O	O	O	O	O	O	O	O	O	O	O	O
23	Arrival Time	O	O	O	O	O	O	O	O	O	O	O	O
24	Triage Date	M	O	O	M	O	O	M	O	O	M	O	O
25	Triage Time	M	O	O	M	O	O	M	O	O	M	O	O
26	Triage Level	M	O	O	M	O	O	M	O	O	M	O	O
27	Date of Registration/Visit	M	M	M	M	M	M	M	M	M	M	M	M
28	Registration/Visit Time	M	M	O	M	M	O	M	M	O	M	M	O
29	Date of Physician Initial Assessment	M*	O	O	M*	O	O	M*	O	O	M*	O	O
30	Time of Physician Initial Assessment	M*	O	O	M*	O	O	M*	O	O	M*	O	O
31	Referral Source Prior to Ambulatory Care Visit	O	O	O	O	O	O	O	O	O	O	O	O
32	Institution From	M*	M*	M*	M*	M*	M*	O	O	O	O	O	O
33	Decision to Admit Date	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
34	Decision to Admit Time	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
35	Visit Disposition	M	M	M	M	M	M	M	M	M	M	M	M
36	Date Visit Completed	M	M	O	M	M	O	M	M	O	M	M	O
37	Time Visit Completed (FY01/02 Title = Disposition Time)	M	M	O	M	M	O	M	M	O	M	M	O
38	Referred To—After Completion of Am. Care Visit	O	O	O	O	O	O	O	O	O	O	O	O
39	Institution To	M*	M*	M*	M*	M*	M*	O	O	O	O	O	O
40	Provider Type	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
41	Service Provider	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
42	Service Provider ID Number	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
43, 43 (a-i)	Main and Other Problem Prefix	O	O	O	O	O	O	O	O	O	O	O	O
44	Main Problem	M	M	M	M	M	M	M	M	M	M	M	M
45 (a-i)	Other Problem(s)	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
46	Main Intervention	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
47 (a-i)	Other Intervention(s)	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
48, 48(a-i)	Status Attribute (main and other)	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*

Data Element ID Number	Data Element Description	Ontario			Nova Scotia			British Columbia			Prince Edward Island		
		ED	SURG D/N	CL	ED	SURG D/N	CL	ED	SURG D/N	CL	ED	SURG D/N	CL
49, 49(a-i)	Location Attribute (main and other)	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
50, 50(a-i)	Extent Attribute (main and other)	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
51 (a-i)	Duration of Am. Care Intervention For Main and Other Interventions	O	O	O	O	O	O	O	O	O	O	O	O
52, 52 (a-i)	Intervention Location Code For Main and Other Interventions	O	M	O	O	M	O	O	O	O	O	O	O
53	Anaesthetic Technique	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
54	Died During Intervention Flag	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
55	Out of Hospital Indicator	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
56	Out of Hospital Institution Number	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
57	Blood Transfusion Indicator	M	M	M	M	M	M	O	O	O	M	M	M
58	Blood Components/ Products—Red Blood Cells	M	M	M	M	M	M	O	O	O	M	M	M
59	Platelets	M	M	M	M	M	M	O	O	O	M	M	M
60	Plasma	M	M	M	M	M	M	O	O	O	M	M	M
61	Albumin	M	M	M	M	M	M	O	O	O	M	M	M
62	Other	M	M	M	M	M	M	O	O	O	M	M	M
63	Autologous	M	M	M	M	M	M	O	O	O	M	M	M
64	Units of Blood Transfused— Red Blood Cells	O	O	O	O	O	O	O	O	O	O	O	O
65	Platelets	O	O	O	O	O	O	O	O	O	O	O	O
66	Plasma	O	O	O	O	O	O	O	O	O	O	O	O
67	Albumin	O	O	O	O	O	O	O	O	O	O	O	O
68	Other	O	O	O	O	O	O	O	O	O	O	O	O
69	Therapeutic Abortion Info—Number of Previous Term Deliveries	M	M	M	M	M	M	O	O	O	O	O	O
70	Number of Previous Pre-term Deliveries	M	M	M	M	M	M	O	O	O	O	O	O
71	Number of Previous Spontaneous Abortions	M	M	M	M	M	M	O	O	O	O	O	O
72	Number of Previous Therapeutic Abortions	M	M	M	M	M	M	O	O	O	O	O	O
73	Gestational Age— Therapeutic Abortion	M	M	M	M	M	M	O	O	O	O	O	O

Data Element ID Number	Data Element Description	Ontario			Nova Scotia			British Columbia			Prince Edward Island		
		ED	SURG D/N	CL	ED	SURG D/N	CL	ED	SURG D/N	CL	ED	SURG D/N	CL
74	Date of Last Menses	M	M	M	M	M	M	O	O	O	O	O	O
75 (a-j)	MIS FC Acct. Code	O	O	O	O	O	O	O	O	O	O	O	O
79	Project Number	O	O	O	O	O	O	O	O	O	O	O	O
80-96	Facility/jurisdiction specific	O	O	O	O	O	O	O	O	O	O	O	O
97	PCTAS Indicator	M	O	O	M	O	O	M	O	O	M	O	O
98	Program Area	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
99	Scheduled ED Visit Indicator	M	O	O	O	O	O	O	O	O	M	O	O
100	Glasgow Coma Scale	M*	O	O	M*	O	O	M*	O	O	M*	O	O
101	Seatbelt Indicator	M*	O	O	M*	O	O	M*	O	O	M*	O	O
102	Helmet Indicator	M*	O	O	M*	O	O	M*	O	O	M*	O	O
103	Level of Care/ Service Recipient	O	O	O	O	O	O	O	O	O	O	O	O
104	Referral Date	O	O	O	O	O	O	O	O	O	O	O	O
105	Vendor MAC	O	O	O	O	O	O	O	O	O	O	O	O
106	Vendor CACS	O	O	O	O	O	O	O	O	O	O	O	O
107	Vendor ACW	O	O	O	O	O	O	O	O	O	O	O	O
108	Complete Record Flag	O	O	O	O	O	O	O	O	O	O	O	O
109	Main Intervention Date	O	O	O	O	O	O	O	O	O	O	O	O
110	Main Intervention Start Time	O	O	O	O	O	O	O	O	O	O	O	O
111(a-i)	Other Intervention Date	O	O	O	O	O	O	O	O	O	O	O	O
112(a-i)	Other Intervention Start Time	O	O	O	O	O	O	O	O	O	O	O	O
113	Reason for Visit/ Chief Complaint	M	O	0	0	0	0	0	0	0	0	0	0

Appendix C—NACRS Field Evolution by Fiscal Year

This document is intended for use in conjunction with the NACRS Abstracting Manual. Refer to the FY 2006–2007 NACRS Manual for details.

Legend	
* = No change to existing data element	D = Deleted data element
C = Change in data element definition (including legend/code change/collection of new data)	N = New data element
F = Change in data element format	O = Data element did not exist that year
	R = Retired data element

Current		ICD-10-CA							ICD-9	
Data Element ID Number	Data Element Description	FY 2008–2009	FY 2007–2008	FY 2006–2007	FY 2005–2006	FY 2004–2005	FY 2003–2004	FY 2002–2003^	FY 2001–2002	Data Element ID Number
00A	Reporting Facility's Province/Territory	*	*	*	*	*	*	N	O	-
00B	Reporting Facility's Ambulatory Care Number	*	*	*	*	*	*	*	*	N/A
00C	Submission Fiscal Year	*	*	*	*	*	*	*	*	N/A
00D	Submission Period	*	*	*	*	*	*	*	*	N/A
OOE	Abstract Identification Number	*	*	*	*	*	*	N	O	-
OOF	Coder Number	*	*	*	*	*	*	N	O	-
OOG	Primary Abstract ID Number	R	R	R	N	O	O	O	O	-
01	Chart Number	*	*	*	*	*	*	*	*	01
02	Health Care Number	*	*	*	*	*	*	*	*	02
03	Province/Territory Issuing Health Care Number	*	*	*	*	*	C	F	*	03
04	Responsibility for Payment	*	*	*	*	*	*	C	*	35
05	Postal Code	*	*	*	*	*	C	F	*	04
06	Residence Code/ Geographic Code (2001)	*	*	*	*	*	*	F	*	34
07	Gender	*	*	*	*	*	*	F	*	05
08	Birth Date	*	*	*	*	*	*	*	*	06
09	Birth Date is Estimated	*	*	*	*	*	*	F	*	07
10	Family Physician Flag	*	C	*	*	*	*	N	O	-

Current		ICD-10-CA							ICD-9	
Data Element ID Number	Data Element Description	FY 2008–2009	FY 2007–2008	FY 2006–2007	FY 2005–2006	FY 2004–2005	FY 2003–2004	FY 2002–2003^	FY 2001–2002	Data Element ID Number
11	Ambulatory Registration Number/ Encounter Number (2001)	*	*	*	*	*	*	*	*	08
12	Ambulatory Registration/ Encounter Sequence Number	*	*	*	*	*	*	*	*	08b
13	Visit MIS FC Acct code	*	*	*	*	*	*	*	*	09
14	Admit via Ambulance	*	*	C	*	*	C	*	*	48
15	Ambulance Call Number	*	*	*	*	*	*	*	*	49
-	Marital Status (2001)	D	D	D	D	D	D	D	*	46
16	Living Arrangement	*	*	*	*	*	*	C	*	28
17	Residence Type	*	*	*	*	*	*	C	*	29
18	Visit Type	*	*	*	*	*	*	N	O	-
19	Ambulatory Visit Status/Type of Visit (2001)	*	*	*	*	*	*	*	*	24
20	Mode of Visit/Contact	*	*	*	*	*	*	*	*	25
21	Highest Level of Education	*	*	*	*	*	*	C	*	30
22	Arrival Date	*	*	*	*	*	*	N	O	-
23	Arrival Time	*	*	*	*	*	*	N	O	-
24	Triage Date	*	*	*	*	*	*	N	O	-
25	Triage Time	*	C	*	*	*	*	N	O	-
26	Triage Level	*	*	C	*	*	*	*	*	20
27	Date of Registration/Visit	*	*	*	*	*	*	*	*	10
28	Registration/Visit Time	*	*	*	*	*	*	*	*	22
29	Date of Physician Initial Assessment	*	*	*	*	*	*	N	O	-
30	Time of Physician Initial Assessment	*	*	*	*	*	C	N	O	-
31	Referral Source Prior to Ambulatory Care Visit	C	*	*	*	C	*	C	*	26
32	Institution From	*	*	*	*	*	*	N	O	-
33	Decision to Admit Date	R	R	*	*	*	*	N	O	-
34	Decision to Admit Time	R	R	*	*	*	C	*	*	47
35	Visit Disposition	*	*	*	C	*	C	C	*	14
36	Date Visit Completed	R	R	*	*	*	*	*	*	21

Current		ICD-10-CA							ICD-9	
Data Element ID Number	Data Element Description	FY 2008–2009	FY 2007–2008	FY 2006–2007	FY 2005–2006	FY 2004–2005	FY 2003–2004	FY 2002–2003^	FY 2001–2002	Data Element ID Number
37	Time Visit Completed/ Disposition Time (2001)	R	R	C	*	*	*	*	*	23
38	Referred To—After Completion of Am. Care Visit	*	*	*	*	C	*	C	*	27
39	Institution To	*	*	*	*	*	*	N	O	-
40	Provider Type/ Primary Provider Type (2001)	*	C	*	*	*	*	C	*	12
41	Service Provider/ Provider Type (2001)	*	C	C	C	*	C	C	*	11
42	Service Provider ID Number	*	*	*	*	*	*	F	*	13
43, 43 (a - i)	Main & Other Problem Prefix	*	*	C	*	*	C	N	O	-
44	Main Problem	*	*	*	*	*	*	F	*	15
45 (a - i)	Other Problem(s)	*	*	*	*	*	*	F	*	16
45 (a - i)	External Cause of Injury/Poisoning (*2001—Separate data element*)	*	*	*	*	*	*	C	*	17
45 (a - i)	Place of Occurrence/ Activity when injured (*2001—Separate data element*)	*	*	*	*	*	*	C	*	33
46	Main Intervention	*	*	*	*	*	*	F	*	18
47 (a - i)	Other Intervention(s)	*	*	*	*	*	*	F	*	19
48, 48(a-i)	Status Attribute (main and other)	*	*	*	*	*	*	N	O	-
49, 49(a-i)	Location Attribute (main and other)	*	*	*	*	*	*	N	O	-
50, 50(a-i)	Extent Attribute (main and other)	*	*	*	*	*	*	N	O	-
51 (a - i)	Duration of Am. Care Intervention for Main and Other Interventions	*	*	*	*	*	*	N	O	-
52, 52 (a - i)	Intervention Location Code for Main and Other Interventions	*	*	*	*	*	C	N	O	-
53	Anaesthetic Technique	*	*	*	C	*	*	C	*	36
54	Died During Intervention Flag	*	*	*	*	*	*	N	O	-
55	Out of Hospital Indicator	*	*	*	*	*	*	N	O	-

Current		ICD-10-CA							ICD-9	
Data Element ID Number	Data Element Description	FY 2008–2009	FY 2007–2008	FY 2006–2007	FY 2005–2006	FY 2004–2005	FY 2003–2004	FY 2002–2003^	FY 2001–2002	Data Element ID Number
56	Out of Hospital Institution Number	*	*	*	*	*	*	N	O	-
57	Blood Transfusion Indicator	*	*	*	*	*	*	*	*	31
58	Blood Components/ Products—Red Blood Cells	*	*	*	*	*	*	C	*	32
59	Platelets	*	*	*	*	*	*	C	*	32
60	Plasma	*	*	*	*	*	*	C	*	32
61	Albumin	*	*	*	*	*	*	C	*	32
62	Other	*	*	*	*	*	*	C	*	32
63	Autologous	*	*	*	*	C	*	N	O	-
64	Units of Blood Transfused—Red Blood Cells	*	*	*	*	*	*	*	*	50
65	Platelets	*	*	*	*	*	*	*	*	50
66	Plasma	*	*	*	*	*	*	*	*	50
67	Albumin	*	*	*	*	*	*	*	*	50
68	Other	*	*	*	*	*	*	*	*	50
69	Therapeutic Abortion Info—Number of Previous Term Deliveries	*	*	*	*	*	*	C/F	*	41
70	Number of Previous Pre-term Deliveries	*	*	*	*	*	*	N	O	-
71	Number of Previous Spontaneous Abortions	*	*	*	*	*	*	C/F	*	42
72	Number of Previous Therapeutic Abortions	*	*	*	*	*	*	C/F	*	43
73	Gestational Age—Therapeutic Abortion	*	*	*	*	*	*	C	*	44
74	Date of Last Menses	*	*	*	*	*	*	*	*	45
75 (a-j)	MIS FC Acct Code	*	*	*	*	F	*	*	*	37
76	Service Recipient—Specific Direct Cost	R	R	R	R	R	*	*	*	38
77	Service Recipient—Specific Indirect Cost	R	R	R	R	R	*	*	*	39
78	Traceable Supplies/ Patient Specific Supplies (2001)	R	R	R	R	R	*	*	*	40
79	Project Number	*	*	*	*	*	*	N	O	-
80-96	Facility/Jurisdiction specific	*	*	*	*	*	*	N	O	-
97	PCTAS Indicator	*	*	*	*	*	N	O	O	-

Current		ICD-10-CA							ICD-9	
Data Element ID Number	Data Element Description	FY 2008–2009	FY 2007–2008	FY 2006–2007	FY 2005–2006	FY 2004–2005	FY 2003–2004	FY 2002–2003^	FY 2001–2002	Data Element ID Number
98	Program Area	*	*	*	*	*	N	O	O	-
99	Scheduled ED Visit Indicator	*	*	*	*	*	N	O	O	-
100	Glasgow Coma Scale	*	*	*	*	*	N	O	O	-
101	Seatbelt Indicator	*	*	*	*	*	N	O	O	-
102	Helmet Indicator	C	*	*	*	N	O	O	O	-
103	Level of Care/ Service Recipient	*	*	*	*	N	O	O	O	-
104	Referral Date	*	*	*	*	N	O	O	O	-
105	Vendor MAC	*	*	*	*	N	O	O	O	-
106	Vendor CACS	*	*	*	*	N	O	O	O	-
107	Vendor RIW/ACW (2004 to 2005)	*	*	C	*	N	O	O	O	-
108	Complete Record	*	*	*	*	N	O	O	O	-
109	Main Intervention Date	*	*	*	*	N	O	O	O	-
110	Main Intervention Start Time	*	*	*	*	N	O	O	O	-
111 (a - i)	Other Intervention Date	*	*	*	*	N	O	O	O	-
112 (a - i)	Other Intervention Start Time	*	*	*	*	N	O	O	O	-
113 (#43 "R" Code-2003 to 2005)	Reason for Visit/Chief Complaint	*	*	N	O	O	O	O	O	-
114	Disposition Date	*	N	O	O	O	O	O	O	-
115	Disposition Time	*	N	O	O	O	O	O	O	-
116	Date Patient Left Emergency Department	*	N	O	O	O	O	O	O	-
117	Time Patient Left Emergency Department	*	N	O	O	O	O	O	O	-

Note: ^FY 2002–2003 NACRS Re-engineered + ICD10 Implementation—data element numbering convention substantially changed.

Appendix D—Identifying Duplicates in NACRS

- For FY 2006–2007, "true" duplicate records were identified using all data elements except these three data elements:

  am_care_key
  abstract_id_number
  date_recorded

- For FY 2006–2007, abstracts are matched on 4 data elements including (Table 7):

  chart_number
  health_care_number
  date_of_registration
  registration_time

- For FY 2003–2004, 2004–2005 and 2005–2006, abstracts are matched on 26 data elements including (Table 6):

  facility_am_care_num
  submission_fiscal_year
  submission_period
  coder_number
  chart_number
  health_care_number
  postal_code
  gender
  birth_date
  MIS_functional_centre
  triage_date
  triage_time
  triage_level
  date_of_registration
  registration_time
  date_physican_init_assessment
  time_physican_init_assessment
  decision_to_admit_date
  decision_to_admit_time
  visit_disposition
  date_visit_completed
  time_visit_completed
  main_problem
  main_intervention
  service_provider
  service_provider_id

- The matching process used was the SAS PROC SORT procedure with the nodupkey option.