



Executive Summary:
**Database Background and General Data
Limitations Documentation**

**National Ambulatory Care Reporting
System (NACRS)**

FY 2005-2006

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Abbreviations

ACCS	Ambulatory Care Classification System
AHP	Allied Health Professional
BC	British Columbia
CACS	Comprehensive Ambulatory Classification System
CC	Cardiac Catharization 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
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 9 th Revision
ICD-9-CM	International Statistical Classification of Diseases and Related Health Problems 9 th 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

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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 healthcare 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	<ul style="list-style-type: none"> • NACRS launched • 1st BC facility adopts emergency department (ED) reporting
2000 Jul	<ul style="list-style-type: none"> • ON adopts ED reporting
2001 Apr	<ul style="list-style-type: none"> • The Comprehensive Ambulatory Classification System (CACS) and Ambulatory Cost Weights (ACW) launch
2002 Apr	<ul style="list-style-type: none"> • 2nd BC facility adopts ED reporting • Implementation of ICD10 CA/CCI, the NACRS re-engineered
2003 Apr	<ul style="list-style-type: none"> • ON adopts surgical day/night care (SURG D/N) reporting • 3rd BC facility adopts ED reporting • 1 NS facility adopts ED reporting
2003 Jul	<ul style="list-style-type: none"> • 1 PE facility adopts ED reporting
2003 Oct	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 1 Yukon facility adopts ED reporting
2005 Apr	<ul style="list-style-type: none"> • 1 NS facility adopts ED and SURG D/N reporting

The population of interest (the population for which information is wanted) for the NACRS includes all ambulatory care visits in Canada including SURG D/N, ED, outpatient community clinics and facility based public or private clinics. The table below highlights actual provincial/territorial participation in the NACRS:

NACRS 2005-2006 participation, by Province and Ambulatory Care Type					
Ambulatory Care Type	ON	BC	PE	NS	YT
ED	✓	*	*	*	*
SURG D/N	✓	*	*	*	*
Clinic – CC	✓	*	*	*	*
Clinic – RD	✓	*	*	*	*
Clinic – OC	✓	*	*	*	*
Other	*	*	*	*	*

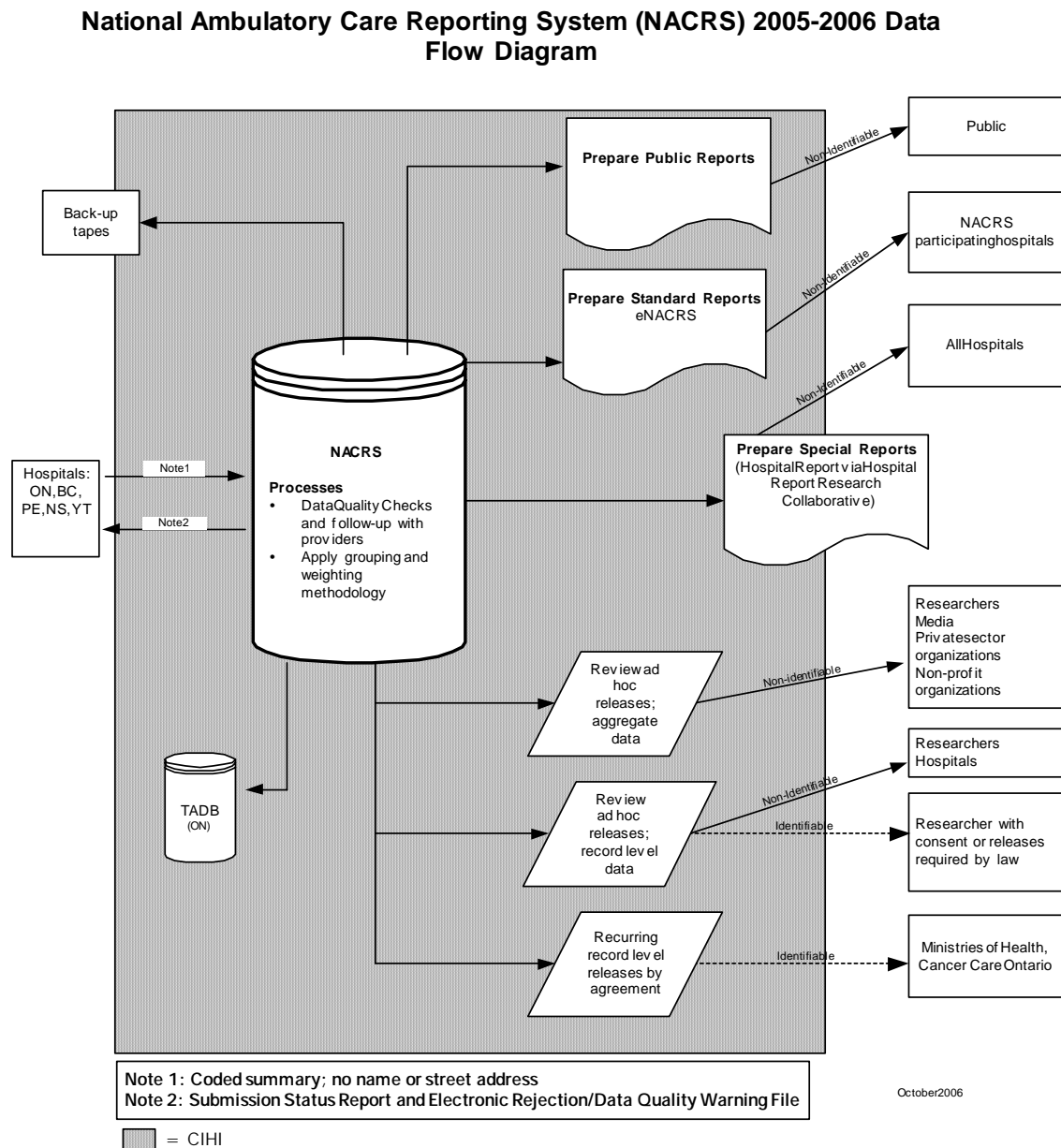
✓ = all public facilities reporting; * = some, but not all, facilities reporting

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:



This document includes 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, 2005 and March 31st, 2006 from all NACRS participating facilities in Canada. For FY 2005-2006, this includes:

- All ON facility's ED, SURG D/N, RD, OC and CC clinic visits
- 3 BC facility's ED visits
- 1 PE facility's ED visits
- 5 NS facility's ED visits and 3 of the 5 NS facility's SURG D/N visits
- 1 YT facility's 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 2005-2006, 9,743,258 abstracts were submitted to the NACRS as of the published year-end deadline of July 31st, 2006. 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 2005-2006, by Province and Ambulatory Care Type

Prov.	ED	SURG D/N	CC	RD	OC	Other*	Totals
PE	30,448	0	0	0	0	211	30,659
NS	99,529	11,163	0	0	0	28,692	139,384
ON	5,244,952	1,184,124	39,505	1,005,089	1,761,394	248,248	9,483,312
BC	62,300	0	0	0	0	1,390	63,690
YT	26,116	0	0	0	0	97	26,213
Total	5,463,345	1,195,287	39,505	1,005,089	1,761,394	278,638	9,743,258

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

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

In comparison, 9,392,263 abstracts were submitted to the NACRS 2004-2005 as of the published year-end deadline of August 31st, 2005. Table 2 presents changes in the volume of NACRS abstracts between fiscal years. In particular, the increased volumes associated with submissions from the province of NS for NACRS 2005-2006 compared to NACRS 2004-2005, reflect the submission of 8 periods of data from a new participating facility from this province.

Table 2. Percent change in volume of NACRS from 2004-2005 & 2005-2006, by Province and Ambulatory Care Type

Prov.	ED	SURG D/N	CC	RD	OC	Other*	Totals
PE	0.6 %	0.0 %	0.0 %	0.0 %	0.0 %	-9.8 %	0.5 %
NS	33.8 %	80.6 %	0.0 %	0.0 %	0.0 %	114.4 %	48.4 %
ON	2.7 %	5.3 %	10.4 %	1.7 %	5.4 %	-2.6 %	3.3 %
BC	4.7 %	0.0 %	0.0 %	0.0 %	0.0 %	60.7 %	5.5 %
YT	7.4 %	0.0 %	0.0 %	0.0 %	0.0 %	-14.9 %	7.3 %
Total	3.1 %	5.7 %	10.4 %	1.7 %	5.4 %	3.4 %	3.7 %

Source: NACRS 2004-2005 and 2005-2006

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

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 2005-2006 NACRS population of reference includes 196 facilities in Canada:

Table 3. 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
PE	1	0	0	0	0	1	1
NS	5	3	0	0	0	4	5
ON	180	156	21	52	85	130	186
BC	3	0	0	0	0	2	3
YT	1	0	0	0	0	1	1
Total	190	159	21	52	85	138	196

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

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

In comparison, the FY 2004-2005 NACRS population of reference includes 193 facilities in Canada:

Table 4. The number of institutions submitting to each Ambulatory Care Type in the 2004-2005 NACRS

Prov.	ED	SURG D/N	CC	RD	OC	Other*	Total
PE	1	0	0	0	0	1	1
NS	4	2	0	0	0	3	4
ON	177	153	21	51	82	147	184
BC	3	0	0	0	0	2	3
YT	1	0	0	0	0	1	1
Total	186	155	21	51	82	154	193

Source: NACRS 2004, as of August 31st, 2005

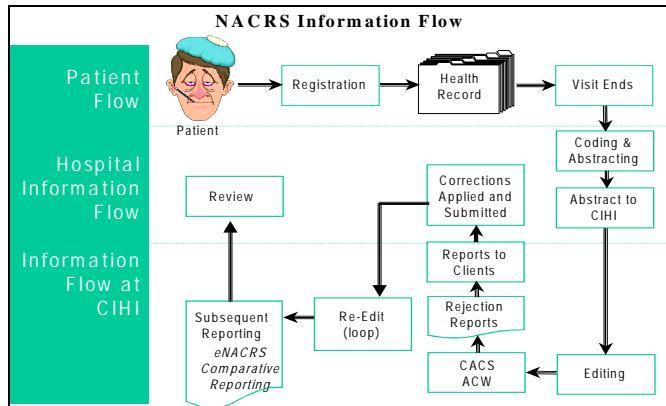
*Other includes all visits with an MIS FC other than those listed in Appendix A as well as multiple contact records.

Changes in the NACRS frame between FY 2004-2005 and 2005-2006 are a result of a new submitting facility from Nova Scotia for FY2005-2006 (as noted in previous section) and a series of transfer of services and closures of facilities in the Ontario Niagara Health System. 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 2005-2006 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). A multiple contact records (MCR) is created when an Allied Health Professional (AHP), outside of the mandated MIS FC in which the visit occurred, provides care and/or treatment. MCRs account for less than 3% of the abstracts submitted for FY 2005-2006, and are managed as stand-alone records in the CIHI database.

The *NACRS Manual* is the abstracting reference tool provided to clients. It may be purchased in PDF format or in a HTML 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:

- o Province of submission
- o Specific ICD-10CA/CCI codes
- o 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 codes, 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 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 throughout the year.

Data Submission Timeline

All data must be submitted to the NACRS prior to the year-end deadline. The published submission deadline for the 2005-2006 NACRS was July 31, 2006.

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/ACW 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 online Coding Query Database also helps users answer coding questions related to ICD-10CA/CCI.

- **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 2005-2006. 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 on 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 is currently finalizing 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 December 2006.

- **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 discuss suggestions and consider 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 2005-2006 NACRS database.

Appendix B outlines the mandatory and optional data elements in the FY 2005-2006 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 2003 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 assure 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 card 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 Card Numbers facilitate

linkage to other databases with the same fields. However, Health Card 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 data releases, the grouper methodology applied to calculate the CACS is that applied to the most current year of data released for the specific request. Therefore, for the current fiscal year of NACRS (2005-2006), the CACS 2003 v3 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, 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 on the database.

Under-coverage

There is no under-coverage in the NACRS since facilities in ON are mandated by the provincial MOHLTC to submit all abstracts in a fiscal year. CIHI and the provincial or territorial MOHLTC monitor participation by receiving monthly reports of submission status for each facility. Since all non-ON facilities mentioned in the population of reference are in the frame, they do not contribute to under-coverage.

Over-coverage

Duplicates

A source of over-coverage on the NACRS is duplicate records. A number of data quality issues for FY2005-2006 result in duplicate records appearing on the NACRS.

- Table 5 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 5. NACRS Potential Duplicates

Fiscal year	Potential Duplicates (N)	Emergency N (%)	Oncology N (%)	Proportion of NACRS
2003-2004	15,036	2165 (14.4)	12164 (80.9)	0.19%
2004-2005	11,287	486 (4.3)	10306 (91.3)	0.12%
2005-2006	3,725	1579 (42.4)	1639 (44.0)	0.04%

Source: NACRS 2003-2004, 2004-2005 and 2005-2006

Potential duplicates that are OC are not considered 'true' duplicates. This is because of the NACRS reporting model specified by the MOHLTC. The MOHLTC requires separate reporting or distinct abstracts for each of the three visit MIS functional centres usually associated with a one-day visit (i.e. RAD Treatment Planning (7146610), RAD Mould Room (7146620) and RAD Treatment (7146630). Visit MIS functional centre reporting is not required at the third level (i.e. 7 digits), therefore it is not possible to differentiate these records with the 'matching' procedure when they occur within the same day.

Further, potential duplicate records are for the most part limited to only a few submitting facilities. Researchers/Analysts may decide to include/exclude these potential duplicates depending on the impact of inclusion/exclusion on dataset sample sizes and study estimates.

- Another source of potential duplication or over-coverage on the NACRS is the submission of multiple contact records (MCR) within the ED MIS FC (i.e. 7*310** series). Since a MCR and its main record are associated with a single visit, correctly identifying the number of ED visits would require exclusion of MCRs within the ED visit MIS functional centre.
 - For ON visits, MCRs were generated under the MIS FC 7131076 (Emergency Psychiatric Services/Crisis Intervention) with a main abstract having the MIS FC 7131020 (General Emergency) and vice versa (23,875 records or 0.46% of ON ED records).
 - For NS visits, MCRs were generated under the MIS FC 713104000 (Interim Assessment – ER) and 713107000 (Emergency Psychiatric Services) with a main abstract having the MIS FC 713102000 (General Emergency) and vice versa (719 records or 0.72% of NS ED records).
- The occurrence of "overlapping visits" on the NACRS may indicate possible incorrect abstract submissions or duplication that would result in over-coverage. On NACRS 2005-2006, there were 369,225 records with the same health care number, province issuing health care number, and date of registration. These records do not include MCRs and all include data for time visit completed.

Of the 369,225 records identified with the same HCN, province issuing health care number and date of registration, 71,800 were found to have an overlapping date/time (65,804 occurred within a facility, and 5,996 occurred within multiple facilities). 74% of records with overlapping date/time are associated with OC and may be due to the issue of reporting separate abstracts for RAD Treatment Planning (7146610), RAD Mould Room (7146620) and RAD Treatment (7146630) as noted above.

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 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 6 below summarizes the level of unknown information reported for several mandated data elements.

Table 6. The proportion of unknown data reported for certain NACRS mandatory data elements. NACRS 2005-2006.

Element Number	Element	Unknown value	Prop ⁿ on NACRS (%)	Definition
02	HCN	0,1	1.84	Health care number not available
05	Postal Code	2-digit alpha code or invalid code	1.71	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	21.07	Unknown
34	Decision to admit time	9999	6.44	Unknown
44	Other Problem	U98.9	51.4	Unknown codes for place of occurrence with injuries
100	Glasgow coma scale	99	54.27	Not available
101	Seatbelt indicator	99	15.79	Unknown
102	Helmet indicator	99	44.20	Unknown

It is important to note that the proportion of unknown data may vary considerably by facility. For example, the proportion of unknown time of 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 2005-2006) 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 is currently finalizing 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 reabstracted 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 December 2006.
- A number of 'measurement error' issues associated with NACRS time elements have been identified and include:
 - *Time visit completed.* It is known that when the exact time the visit is completed is not available, '2359' or '2358' has been used as a proxy value by some facilities. Length of Stay (LOS) for ED and SURG D/N visits may be overestimated due to this measurement error. Calculations of the distribution of LOS for visits where the time visit completed is '2359' or '2358' is left-skewed in comparison to the right-skewed distribution of LOS for visits with other discharge times. Facility and therefore possibly regional bias occurs with this measurement error in reporting time visit completed. The majority of this issue in ED submissions occurs with 5 reporting facilities. Facility variation in the proportion of their ED data coded with 23:59 or 23:58 ranges from 0% to 31% (178 facilities have < 1.0% of their ED data coded with 23:59 or 23:58). The majority of this issue in DS submissions occurs with 2 reporting facilities. Facility variation in the proportion of their DS data coded with 23:59 or 23:58 ranges from 0% to 17%.
 - *Triage time.* Overall, 27% of ED records have a triage time that is exactly the same as registration time. 21 facilities report triage and registration as the same time in > 95% of their data. 11 of these are large facilities (ED visits > 30,000), 5 medium (ED visits b/w 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 b/w triage and registration is 1 minute and several others code > 20% of their data where the time b/w triage and registration is either 2, 3, 4 or 5 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 b/w these two times should be observed. Overall for Ontario, the decision to admit time equals the

time visit completed for 58% of admitted visits, which is correct coding. For PE and NS this is observed for 4% and 61% of their data, respectively and for BC and YT this is observed for 93% and 99.7%, respectively. However, by facility there is 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 b/w these two times across provinces ranges from 50 to 110 minutes approximately. Again there is large variation by facility. These results are similar to that observed for FY2004-2005.

- *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. see above bullet re: Time of physician's initial assessment).
- There is measurement error with data reported in the duration of ambulatory intervention data element (#51). This optional data element is reported in 26.9% (456,353/1,699,536) of DS interventions (note: one record may account for several interventions). For a significant number of these records, it appears as if the end time of the intervention, rather than the duration of the intervention, is being abstracted. An analysis that identifies records where the difference between the main_intervention_start_time and main_intervention_duration is a negative number indicates this issue in general. In the majority of instances, this difference would be a positive value where the duration is an actual duration of intervention coded in minutes. Thirty-four facilities were identified as having records with illogical durations assessed with the analysis described above, ranging from 1 to 3786 records. These data should be excluded from analysis assessing duration of ambulatory care interventions.
- Invalid postal codes occur on the NACRS 2005-2006. 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 7). This represents 0.79% of records on the NACRS.

Table 7. Sample of invalid postal codes in the 2005-2006 NACRS

Postal code	Number of Records
X9X9X9	570
X0X0X0	564
N0N0N0	83
A0A0A0	79
X0X1X0	74
Z9Z9Z9	62
N1N1N1	48
M0M0M0	39
H0H0H0	35
L1L1L1	21
M9M9M9	18
...	
Total	76742

Source: NACRS 2005-2006

- 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 2005-2006). NACRS requires completion of mandatory data elements upon submission. If mandatory data elements are left blank the record is not included on the NACRS. Therefore in the case where information is not included on the original health record, to ensure the NACRS abstract is included on 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 (55%) of OC data in the NACRS. Measurement error has occurred with these data for data elements including:
 - *Visit disposition.* CCO does not capture NACRS discharge 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 are coded with the main service provider as a Medical or Radiation Oncologist (86%). 56% of CCO abstracts are coded with a 'procedural intervention' service provider of which all are coded with either a radiotherapist (74%), registered nurse (24%) or laboratory technician (2%). Almost all abstracts coded with an 'other responsible' service provider (45.5% 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 (16.5% 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 ER Visit Indicator
 - Triage Date
 - Triage Time
 - Triage Level (CTAS)
 - Glasgow Coma Scale
 - Seatbelt Indicator
 - PCTAS Indicator

Data has been included for these elements primarily with MCRs, and as such should be used with caution when associated with non-emergency visits.

- 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 is pending for 2006.
- There is provincial response bias on the NACRS. In the FY 2004-2005, 97.3% 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 as, the FY 2005-2006 NACRS Manual.
- 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 as, the FY 2005-2006 NACRS Manual.

4.2.2 Linkage

- In 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 new data element 00G in 2005-2006 was added to the NACRS for the purpose of linking a MCR to their main abstract. On previous years of NACRS there is no way to confidently link a MCR to their main abstract. To identify a MCR record prior to FY 2005-2006, several steps are suggested. These include, (i) removing mandated MIS FC from the dataset, and (ii) identify records with an ambulatory care sequence number greater than '001'.
- For FY 2005-2006, the NACRS visit disposition legend was changed to include a new code (i.e. '15') representing 'Discharged to place of residence (Institution i.e. Nursing or Retirement Home or Chronic Care; Private Dwelling with Home Care, VON, Meals on Wheels, etc; or Jail)'. On previous years of NACRS ALL records with a 'discharge to place of residence' received a visit disposition code of '01'.
- For FY 2005-2006 the NACRS included seven new service provider codes. This allows for the specific coding of a Paediatric Oral Surgeon, Paediatric Dentist, Physiotherapist Assistant, Occupational Therapist Assistant, Orthotist, Ophthalmologic Technician and Orthoptician/Prosthetician. These types of service providers may have been included in the NACRS prior to FY 2005-2006 by codes representing more general but related service provider code categories.

5. General Data Query Guidelines

In general, a well-defined research question and analytical plan will help to make the process of working with NACRS less complex. As such, the extensive nature of 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 NACRS data:

- Included in 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' (data element #99).
- A main diagnosis and intervention is 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.
- When selecting diagnoses for study, consideration must be made for those ICD-10-CA codes indicating the 'reason for visit'. These data are not diagnoses and can be identified by an 'R' code in the 'Other Problem Prefix (data element #43), the exception being when the reason for visit is the same as the Main Problem.

- There is known measurement error on 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.

6. References

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 (CACCS) - Version 3*. Available by Order, www.cihi.ca.

Canadian Institute for Health Information (2006), *National Ambulatory Care Reporting System Manual for Fiscal 2006*. Available by Order, 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", www.cihi.ca

Canadian Institute for Health Information (2003), *MIS Guidelines, 2003*. Available by Order, www.cihi.ca.

Canadian Institute for Health Information (2003), "Coding Variations in the Discharge Abstract Database (DAD) Data", 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 and 2002/2003 data, www.cihi.ca

Canadian Institute for Health Information (2002), "Privacy and Confidentiality of Health Information at CIHI, 3rd Edition", www.cihi.ca

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

Canadian Institute for Health Information (1999), "Improving Timeliness of Discharge Abstract Database Data", 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

7. Contacts

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Appendix A – Visit MIS Functional Centre Codes

Visit MIS Functional Centre Code Legend

Ambulatory Care Type	MIS Functional Centre Account Codes
ED	
	7*310** (* = 1, 2, or 3)
SURG D/N	
	7*260, 7*260**, 7*262, 7*265, 7*265**, 7*34020, 7*34025, 7*34025**, 7*34055 (* = 1, 2 or 3 ** = series)
MED D/N and Clinics	
RD	7*34086**, 7*53086 (* = 1, 2 or 3 ** = series)
OC	7*34066**, 7*35066**, 7*466**, 7*53066, 7*51066** (* = 1, 2 or 3 ** = series)
CC	7*41544** (* = 1, 2 or 3 ** = series)
Other	
All non-mandatory	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:

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

Appendix B – FY 2005-2006 Mandatory NACRS Data Elements

This document is intended for use in conjunction with the NACRS Abstracting Manual. Refer to the FY 2005-2006 NACRS Manual for details.

LEGEND	
M	Mandatory
M*	Mandatory if applicable
O	Optional

Data Element ID Number	Data Element Description	ON			NS			BC			PE		
		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
00E	Abstract Identification Number	M	M	M	M	M	M	M	M	M	M	M	M
00F	Coder Number	M	M	M	M	M	M	M	M	M	M	M	M
00G	Primary Abstract ID 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	O	O	M	O	O	M	O	O	M	O	O
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	ON			NS			BC			PE		
		ED	SURG	CL	ED	SURG	CL	ED	SURG	CL	ED	SURG	CL
			D/N			D/N			D/N			D/N	
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 & Other Problem Prefix	M	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 & other)	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
49, 49(a-i)	Location Attribute (main & other)	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*

Data Element ID Number	Data Element Description	ON			NS			BC			PE		
		ED	SURG D/N	CL	ED	SURG D/N	CL	ED	SURG D/N	CL	ED	SURG D/N	CL
50, 50(a-i)	Extent Attribute (main & 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
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

Data Element ID Number	Data Element Description	ON			NS			BC			PE		
		ED	SURG D/N	CL	ED	SURG D/N	CL	ED	SURG D/N	CL	ED	SURG D/N	CL
76	Service Recipient - Specific Direct Cost	0	0	0	0	0	0	0	0	0	0	0	0
77	Service Recipient - Specific Indirect Cost	0	0	0	0	0	0	0	0	0	0	0	0
78	Traceable Supplies (FY01/02 Title = Patient Specific Supplies)	0	0	0	0	0	0	0	0	0	0	0	0
79	Project Number	0	0	0	0	0	0	0	0	0	0	0	0
80-96	Facility/jurisdiction specific	0	0	0	0	0	0	0	0	0	0	0	0
97	PCTAS Indicator	M	0	0	M	0	0	M	0	0	M	0	0
98	Program Area	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*	M*
99	Scheduled ED Visit Indicator	M	0	0	0	0	0	0	0	0	M	0	0
100	Glasgow Coma Scale	M*	0	0	M*	0	0	M*	0	0	M*	0	0
101	Seatbelt Indicator	M*	0	0	M*	0	0	M*	0	0	M*	0	0
102	Helmet Indicator	M*	0	0	M*	0	0	M*	0	0	M*	0	0
103	Level of Care/Service Recipient	0	0	0	0	0	0	0	0	0	0	0	0
104	Referral Date	0	0	0	0	0	0	0	0	0	0	0	0
105	Vendor MAC	0	0	0	0	0	0	0	0	0	0	0	0
106	Vendor CACS	0	0	0	0	0	0	0	0	0	0	0	0
107	Vendor ACW	0	0	0	0	0	0	0	0	0	0	0	0
108	Complete Record Flag	0	0	0	0	0	0	0	0	0	0	0	0
109	Main Intervention Date	0	0	0	0	0	0	0	0	0	0	0	0
110	Main Intervention Start Time	0	0	0	0	0	0	0	0	0	0	0	0
111(a-i)	Other Intervention Date	0	0	0	0	0	0	0	0	0	0	0	0
112(a-i)	Other Intervention Start Time	0	0	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 2005-2006 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	FY2006/07	FY2005/06	FY2004/05	FY2003/04	FY2002/03^	FY2001/02	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
00E	Abstract Identification Number	*	*	*	*	N	O	-
00F	Coder Number	*	*	*	*	N	O	-
00G	Primary Abstract ID Number	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	*	*	*	*	N	O	-
11	Ambulatory Registration Number / Encounter Number (2001)	*	*	*	*	*	*	08
12	Ambulatory Registration/Encounter Sequence Number	*	*	*	*	*	*	08b

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CURRENT		ICD-10-CA					ICD-9	
Data Element ID Number	Data Element Description	FY2006/07	FY2005/06	FY2004/05	FY2003/04	FY2002/03^	FY2001/02	Data Element ID Number
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	*	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	*	*	*	*	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	*	26
32	Institution From	*	*	*	*	N	O	-
33	Decision to Admit Date	*	*	*	*	N	O	-
34	Decision to Admit Time	*	*	*	C	*	*	47
35	Visit Disposition	*	C	*	C	C	*	14
36	Date Visit Completed	*	*	*	*	*	*	21
37	Time Visit Completed / Disposition Time (2001)	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	*	12
41	Service Provider / Provider Type (2001)	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

CURRENT		ICD-10-CA					ICD-9	
Data Element ID Number	Data Element Description	FY2006/07	FY2005/06	FY2004/05	FY2003/04	FY2002/03^	FY2001/02	Data Element ID Number
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 & other)	*	*	*	*	N	O	-
49, 49(a-i)	Location Attribute (main & other)	*	*	*	*	N	O	-
50, 50(a-i)	Extent Attribute (main & 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	-
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

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CURRENT		ICD-10-CA					ICD-9	
Data Element ID Number	Data Element Description	FY2006/07	FY2005/06	FY2004/05	FY2003/04	FY2002/03^	FY2001/02	Data Element ID Number
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	*	*	*	38
77	Service Recipient - Specific Indirect Cost	R	R	R	*	*	*	39
78	Traceable Supplies / Patient Specific Supplies (2001)	R	R	R	*	*	*	40
79	Project Number	*	*	*	*	N	O	-
80-96	Facility/jurisdiction specific	*	*	*	*	N	O	-
97	PCTAS Indicator	*	*	*	N	O	O	-
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	*	*	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	F	*	*	N	O	O	-

^FY2002-03 NACRS Re-engineered + ICD10 Implementation - data element numbering convention substantially changed.

Appendix D – Identifying Duplicates in NACRS

- Abstracts are matched on 26 data elements including:

```
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.
- Duplicates are those matched records that have a submission date (date_recorded) later than the first record.