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NACRS

CIHI Data Quality Study of Ontario Emergency Department Visits for 2004–2005



Executive Summary



Canadian Institute
for Health Information

Institut canadien
d'information sur la santé

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Introduction

A data quality study on emergency department (ED) data was recently completed by the Canadian Institute for Health Information (CIHI), in collaboration with the Canadian Health Information Management Association. This involved conducting a reabstraction study to evaluate the quality of ED data submitted by Ontario facilities to the National Ambulatory Care Reporting System (NACRS) in 2004–2005. Information on ED documentation and processes was also collected through a questionnaire sent to all participating hospitals. The information collected in this questionnaire was used to supplement the reabstraction study findings.

Patient data for ambulatory care services provided in Canadian health care facilities—such as ED visits, day surgeries and visits to outpatient clinics—are collected in the NACRS. This information is used by provincial and territorial governments, researchers and other agencies for policy development, system planning and evaluation, quality and risk management and report cards. This is a fairly young database, launched in 1997 with the first British Columbia facility to adopt ED reporting. By 2004–2005 (the study year), a limited number of facilities from other provinces were also submitting to the NACRS (Prince Edward Island, Nova Scotia and the Yukon Territory), with Ontario having mandated reporting for all of its facilities. Given the critical importance of ambulatory care information in the management of Canada's health care system, a data quality study of the NACRS is timely, particularly as this database is in its early days.

The reabstraction study examined the charts for 7,500 unplanned visits to EDs at 15 Ontario facilities from April 1, 2004, to March 31, 2005. The study also included the double reabstraction of approximately 1,500 charts to specifically measure the inter-rater reliability of the health information professionals who participated in the study. The hospital questionnaire was completed by all 15 facilities selected in the study.

Summary Findings

The detailed findings of this study are presented in a four-volume report. This first volume provides a summary of the study findings and recommendations for action. The second volume presents the findings from the main reabstraction study. The third volume discusses the reliability of coding among the study's reabstractors. The fourth presents the findings pertaining to the hospital questionnaire.

Non-Clinical Data

Generally, very high agreement rates were observed for demographic data, financial and institutional data and visit and assessment data. For the five key dates and times associated with the ED visit, three of these (triage, decision to admit and visit completed) demonstrated lower agreement rates for *times* only. These differences in values coded for times impacted calculations of ED wait times. Some of the difficulties in abstracting the non-clinical data accurately were attributed to differing interpretations of the definitions and instructions in the NACRS Abstracting Manual, lack of clarity and completeness of the chart documentation and dissimilar facility practices.

Patient Problems and Reasons for Being Seen in the ED

There is an *under-reporting of problems* for patients seen in the ED. This was particularly evident for patients who presented with multiple conditions or problems where only one problem was reported to the NACRS. This issue appeared to be a response by facilities to address workload demands. In some cases, the use of a default or predetermined diagnosis code when a chart could not be located also resulted in under-reporting of problems, as well as submission of inaccurate diagnostic information. In contrast, facilities that insisted on complete physician assessment information reported presenting problems more reliably.

Generally, high agreement rates were observed for the selection of the patient's *main problem*. That is, for patients with multiple problems, the selection of the one that was the most clinically significant reason for the visit to the ED was performed consistently. However, there was a lower agreement in the diagnosis codeⁱ that described the *main problem*. Analysis of *all* problems coded revealed a similar finding where the diagnosis code used to describe the problem varied. This limitation was observed by both the original coders and reabstractors. It appears that certain codebook directives and coding standards are being misinterpreted and applied incorrectly because of a lack of clarity in the directive or a lack of understanding by the coders, coupled with difficulties in interpreting chart information to the level of detail required by the classification system.

i. The classification system used to code diagnoses is the International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada (ICD-10-CA).

The *reason for the patient's visit* to the ED is also collected in the NACRS. This information was notably the most difficult for coders and reabstractors to agree upon for many reasons: lack of clarity in the patient's chart, challenges in choosing one reason when a patient presented with many and some facility practices to default the reason for the patient's visit to the main problem. Further difficulties were encountered when selecting a diagnosis code to describe the reason for the patient's visit. A clinical diagnosis classification system such as the International Statistical Classification of Diseases and Related Health Problems (ICD), designed to capture medical diagnoses, may not be appropriate to capture patient complaints.

Interventions Performed in the ED

Similarly to what was found for problems, there was also an *under-reporting of interventions*. Often, no interventions were submitted despite their presence on the chart. Reabstractors attributed this to facility practices adopted to address workload demands. In contrast, over-reporting of interventions was seen at other facilities. One of the key contributors to this was the lack of understanding about which interventions to include on the NACRS abstract (for example, those used in the ambulatory care grouping methodology). This was not well understood by all coders, including the reabstractors. Facilities that required additional clinical documentation beyond the ED record form had more complete documentation, which resulted in a higher agreement for interventions submitted.

Generally, a high agreement rate was observed for the selection of *main intervention*, which is the procedure that was most clinically significant during the patient's visit. This was a slightly lower agreement rate than that observed for *main problem*. Difficulties were encountered when multiple interventions were performed and *one* had to be chosen as the most significant. In addition, the term "clinically significant" in the definition of main intervention was also difficult for many coders to interpret.

High agreement rates were observed when examining the classification code selected to describe *all* of the interventionsⁱⁱ performed in the ED. Given the difficulties already identified with selecting the main intervention when many were present, it is not surprising that lower agreement rates were found in the CCI codes selected for the *main* intervention. These results were applicable to all coders, including the reabstractors.

Codebook directives that were not followed and difficulties encountered when reviewing the documentation within the chart were cited as significant contributors to the differences observed in the coding of interventions. Additional instructions are required regarding the coding of interventions performed on patients who die in the ED or who are dead on arrival.

ii. The classification system used to code interventions is the Canadian Classification of Health Interventions (CCI), developed and maintained by CIHI.

Facility Practices That Promote Data Quality

Facilities that adopted the following practices reported higher agreement rates for the coding of non-medical data elements, problems and/or interventions:

- Providing sufficient time to the coders to review the coding standards
- Dedicating coders to abstract ED visits only
- Developing facility-specific guidelines that further clarify CIHI directives
- Always complying with the standards for the selection of the *main problem* and *reason for visit*
- Not defaulting triage time
- Documenting all non-clinical data on the ED record form
- Producing additional clinical documentation other than the ED record form
- Involving the administrative team in documenting the patient's triage
- Requiring detailed documentation practices and standards
- Providing formal training on chart documentation requirements
- Routinely reviewing the Admit Discharge Transfer/Emergency Department Information System interface
- Using the Admit Discharge Transfer system to collect patient registration information

Impact on Resource Utilization Indicators

CIHI uses grouping methodologies that aggregate patient data into clinically similar and cost-homogenous groups to provide national indicators for reporting resource utilization. For the NACRS, it is the Comprehensive Ambulatory Classification System (CACS) that is used to determine the costs and resource utilization in ambulatory care settings.

Unlike the CIHI grouping methodology for hospital acute care inpatients, the role of the *main intervention* is critical in the CACS grouping methodology. As a result of the challenges already noted above in terms of under-reporting of interventions and the selection of a main intervention, substantial changes were noted after reabstraction in the CACS cell assignment for the day procedure groups and the diagnosis-driven visits. Changes were also noted in the assignment of Major Ambulatory Clusters as a result of the selection of a different condition for the patient's main problem. These differences resulted in lower cost weights assigned to the day procedure groups and higher cost weights for the diagnosis-driven visits, consistent with the shift in assignment between these two components of the grouping methodology. Higher agreement rates were observed for these resource indicators in the inter-rater reliability study (between reabstractors) because of the greater consistency in their coding of main problem and main intervention.

A broader discussion of the study findings is continued in the attached appendix. Please refer to the three other reports (main reabstraction study, inter-rater reliability study and questionnaire study), available upon request, for an in-depth analysis of the study results.

Recommendations

This data quality study provided a wealth of information on the coding and reporting of ED visits by Ontario facilities for the study year (2004–2005). As the NACRS has been receiving data for only a few years, this study was important in that it confirmed the many aspects of ED data that are robust and dependable. The study also highlighted six areas that should be addressed in order to improve the quality of the ED data within the NACRS and to ensure the continued growth and reliability of the NACRS:

1. Review and clarify the definitions and instructions in the NACRS Abstracting Manual.

Strategy: The study found that some of the non-clinical data were not well coded because of unclear definitions in the manual that coders use to abstract and code the ED visit. In addition, domain values sometimes required the option to code “unknown.” More instructions are also required regarding the selection and coding of the main problem and main intervention, particularly when there are many of these documented within the patient’s chart or when the patient dies in the ED or is dead upon arrival. A thorough review and updating of the NACRS Abstracting Manual will address these abstracting and coding difficulties.

Lead: CIHI.

2. Review the choice of classification system for the coding of *reason for visit*.

Strategy: The results for the coding of the reason for the patient’s visit to the ED highlighted the difficulties encountered by all coders, including reabstractors, in using a detailed diagnostic classification system like the ICD to code a patient’s complaint, which could be non-specific and vague in nature. An alternative to the ICD should be explored to capture this valuable information.ⁱⁱⁱ

Lead: CIHI.

3. Address issues of clarity and completeness in the chart documentation.

Strategy: The study found that the content of the chart documentation often resulted in a different interpretation of the facts surrounding the patient’s visit. Names were unclear, where patients had transferred from or were going to was not known, and decisions regarding admission or when the visit was completed were not documented on the face sheet, nurses’ notes or physicians’ orders. There were also inconsistent formats used for dates, information was not in one central document and there was conflicting information between the Admit Discharge Transfer system and the chart. Coders face difficulties identifying the problems and interventions presented in the ED visit, as they are not well defined in the chart, as well as identifying the main one contributing to resource use. This initiative could be addressed by the Physician Documentation Expert Panel established by the Ontario Ministry of Health and Long-Term Care (MOHLTC) to address similar issues in hospital inpatient coding in Ontario.

Lead: MOHLTC.

iii. In 2007–2008, CIHI initiated a voluntary project (312) to collect the data element *presenting complaint*. Presenting complaint will be captured using the Canadian Emergency Department Information System (CEDIS) Presenting Complaint list. In 2007–2008, facilities will still be able to collect reason for visit (using ICD-10-CA).

4. Review and update the standards for ambulatory care coding.

Strategy: As the NACRS database was still in its early years of implementation in 2004–2005, many of the coding standards for ambulatory care were still under development. This study confirmed the need to expand on the coding standards for the coding of problems and interventions.

Lead: CIHI.

5. Review the logic in the CACS grouping methodology.

Strategy: The current logic for the CACS grouping methodology is driven by the main intervention. As the study findings indicated, coders are having difficulty identifying which is the main intervention, particularly in situations where the patient may have several during the ED visit. The CACS grouping methodology needs to be reviewed and modified, if deemed appropriate, to address this coding challenge. In addition, the study also found that coders are having difficulty determining which interventions are currently utilized in the CACS grouping methodology and which therefore should be included on the abstract. Additional educational efforts are needed to address this lack of understanding.

Lead: CIHI.

6. Address data quality issues introduced by specific facility practices.

Strategy: The study found that some facilities have addressed workload demands by under-reporting problems and interventions to the NACRS. Some facilities have also developed policies that directly contravene the directives in the NACRS Abstracting Manual, such as defaulting values for the patient's reason for visit or the time of their triage. However, not all facility practices have introduced data quality issues—some facilities have developed policies that have promoted good-quality data. Those practices that are jeopardizing the quality of ED data need to be examined and modified. This will involve a collaborative effort between the MOHLTC, the hospitals and CIHI.

Lead: MOHLTC, hospitals.

Developments Since the Study

Over the last few years, and prior to the results of this study becoming available, CIHI had already been working on various initiatives aimed at improving the coding of ED data in the NACRS. These initiatives included the following:

- Significant updates to the vendor specifications that are used in submission of the data to CIHI up to 2006–2007
- Updates to the NACRS Abstracting Manual for every year up to 2007–2008
- Updates to the Canadian Coding Standards for ICD-10-CA/CCI up to 2007–2008

Another initiative that is currently under way is examining the use of the “presenting complaint list” from the Canadian Association of Emergency Physicians as a different tool with which to identify the reason for the patient’s visit to the ED.

This data quality study confirmed that the work that has already been undertaken at CIHI will prove valuable in improving the quality of NACRS data in years to come. This study also highlighted additional areas of focus for future data quality improvement work.

Appendix—Overview of Study Findings

1. Overview of Participating Facilities

The 15 NACRS facilities that participated in this reabstraction study had many similarities and differences regarding staff experience and training, coding and abstracting practices, the data collection process and chart documentation and data quality initiatives and programs during 2004–2005. The following provides an overview of the practices and policies within the participating facilities of this study, as reported through the hospital questionnaire.

NACRS coders at these facilities had different coding backgrounds and each had unique coding experiences. However, most were employed full-time, had coded NACRS data for two years or longer and had received training and/or continuing education.

Coding and abstracting practices varied across facilities. Many facilities (60%) always or sometimes used facility-specific coding guidelines. Some guidelines included coding from “pick lists” rather than coding from the ICD-10-CA codebook. Most facilities (80%) provided time for their coders to review coding and abstracting standards. However, 53% of the facilities stated that their coders did not always comply with the coding standards associated with *reason for visit*. Some facilities automatically populated certain data elements through a vendor system with default values.

The collection and documentation of information in the patient’s chart differed across the participating facilities. Many facilities required additional documentation beyond the emergency department (ED) record form for the health record to be classified as having complete documentation. Also, vendor systems were used to collect information associated with the patient’s registration, whereas paper forms were used to document the clinical information and the patient’s discharge disposition. The responsibility for documenting a given component of the patient’s stay was shared among several health care providers at some facilities, but was delegated to specific health care providers at others. Half of the facilities indicated that they had standard documentation procedures in place for the physician assessment, and most had standard procedures in place for all other aspects of the patient’s stay. Also, the physician assessment frequently contained incomplete information.

Data quality programs encompass a broad range of activities such as staff training and communication, software testing and data quality assessments. Most of the participating facilities (93%) promoted education by routinely reviewing CIHI publications, but only 60% provided education to the coding team; one-third provided formal physician training on chart documentation. Nearly all facilities tested the coding and abstracting edits in vendor software, two-thirds created quality assurance reports, 40% performed coding and abstracting audits, and one-fifth performed consistency audits. Many facilities (60%) had programs in place to facilitate communication between the health services team and the coders.

2. Reabstraction Study Findings

This section presents the reabstraction study findings. These findings were further investigated using inter-rater reliability study data and auxiliary information gathered via the hospital questionnaire.

2.1 Non-Medical Data Elements

The study found overall high agreement rates for the patient's **demographic data** (*health care number, postal code, gender, birth date, birth date is estimated, family physician flag*) as well as for facility information pertaining to **financial and institutional data** (*institution to, institution from, visit MIS functional centre account code*).

The study assessed the quality of **dates and times** for five key ambulatory care events (*registration, triage, physician initial assessment, decision to admit, visit completed*). Lower agreement rates were observed for the times associated with when the patient was triaged, when the decision was made to admit the patient and when his or her ED visit was completed. When recorded in multiple locations, reabstractors found that documented times sometimes conflicted. They also noted that times were not always originally abstracted according to directives in the abstracting manual. The following highlights specific findings:

- Original and reabstracted values for *triage time* often differed by a few minutes. Original times were frequently default values derived from *time of registration* rather than actual times as recorded in the chart documentation. This explained the higher exact agreement rate found in the inter-rater reliability study (87.3%) in comparison to the reabstraction study (64.9%). Reabstractors did not code using default values. Furthermore, facilities that reported that *triage time* was coded with a default value had lower agreement than facilities that reported they did not default this time.
- Original and reabstracted values for *decision to admit time* differed by 30 minutes or more for 12.2% of admitted patients. Agreement rates varied between facilities. Overall, the inter-rater reliability study had higher agreement, with only 3.4% of admitted patients having times differing between reabstractors by 30 minutes or more. Values of "unknown" were reabstracted for this time data when actual times were originally coded.
- Reabstractors entered codes of "unknown" for *time visit completed* for 8.0% of the ED visits, and entered times that differed by 30 minutes or more from the original coder for 4.2% of the visits. Fewer visits in the inter-rater reliability study had times that differed by 30 minutes or more. Reabstractors noted that it was difficult to code this time for patients who continued to receive care from ED staff while waiting for an inpatient bed. In the inter-rater reliability study, reabstractors often disagreed on coding "unknown."

Reabstracted values for *registration date/time* and *date/time visit completed* generated shorter *length of stay* values than those generated with the original data, particularly for patients who were admitted or who died. Much higher agreement on length of stay was found in the inter-rater reliability study.

Most **visit and assessment data** had high agreement (*admit via ambulance, triage level, visit disposition*). Only *visit type* had low agreement. *Visit type* is used for multiple purposes, and thus it has a more complex definition compared to the other non-medical data. Reabstractors assigned different domain values than the original coders for 6.3% of the ED visits and values of “unknown” for another 6.4% of the ED visits. Similar results were observed in the inter-rater reliability study. Agreement rates for these data varied greatly between facilities. For example, facilities that used the Admit Discharge Transfer system to code *visit type* had a higher agreement rate of 91.6% compared to 65.7% for the other facilities.

Certain practices or procedures as reported in the hospital questionnaire contributed to higher agreement rates in facilities that followed the practices or procedures listed below. The data in parentheses were most affected by this practice:

- Affording time to coders to review coding standards (*time visit completed*)
- Dedicating some coders to abstract ED visits only (*visit type*)
- Developing facility-specific guidelines—these guidelines appear to clarify directives provided by CIHI (*time of physician initial assessment* and *time visit completed*)
- Documenting all non-medical data in the ED record form (*triage time, time visit completed* and *visit type*)
- Involving the administrative team in documenting the patient’s triage (*triage time*)
- Routinely reviewing the Admit-Discharge-Transfer/Emergency Department Information System interfaces (*time visit completed*)
- Not defaulting *triage time*. Facilities that default this data element had a lower agreement rate
- Using the ADT system to collect information on the patient’s registration (*visit type*)

2.2 Problems

The diagnostic data contained in the patient chart are assigned problem codes using ICD-10-CA, which uses both alphabetic and numeric codes to represent problems in the format A.NN.NNN. Data analysis in this section focuses on the extent and causes for the observed discrepancies.^{iv}

iv. The following *other problems* are out of scope for this analysis: post-operative/post-procedural sandwich codes, infectious organism codes and previous injury codes when no longer present.

Coverage of Problems

The volume of problems reabstracted was greater than the volume of problems originally submitted. The difference in volume was statistically significant. Reabstractors indicated that the data originally submitted did not always contain complete information. They observed that facilities developed various coding practices to address workload demands. They often encountered abstracts with only one diagnosis, condition or circumstance originally captured when multiple conditions were listed in the health record. Table 2.2-A supports these observations with the reabstraction study results.

Table 2.2-A Number of Problems Coded per Emergency Department Visit in the Original and Reabstracted Data

	Original Data (Percent)	Reabstracted Data (Percent)
One Problem per Visit	34.6	21.1
Two Problems per Visit	35.1	43.1
Three Problems per Visit	20.8	18.9
Four Problems per Visit	8.0	14.5
Five or More Problems per Visit	1.4	2.4

Source: Canadian Institute for Health Information, 2007.

Reabstractors observed that default or predetermined diagnosis codes were submitted when the chart could not be located (“dummy” codes). Note that facilities are mandated by the Ontario Ministry of Health and Long-Term Care to have complete submission of all visits within certain time frames, and are also required by CIHI to submit abstracts with all mandatory data elements. Dummy coding appears to be a practice that has been adopted to respond to these two requirements.

Agreement rates on the presence of a condition in the inter-rater reliability study were significantly higher than in the reabstraction study (84.0% compared to 74.1%). Reabstractors were more consistent in capturing the problems in the health record, particularly for patients who are discharged/left or admitted. However, the inclusion of problems was inconsistently done in both the inter-rater reliability and reabstraction studies for the subset of patients who died.

When reviewing information from the hospital questionnaire, facilities that reported they always had complete information in their physician assessments had significantly higher agreement rates on the presence of a problem than facilities where this information was not always complete (85.2% compared to 72.1%).

Selecting Main Problem and Reason for Visit

One of the problems included in a patient's abstract must be designated as the *main problem*. The *main problem* is the most clinically significant reason for the client's visit, which requires evaluation and/or treatment or management. Ontario also mandates that the patient's *reason for visit* be indicated. The *reason for visit* is the patient's chief complaint or the reason for seeking emergency medical care.

Table 2.2-B shows the agreement rates in the selection of *main problem* and *reason for visit* in both the reabstraction and inter-rater reliability studies. Reabstractors were able to achieve significantly higher agreement rates in the inter-rater reliability study with the information in the chart and in the existing coding standards.

Table 2.2-B Agreement in the Selection of *Main Problem* and *Reason for Visit* From the Problems Presented During the Emergency Department Visit

	Reabstraction Study (Percent)	Inter-rater Reliability Study (Percent)
Selection of <i>Main Problem</i>	85.5 ± 1.9	90.4 ± 1.9
Selection of <i>Reason for Visit</i>	72.5 ± 7.5	86.0 ± 5.3

Source: Canadian Institute for Health Information, 2007.

The following are observations made by reabstractors during field collection or are findings in the analysis of the collected data:

- Further instructions are needed on selecting the *main problem* in the ED when many problems are present.
- In the original data, the *reason for visit* code was quite often the same as the *main problem*. The same condition was assigned as the *main problem* and the *reason for visit* in 59.2% of the ED visits in the original data, but in only 40.1% of the ED visits in the reabstracted data.
- The study found that where more than one symptom or condition was documented as the *reason for visit*, the lack of clarity in the chart documentation and in the NACRS Abstracting Manual contributed to the inconsistencies in selecting the patient's *reason for visit*.

ICD-10-CA Coding

The ICD-10-CA coding accuracy was studied for problems that were present in both the original and reabstracted data. Analysis assessed the coding accuracy of all problems, and also assessed the coding of *main problem* and *reason for visit* specifically.

As illustrated in Table 2.2-C, original and reabstracted ICD-10-CA codes matched exactly for 78.5% of the problems, with another 10.3% matching at the category level. Further investigation of the reabstraction study data found that the ICD-10-CA codes that were present in high volumes were generally reabstracted with higher agreement than those that were present less frequently.

Table 2.2-C ICD-10-CA Code Comparisons From the Reabstraction Study

	Format	Problem Codes (Percent)	Main Problem (Percent)	Reason for Visit (Percent)
Exact Code Match	A.NN.NNN	78.5	68.8	59.3
Category Match Only	A.NN	10.3	9.2	6.7
Block Match Only	A.(NN) _x to A.(NN) _y	5.1	5.4	7.3
Chapter Match Only	A	4.0	6.6	8.5
Different Chapter		2.0	10.0	18.2

Source: Canadian Institute for Health Information, 2007.

The code describing the *main problem* matched between the original coder and reabstractor for 68.8% of the visits, and the code describing the patient's *reason for visit* matched for 59.3% of the visits. As shown earlier in Table 2.2-B, a considerable proportion of visits had different conditions reabstracted as the *main problem* and different patient complaints reabstracted as the *reason for visit*. This contributed to most instances of original and reabstracted codes for these data belonging to different ICD-10-CA blocks.

Table 2.2-D compares exact code match rates between the inter-rater reliability and reabstraction studies. The agreement rate for ICD-10-CA coding of problems was similar in the inter-rater reliability and reabstraction studies (79.7% and 78.5% respectively). This indicates that both original coder and reabstractor experienced similar limitations that affected their ability to abstract or code consistently. Reabstractors attributed the majority of discrepancies in problem code assignment to non-compliance of the original coder with codebook directives. However, as the same level of disagreement was observed in the inter-rater reliability study, it seems that certain codebook directives for ICD-10-CA are being misinterpreted or applied incorrectly by both reabstractors and original coders and that there could be issues other than non-compliance with codebook directives that are contributing to this coding variation.

Agreement rates for ICD-10-CA code assignment in the inter-rater reliability study for *main problem* and *reason for visit* are significantly higher than the rates in the reabstraction study. Reabstractors had a greater common understanding and application of the definitions provided in the NACRS Abstracting Manual. Despite the higher agreement, inconsistent ICD-10-CA code assignment remained for *reason for visit* in the inter-rater reliability study (69.9% agreement). This suggests that there may be a systematic problem in using a clinical diagnosis classification (that is, ICD) to capture patient complaints.

Table 2.2-D Exact ICD-10-CA Code Match Rates in the Reabstraction and Inter-Rater Reliability Studies

	Reabstraction Study (Percent)	Inter-Rater Reliability Study (Percent)
ICD-10-CA Coding of Problems	78.5 ± 2.3	79.7 ± 2.1
ICD-10-CA Coding of <i>Main Problem</i>	68.8 ± 3.2	77.2 ± 3.9
ICD-10-CA Coding of <i>Reason for Visit</i>	59.3 ± 6.7	69.9 ± 7.4

Source: Canadian Institute for Health Information, 2007.

Further investigation of ICD-10-CA coding was performed by grouping facilities based on their responses to questions in the hospital questionnaire. Agreement rates differed between facilities that complied with various coding standards listed in the NACRS Abstracting Manual and those that did not. When investigating the two coding standards regarding the *reason for visit* and *main problem*, the facilities that complied with these standards had significantly higher agreement rates for these specific data.

Higher agreement rates for ICD-10-CA coding were also observed for facilities that followed the practices or procedures listed below. The data in parentheses were most affected by this practice:

- Affording time to coders to review coding standards
- Dedicating some coders to abstract ED visits only (*reason for visit*)
- Always complying with the standards for *main problem* and *reason for visit*
- Having clinical documentation beyond the ED record form for the health record to be considered complete (*reason for visit*)
- Involving the administrative team in documenting the patient's triage (*reason for visit*)
- Producing standard procedures that detail documentation requirements
- Providing formal physician training on chart documentation requirements

2.3 Interventions

The intervention data contained in the patient chart are assigned codes using CCI. Multiple interventions can be coded in the abstract, with one designated as the *main intervention*. CCI codes use both alphabetic and numeric codes to represent interventions in the format N.AA.NN.AA-AA. Data analysis in this section focuses on the extent and causes for the observed discrepancies.^v

Coverage of Interventions

The volume of interventions reabstracted was slightly greater than the volume of interventions that were originally submitted. As observed for the diagnostic data, reabstractors indicated that the data originally submitted did not always contain complete information and that practices have been developed within facilities to address workload demands. For many ED visits, no interventions were originally captured despite their presence in the chart, or the coding of interventions was limited to what was documented in the face sheet. In contrast, over-reporting of selected interventions was also practised at some facilities. Table 2.3-A supports these observations with the reabstraction study results.

Table 2.3-A Number of Interventions Coded for Each Emergency Department Visit in the Original and Reabstracted Data

	Original Data (Percent)	Reabstracted Data (Percent)
No Interventions per Visit	57.4	46.6
One Intervention per Visit	29.5	43.8
Two Interventions per Visit	9.1	7.7
Three or More Interventions per Visit	3.9	1.9

Source: Canadian Institute for Health Information, 2007.

Differences in the inclusion and exclusion of interventions were partly explained by the role of the ambulatory care grouping methodology (CACS—Comprehensive Ambulatory Classification System). At a minimum, coders are to report all intervention codes that are currently utilized in the CACS grouping methodology. Where coders are not familiar with what is included in the CACS grouping methodology, it is difficult for them to include and exclude the appropriate interventions.

Agreement rates on the presence of an intervention in the inter-rater reliability study were significantly higher than in the reabstraction study (66.5% compared to 54.1%). Despite the differences between the two studies, the agreement in the inter-rater reliability study is relatively low in comparison to the rate observed for the diagnostic data. The requirement to capture all interventions used in the CACS grouping methodology was not well understood or not easy to apply during data capture by both original coder and reabstractor.

Information from the hospital questionnaire indicated that facilities reporting that they required clinical documentation beyond the ED record form for the health record to be considered “complete” had higher agreement than facilities that required the ED record form only.

v. The following *other interventions* are out of scope for this analysis: IV insertion, drug administration, urinary catheter insertion, blood and/or urine specimen collection and allied health interventions associated with multiple contact records.

Selecting Main Intervention

The *main intervention* is the one procedure or intervention performed that is considered by the provider(s) to be the most clinically significant during the patient's ED visit. Table 2.3-B shows the agreement rates in the selection of *main intervention* in both the reabstraction and inter-rater reliability studies. Reabstractors were able to achieve a higher agreement rate in the inter-rater reliability study with the information in the chart or in the existing coding standards.

Table 2.3-B Agreement in the Selection of *Main Intervention* During the Emergency Department Visit

	Reabstraction Study (Percent)	Inter-Rater Reliability Study (Percent)
Selection of <i>Main Intervention</i>	80.9 ± 2.1	87.8 ± 3.7

Source: Canadian Institute for Health Information, 2007.

The following are observations made by reabstractors during field collection or are findings in the analysis of the collected data:

- Most discrepancies observed for *main intervention* between the original coder and reabstractor were differences in the sequencing of interventions for a visit, when multiple interventions were performed. That is, the study found inconsistencies in selecting one *main intervention* for patients who received multiple significant treatments.
- Reabstractors asserted that the term “clinically significant” in the definition of *main intervention* implies some relationship to the *main problem*. This was particularly noted for cases with a clearly stated *main problem* with multiple interventions that appeared to be of equal importance to the patient.

CCI Coding

The CCI coding accuracy was studied for interventions that were present in both the original and reabstracted data. Analysis assessed the coding accuracy of all interventions, and also assessed the coding of *main intervention* specifically.

As illustrated in Table 2.3-C, original and reabstracted CCI codes matched exactly for 90.4% of the interventions, with another 3.1% matching at the rubric level. Most interventions that did not match at the rubric level still matched in the type of procedure performed. Further investigation of the reabstraction study data found that the CCI codes that were present in high volumes were generally reabstracted with higher agreement than those that were present less frequently.

Table 2.3-C CCI Code Comparisons From the Reabstraction Study

	Format	Intervention Codes (Percent)	<i>Main Intervention</i> (Percent)
Exact Code Match	N.AA.NN.AA-AA	90.4	72.2
Rubric Match Only	N.AA.NN.^-^^	3.1	2.9
Procedure Match Only	N.^-NN.^-^^	4.2	5.9
Exact Block Match Only	N.AA.^-^^-^^	0.8	1.2
General Block Match Only	N.A.^-^^-^^-^^	0.2	0.4
Different		1.4	17.5

Source: Canadian Institute for Health Information, 2007.

The code describing the *main intervention* matched between the original coder and reabstractor for 72.2% of the visits. As shown earlier in Table 2.3-B, a considerable proportion of visits had different conditions reabstracted as the *main intervention*. This, rather than the CCI code selection, contributed to most of these discrepancies.

Table 2.3-D shows the CCI match rates for interventions in the inter-rater reliability study (89.8%) and reabstraction study (90.4%). The similar rates in the two studies indicate that both original coder and reabstractor experienced similar limitations that affected their ability to abstract or code consistently. For example, intervention code agreement rates in both studies were lowest for patients who died. In the reabstraction study, reabstractors attributed two-thirds of these discrepancies with the original data to non-compliance with the codebook directives in the Folio product. Given the high use of this discrepancy reason and the similar outcome in CCI code agreement rates between the two studies, it seems that there are instances where conflicting interpretations of the codebook directives exist, which are affecting the consistency in CCI code assignment.

Table 2.3-D Exact CCI Code Match Rates in the Reabstraction and Inter-Rater Reliability Studies

	Reabstraction Study (Percent)	Inter-Rater Reliability Study (Percent)
CCI Coding of Interventions	90.4 ± 1.8	89.8 ± 1.7
CCI Coding of <i>Main Intervention</i>	72.2 ± 2.7	77.8 ± 4.8

Source: Canadian Institute for Health Information, 2007.

The inter-rater reliability agreement rate for *main intervention* was 77.8%, significantly higher than the 72.2% agreement rate observed in the reabstraction study. The key difference between the two studies was in the proportion of ED visits where the code describing the *main intervention* was completely different. In the reabstraction study, 17.5% of the ED visits had original and reabstracted CCI codes for *main intervention* that were completely different (see Table 2.2-C). The equivalent figure in the inter-rater reliability study was much lower, half the number of visits, at 8.9%. This again highlights that the selection of *which* intervention to designate as the *main intervention* was more consistently performed between reabstractors.

Higher agreement rates for CCI coding were also observed for facilities that followed the practices or procedures listed below. The data in parentheses were most affected by this practice:

- Affording time to coders to review coding standards
- Dedicating some coders to abstract ED visits only (*main intervention*)
- Developing facility-specific guidelines (these guidelines appear to further clarify the directives provided by CIHI for *main intervention*)
- Producing standard procedures that detail documentation requirements (*main intervention*)
- Providing formal physician training on chart documentation requirements (*main intervention*)

2.4 CACS Grouping Methodology

CIHI's grouping methodologies produce output variables that enable aggregation of patient data into clinically similar and cost-homogeneous groups. These provide national indicators for reporting resource utilization. The grouping methodology used with the 2004–2005 NACRS was the Comprehensive Ambulatory Classification System (CACS) 2003, v2. One of the applications of this grouping methodology is the adjustment for different patient types. This is achieved by applying cost weights to each type of patient.

The *main intervention* plays a key role in the CACS grouping methodology. CACS cells are assigned to one of four grouper components based on the initial decisions that rely on *main intervention*: day procedure, rehabilitation, mental health and diagnosis-driven. In addition to the CACS cells, there is a higher level of aggregation, called "Major Ambulatory Clusters." The Major Ambulatory Cluster is assigned to a visit based on the *main problem* captured on the abstract.

The following summarizes the reabstraction study findings for the three grouping methodology variables that were studied:

- An estimated 12.4% of the “diagnosis-driven” ED visits changed assignment in Major Ambulatory Cluster upon reabstraction. These changes were the result of reabstractors selecting different conditions as the *main problem* from what had been originally assigned.
- An estimated 33.9% of the “day procedure group” and 26.3% of the “diagnosis-driven” ED visits changed CACS cell assignment upon reabstraction. CACS cells within the “day procedure group” component are assigned based on the *main intervention* code. Many of the discrepancies for the “day procedure group” visits resulted in the CACS cell changing to one that belongs to the “diagnosis-driven” component of the CACS methodology.
- The percent net change in **Ambulatory Cost Weight** upon reabstraction was 9.8% for the “day procedure group” and +9.5% for the “diagnosis-driven” ED visits. A negative net change for “day procedure group” visits indicates that reabstracted data tended to group to a lower cost weight than the original data. This is consistent with the findings that some of these visits were reabstracted to a “diagnosis-driven” component, which generated much lower cost weights. The increase in cost weights for “diagnosis-driven” visits is consistent with the findings that some of these were reabstracted to a “day procedure group.” Discrepancies also occurred for some visits with the same original and reabstracted CACS cell and Major Ambulatory Cluster.

For all the findings listed above, significantly higher agreement rates were observed in the inter-rater reliability study. These different outcomes between the two studies are largely driven by the higher consistency amongst the reabstractors in coding *main problem* and *main intervention*.