

Hospital e-Scorecard Report 2008: Complex Continuing Care

Clinical Utilization and Outcomes Technical Summary

June 2008

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Purpose of this Document

This Technical Summary provides details of the methodology used to calculate the indicators for the Clinical Utilization and Outcomes quadrant of the *Hospital e-Scorecard Report 2008: Complex Continuing Care* (referred to as “e-Scorecard” in this document).

Overview

The thirteen indicators for the Clinical Utilization and Outcomes quadrant for the Complex Continuing Care (CCC-CUO) sector remain unchanged from last year. The e-Scorecard 2008 indicators are calculated using 2006-2007 data from the Continuing Care Reporting System (CCRS).

Indicators are reported at site and hospital-specific levels for participating hospitals only. LHIN and provincial level results are also available and are based on all hospitals within each jurisdiction (irrespective of whether they are participating at the hospital level). Sex-stratified results are also provided at each level.

It should be noted that all of the e-Scorecard indicators are now being used in the 2008-2009 Hospital Annual Planning Submission (HAPS) / Hospital Accountability Agreement (HAA) process. CIHI regularly provides preliminary indicators values to the Joint Policy and Planning Committee (JPPC) and the Ministry of Health and Long Term Care (MOHLTC). These results were based on the Hospital Report methodology. The e-Scorecard indicators will be based on more recent data, the official 2006-2007 CCRS data cut, taken on September 1, 2007.

Description of Data & Data Sources

The Complex Continuing Care Clinical Utilization and Outcomes (CCC-CUO) indicators in the e-Scorecard 2008 were derived from data submitted to the Continuing Care Reporting System (CCRS) maintained at the Canadian Institute for Health Information (CIHI).

The e-Scorecard 2008 is based on fiscal year 2006-2007 data (April 1st 2006 to March 31st 2007). The indicators were calculated using the official 2006-2007 CCRS data cut, taken on September 1, 2007. This data cut includes late submissions of records for the fiscal year 2006-2007, therefore it is more comprehensive. The data from April 1st 2007 onward are not included in the calculation of the 2006-2007 indicators.

These data are collected using the RAI-MDS 2.0© assessment instrument by trained clinicians, in all complex continuing care facilities in Ontario. These data have been used in previous reports on health care performance, and form the basis for many journal articles. The data undergo extensive edit checks to improve accuracy, but all errors cannot be eliminated. It is important to recognize the limitations of the measures of utilization and outcomes; they will only be as accurate as the data sources on which they are based. However, using these data to produce comparative performance information should lead to refinements and improvements in data quality over time.

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The CCRS is a longitudinal database, and CIHI receives multiple records for an individual patient over the course of their stay(s) in a CCC facility. Administrative information is captured each time a patient enters or leaves a CCC facility (through Admission Background, Re-entry and Discharge Tracking Forms). These data were used to calculate the number of patients in the facility, the admissions and discharges provided in the verification packages and are also used to determine whether a patient is a “short-stay” or a “chronic” patient (described in more detail in the Defining Patient Populations section).

The CCC-CUO clinical indicators are calculated from data collected in the RAI-MDS 2.0© assessment: an assessment is mandatory for every patient who stays 14 days or more in a facility and then on a quarterly basis or if there is a significant change in status. In addition, some patients who stay less than 14 days also receive a single RAI-MDS 2.0© assessment.

Due to the timing of RAI-MDS 2.0© assessments and the indicator definitions, patients generally must have been in a CCC facility for at least 100 days to be included in the calculation of twelve of the thirteen indicators in this quadrant. Any patients without any RAI-MDS 2.0© assessments are excluded from all of the clinical indicators.

The clinical indicators have been split into three categories:

- Prevalence Indicators for Chronic Patients (5 indicators)
- Incidence Indicators for Chronic Patients (7 indicators)
- Prevalence Indicator for Short-Stay Patients (1 indicator)

The sections below describe how the patients are categorized as either “chronic” or “short-stay” and a brief description of how to identify which assessments to use in the calculation of each of these types of indicator.

The indicator definitions are described in terms of how the data are collected on the RAI-MDS 2.0© forms. Definitions for the numerator and denominator are provided. To be included in the numerator, the assessments must meet the definitions for both the numerator and denominator.

Depending on their length of stay, patients could have up to four assessments that could be used in the calculation of each of the 12 “chronic” indicators.

For multi-site hospitals, the results are provided on a site-specific basis. Both site-specific and hospital level information will be available in e-Scorecard.

To protect patient confidentiality, indicators in e-Scorecard with a sample size of five or less result in indicator suppression except in cases where the indicator's numerator is 0 and the sample size is six or greater. In this case, the indicator is shown as 0.

Indicator Selection

The clinical utilization and outcome indicators for the 2008 e-Scorecard were originally presented in Hospital Report 2003: Complex Continuing Care. For details about the development of many of these indicators and ongoing research in this area, please consult the website of the “MegaQI project” (final report at <http://www.interrai.org/applications/qireport2.pdf>), sponsored by the Centers for Medicare and Medicaid Services, of the federal government of the USA (<http://www.cms.hhs.gov/NursingHomeQualityInits/>). Details of the methods and findings of that research can be found in several documents on that website and much of it can also be found in the scientific literature.

An important component of the MegaQI project was an extensive project undertaken to evaluate the validity of the clinical performance indicators based on the RAI-Minimum Data Set (MDS) data. In that study, hypotheses were developed concerning the correlation of the indicators to various validation elements. The validation elements included structures, processes or actions that, according to the hypotheses, facilities would use to prevent or respond to the clinical issues addressed in an indicator. For example, to validate a pressure ulcer indicator, hypotheses predicted correlations to such validation elements as use of skin breakdown risk screening, use of skin treatment protocols and programs to implement and monitor individualized prevention interventions. The validation elements were measured by means of direct observation, management surveys, and medical record reviews. The study also involved an extensive examination of the inter-rater reliability of items used in calculation of the indicators, comparing assessments by a research nurse to those routinely conducted by staff nurses. The study involved over 200 long-term care facilities in six states in the USA.

Data Cleaning and Preparation

Several data cleaning and preparation steps are taken before any calculations are done. The CCRS contains multiple records for each patient. The data cleaning criteria listed below have resulted in excluding all data for patients meeting the exclusion criteria below. In other cases, we may only exclude a single assessment.

Please see the Indicator Definitions section for further inclusion and exclusion criteria used in the calculation of each of the individual indicators.

Patient level inclusion criteria – patients must meet all of these conditions for any of their data to be included:

- A valid Ontario health card number (AA5b = “ON”)
- Active in 2006-2007
 - a. Admission/Re-entry Date between April 1, 2006 and March 31, 2007
 - b. Admission/Re-entry Date < April 1, 2006 and (Discharge Date is blank or Discharge Date <= March 31, 2007)

Patient level exclusion criteria – all patient data were excluded if any one of the conditions were met:

- Unassessed patients with no activity since July 1, 2002 i.e. Admission date < July 1, 2002 and patient has no assessment or discharge after July 1, 2002;
- Patients with no full assessments.

Assessment inclusion criteria – individual assessment records were included in the analysis dataset if the condition was met:

- The assessment was the last assessment for a patient in a fiscal quarter.

Assessment exclusion criteria – individual assessment records were excluded from the analysis dataset if any one of the following conditions were met:

- The Assessment Reference Date (A3) was before the Admission or Re-Entry Date;
- The Assessment Reference Date (A3) was before Birth Date (AA3a);
- If the first assessment for a patient was a quarterly assessment (AA8 = 5);
- If the assessment was a quarterly assessment and was carried out on the same day as a full assessment (AA8 = 1 to 4);
- If the assessment was a quarterly assessment and the patient did not have any prior full assessments;
- If the assessment was a quarterly assessment and the assessment date was more than 300 days from the previous assessment.

Definition of Patient Populations

For the purposes of the e-Scorecard, patients in CCC are classified into two broad groups: “chronic” and “short-stay” patients. The paragraphs below provide the criteria for each of these groups and Appendix A provides some examples of how different sequences of CCRS records that can be received meet the various criteria.

Chronic Patients

Twelve of the thirteen indicators are calculated for chronic patients: these patients generally must have been in a CCC facility for at least 100 days and must have had at least two assessments (at least one of them in fiscal 2006-2007) to be eligible for inclusion in these indicators, which are designed to measure outcomes of care during their CCC stay.

Specifically, a patient is classified as chronic if:

1. The patient had at least two RAI-MDS 2.0© assessments, one in each of two continuous fiscal quarters; or
2. The patient had at least two RAI-MDS 2.0© assessments within five fiscal quarters of each other and has had at least one RAI-MDS 2.0© assessment completed more than 80 days after an entry to the CCC facility.

Short-Stay Patients

The CCC-CUO quadrant has one indicator designed for short-stay patients. Short-stay patients are those who stayed in the CCC facility only long enough to get a single RAI-MDS 2.0© assessment and whose stay was neither preceded nor followed within 90 days by another admission in the same CCC facility.

The short-stay indicator is based on assessments carried out during the 2006 calendar year (i.e. January 1 to December 31, 2006). This is different from the chronic indicators, which are based on the 2006-2007 fiscal year (April 1, 2006 to March 31, 2007). This is to determine whether the patient had a subsequent stay in the facility during the last quarter of the fiscal year and therefore whether or not they met the definition for short-stay.

Therefore, a patient is categorized as a short-stay patient when:

1. The stay was separated by more than 90 days on either side (prior to the admission and after the discharge) from any other stay in the same CCC facility; and
2. The patient has at most a single RAI-MDS 2.0© assessment associated with any given stay, which is an admission full assessment.

If the patient had two stays that arise due to a single “temporary transfer” (i.e. a discharge and subsequent re-entry), these two stays can be treated as a single stay as long as the combined stay adheres to the above two criteria.

Other Patients

There are some patients who received care in a CCC facility that do not meet the criteria for either of these two populations. These patients present at some time during 2006-2007 were mostly patients who were admitted prior to the fiscal year and only stayed for a few days at the beginning of 2006-2007 or those who were admitted in the final few days of 2006-2007. These patients could not be classified as chronic or short-stay patients using the definitions used here, since there was too little information about the patients during 2006-2007 to make a definitive classification.

Clinical Indicators Definitions

The CCC-CUO indicators are calculated from data collected in the RAI-MDS 2.0© assessment: an assessment is mandatory for every patient who stays 14 days or more in a facility and then on a quarterly basis or if there is a significant change in status. In addition, some patients who stay less than 14 days also receive a single RAI-MDS 2.0© assessment. Any patients with no RAI-MDS 2.0© assessments are excluded from all of the indicator calculations.

The definitions listed below are split into three categories:

- Prevalence Indicators for Chronic Patients (5 indicators)
- Incidence Indicators for Chronic Patients (7 indicators)
- Prevalence Indicators for Short-Stay Patients (1 indicator)

The indicator definitions are described in terms of how the data are collected on the RAI-MDS 2.0© forms. It should be noted that the data may be stored in a different format within your system. For example, many of the data elements are in the form of check boxes, which may be stored in your data as 1 if they are checked and 0 or blank if unchecked.

Definitions for the numerator and denominator are provided. To be included in the numerator, the assessments must meet the definitions for both the numerator and denominator.

Both inclusion and exclusion criteria are provided: to be included an assessment record must meet all the inclusion criteria, however the assessment record is excluded if any one of the exclusion criteria is met.

Depending on their length of stay, a patient could have up to four assessments that could contribute to the calculation of each of the 12 “chronic” indicators. In addition to the number of assessments used to calculate the indicator, the verification data include the number of unique patients that had at least one assessment included in the numerator and denominator of each indicator.

Prevalence Indicators for Chronic Patients

For these indicators, RAI-MDS 2.0© assessments for chronic patients were only included if the Assessment Reference Date (A3) was at least 80 days after the Admission or Re-entry Date for the patient stay during which the assessment was completed. This rule was used in order to ensure that the indicator reflects the status of patients only after they have been continuously in the care of the complex continuing care provider for a considerable period of time and thus can be more clearly attributed to care provided in the complex continuing care setting.

Assessment Inclusion Criteria for all Chronic Stay Prevalence Indicators

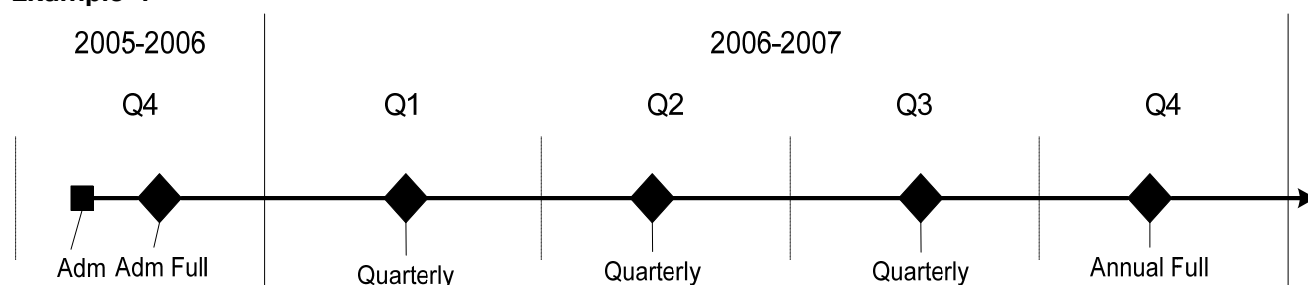
- The assessment was for a Chronic Stay patient;
- The Assessment Date was at least 80 days after the Admission or Re-entry Date for that stay.

Assessment Exclusion Criteria for all Chronic Stay Prevalence Indicators

- The assessment was an admission full assessment (AA8a = 1);
- The assessment was less than 80 days after the Admission or Re-entry Date for that stay.

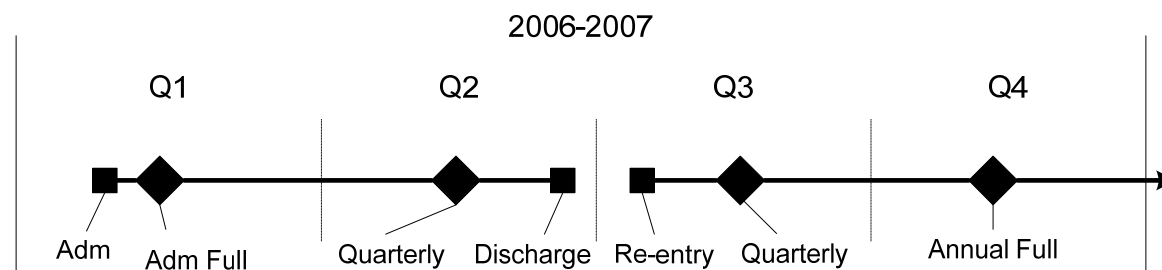
Each assessment is then evaluated to see if it meets the specific criteria for the numerator and denominator for each indicator.

Example 1



In this example, each of the assessments in 2006-2007 for this chronic patient meets the inclusion criteria for the Chronic Prevalence Indicators (the quarter 1 assessment is carried out 90-92 days after the admission full assessment and is therefore more than 80 days after the admission). This patient will therefore contribute up to four assessments to each of the prevalence indicators.

Example 2



In this example, the chronic patient has four assessments in the 2006-2007 fiscal year but only two assessments meet the criteria for the prevalence indicators: from the second and fourth quarters. The assessment in the first quarter is an admission full assessment and the quarterly assessment in the third quarter is less than 80 days after the Re-entry Date for that stay.

Catheter & Continence Indicators

Presence of Indwelling Catheter

Description	This process indicator can be interpreted as an estimate of the percentage of CCC patients who had an indwelling urinary catheter in place during at least part of a typical 90-day period in the fiscal year. Lower values on this indicator are expected to reflect better performance.
HAA Indicator	2008-2009 Monitoring Indicator
Denominator	INCLUDE all assessments for chronic patients in fiscal 2006-2007 that meet general inclusion/exclusion criteria for prevalence indicators.

	<p>EXCLUDE if any of the following apply:</p> <ul style="list-style-type: none"> • H3d is missing; • J5c is checked or missing; • P1ao is checked or missing.
Numerator	INCLUDE if H3d is checked on the assessment.

Clinical Complexity Indicators

Presence of Disruptive or Severe Pain

Description	<p>This outcome indicator can be interpreted as an estimate of the percentage of CCC patients in a typical 90-day period who had moderate pain on a daily basis or severe/excruciating pain at any time. Moderate pain is defined as a level of pain that is sufficiently severe to significantly limit a patient's participation in desired activities and daily routines. Lower values on this indicator are expected to reflect better performance.</p>
HAA Indicator	2008-2009 Monitoring Indicator
Denominator	<p>INCLUDE all assessments for chronic patients in fiscal 2006-2007 that meet general inclusion/exclusion criteria for prevalence indicators.</p> <p>EXCLUDE if any of the following apply:</p> <ul style="list-style-type: none"> • Either J2a or J2b is missing; • J2a and J2b have values that are inconsistent with each other (i.e. J2a=0 and J2b is not missing).
Numerator	INCLUDE if (J2b = 2 and J2a = 2) or (J2b = 3 and J2a = 1 or 2).

Presence of Pressure Sores

Description	<p>This outcome indicator can be interpreted as an estimate of the percentage of CCC patients in a typical 90-day period who had a pressure ulcer at any stage of development. Lower values on this indicator are expected to reflect better performance.</p>
HAA Indicator	2008-2009 Monitoring Indicator
Denominator	<p>INCLUDE all assessments for chronic patients in fiscal 2006-2007 that meet general inclusion/exclusion criteria for prevalence indicators.</p> <p>EXCLUDE if the following apply:</p>

	<ul style="list-style-type: none"> M2a is missing.
Numerator	INCLUDE if M2a > 0.

Presence of Patients in Daily Physical Restraints

Description	This process indicator can be interpreted as an estimate of the percentage of CCC patients who were physically restrained, according to the RAI-MDS 2.0© definition, on a daily basis during a typical 90-day period. Lower values on this indicator are expected to reflect better performance.
HAA Indicator	2008-2009 Monitoring Indicator
Denominator	<p>INCLUDE all assessments for chronic patients in fiscal 2006-2007 that meet general inclusion/exclusion criteria for prevalence indicators.</p> <p>EXCLUDE if the following apply:</p> <ul style="list-style-type: none"> All of P4c, P4d, P4e ≠ 2 and any of P4c, P4d or P4e is missing.
Numerator	INCLUDE if P4c = 2 or P4d = 2 or P4e = 2.

Drug Indicators

Use of Antipsychotic Medication without a Diagnosis of Psychosis

Description	This process indicator can be interpreted as an estimate of the percentage of CCC patients who received antipsychotic medication without a diagnosis of a psychotic condition as indicated on the RAI-MDS, in a typical 90-day period. Lower values on this indicator are expected to reflect better performance.
HAA Indicator	2008-2009 Monitoring Indicator
Denominator	<p>INCLUDE all assessments for chronic patients in fiscal 2006-2007 that meet general inclusion/exclusion criteria for prevalence indicators.</p> <p>EXCLUDE if any of the following apply:</p> <ul style="list-style-type: none"> If the assessment is a full assessment and I1ii is checked or missing; If the assessment is a quarterly assessment and I1ii is checked or missing on the most recent full assessment; J1i is checked or missing;

	<ul style="list-style-type: none"> • O4a is missing; • J5c is checked or missing; • P1ao is checked or missing.
Numerator	INCLUDE if O4a > 0.

Incidence Indicators for Chronic Patients

The “incidence”-type indicators are meant to reflect change in status from one fiscal quarter to the next (over an approximately 90 day period). Assessments of chronic patients will typically be completed 90-92 days apart. However, due to transfers out of the facility, sudden changes in patient status (leading to a “significant change” assessment), assessor error, or other events that disrupt the assessment schedule, the interval between assessments in contiguous fiscal quarters is not always at that optimal spacing. In order to ensure that the indicators reflect change over a reasonably consistent risk period between measurements, the assessments must be within 45 to 165 days apart. (This rule was developed during the MegaQI study to include a maximal number of patients and adopted by the Hospital Report to maintain consistency with the indicator calculation methodology being applied in the USA.)

Assessment Inclusion Criteria for all Chronic Stay Incidence Indicators

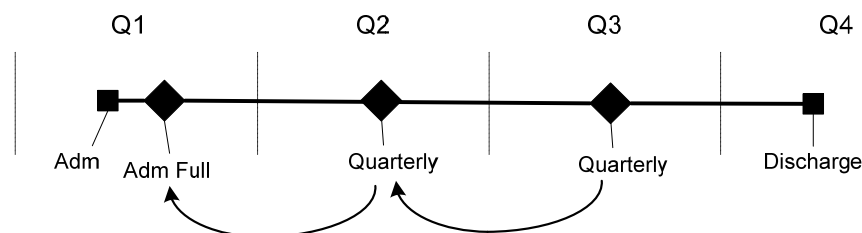
- The assessment is for a chronic stay patient;
- There is a prior assessment that was completed 45 to 165 days earlier (with which to compare against).

Assessment Exclusion Criteria for all Chronic Stay Incidence Indicators

- The assessment is more than 165 days after the previous assessment;
- The assessment is less than 45 days after the previous assessment.

The eligible assessments are then evaluated to see if they meet the specific criteria for the numerator and denominator for each indicator. The two assessments used to calculate the incidence indicator are referred to as the “target” assessment and the “prior” assessment (see example below).

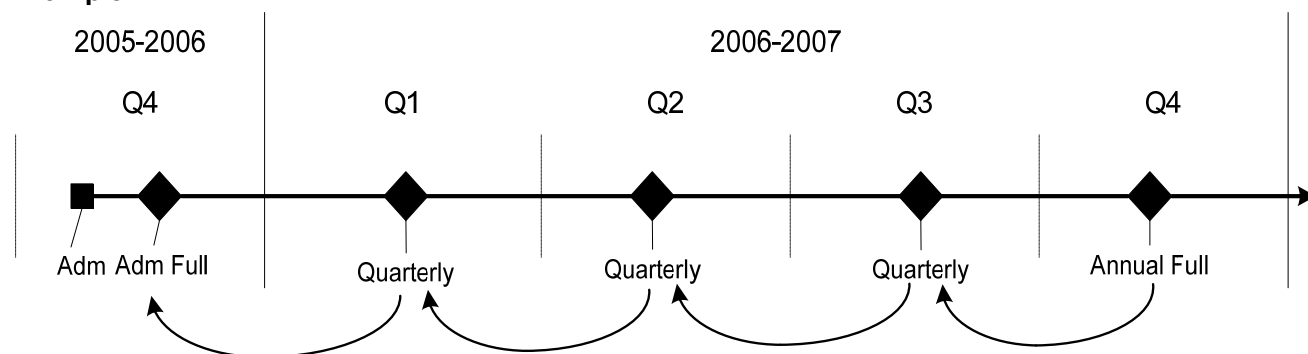
Example 3



In this example the two quarterly assessments meet the inclusion criteria: the quarter 2 assessment is compared against the admission full assessment and the quarter 3 assessment is compared against the quarter 2 assessment. In this example, the quarter 2 assessment is both a target assessment (which is compared against the “prior” admission

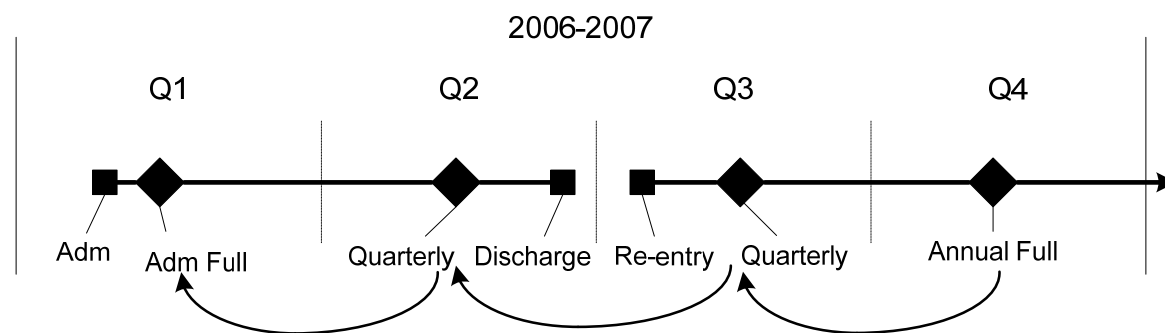
full assessment) and a “prior” assessment that is used to compare the quarter 3 “target” assessment against.

Example 4



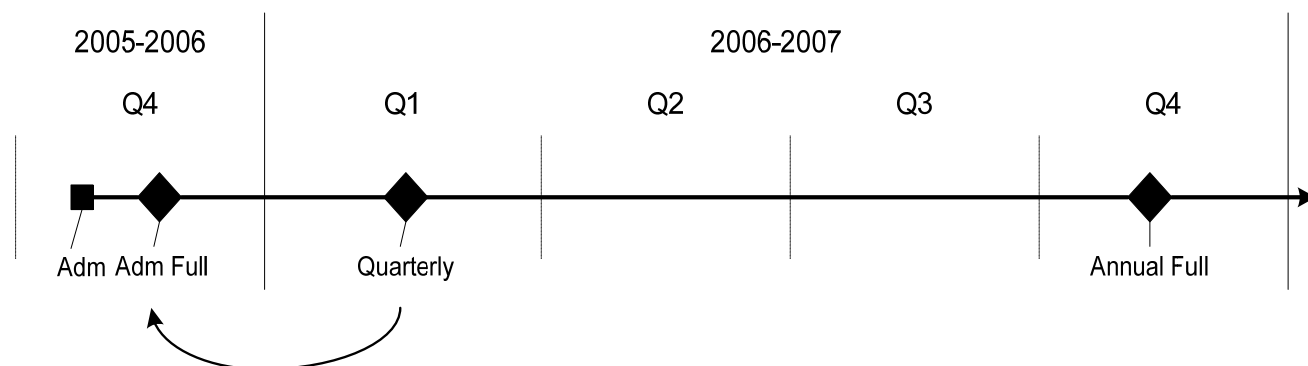
In this example (same patient as in Example 1), each of the assessments in 2006-2007 for this chronic patient was carried out on time (90-92 days apart) and therefore they meet the inclusion criteria for the Chronic Stay Incidence Indicators. The quarterly assessment in quarter 1 is compared against admission full assessment; the quarter 2 assessment against the quarter 1 assessment; and so on. This patient would therefore contribute up to four times to each of the incidence indicators.

Example 5



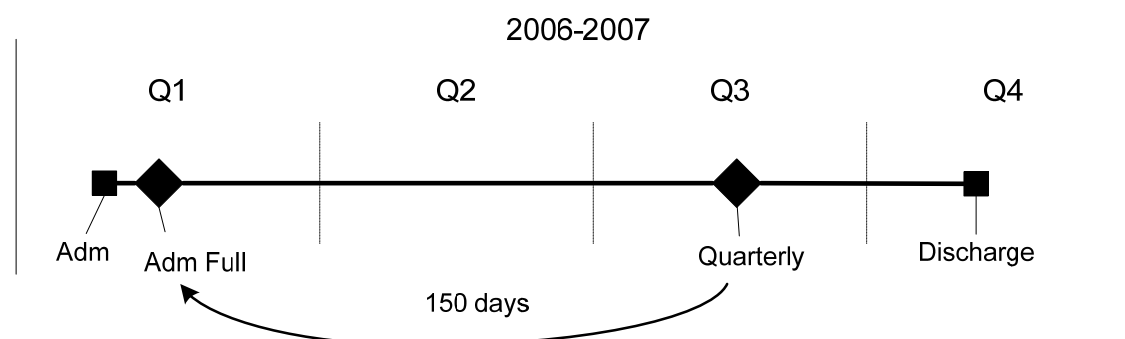
In this example (same patient as in Example 2), the patient has four assessments in 2006-2007 but can contribute up to three times to the incidence indicators. Each of the assessments is carried out 90-92 days apart. Even though the patient has a “temporary transfer” out of the facility between the assessments in quarter 2 and 3, these assessments still meet the criteria for inclusion.

Example 6



In this example, only the quarter 1 assessment meets the criteria for inclusion (compared against the admission full assessment). The quarter 4 assessment is not used because the time between the quarter 1 and quarter 4 assessments is more than 165 days.

Example 7



In this example, even though the assessments are not in continuous quarters they still meet the inclusion criteria for the incidence indicators as the quarter 3 assessment is 150 days after the admission full assessment.

Physical Functioning Indicators

Improvement in Performance of Activities of Daily Living (ADL)

<p>Description</p>	<p>The indicator can be interpreted as an estimate of the percentage of CCC patients considered to have rehabilitation potential, who improved in functional independence over a typical 90-day period during the fiscal year. Higher values on this indicator are expected to reflect better performance.</p> <p>The set of Activities of Daily Living (ADLs) included in this indicator are ones for which chronically ill people tend to lose independence at early, mid, and later stages of functional decline. Taken together, they predict the status of a patient on other ADLs not included in the indicator calculation.</p>
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	This indicator uses the ADL Long-Form Scale (ADL-LF), which is a summative scale comprised of the following RAI-MDS 2.0© items: G1aa, G1ba, G1ea, G1ga, G1ha, G1ia and G1ja. In this calculation, scores of 8 are recoded to 4, prior to the elements being summed together.
HAA Indicator	2008-2009 Monitoring Indicator
Denominator	<p>INCLUDE all assessments for chronic patients in fiscal 2006-2007 that meet general inclusion/exclusion criteria for incidence indicators; and if:</p> <ul style="list-style-type: none"> • Any of G8a, G8b, G8c, G8d is checked on target or prior assessment; • ADL-LF > 0. <p>EXCLUDE if any of the following apply:</p> <ul style="list-style-type: none"> • B1 = 1 or is missing; • J5c = 1 or is missing; • P1ao = 1 or is missing; • None of the indicators of rehabilitation potential (G8a, G8b, G8c or G8d elements) were checked on the target or prior assessment; • Data are missing for any of the items needed for numerator or denominator; • No measurable improvement was possible because ADL-LF = 0 (that is, independent) on the prior assessment.
Numerator	INCLUDE if the ADL-LF on the target assessment is lower compared to the prior assessment (implying improvement).

Decline in Ability to Walk or Wheel

Description	This outcome indicator can be interpreted as an estimate of the percentage of CCC patients who experienced a decline in their level of independence in walking or wheeling (in a wheel chair) in and near their room over a typical 90-day period during the fiscal year. Lower values on this indicator are expected to reflect better performance.
HAA Indicator	2008-2009 Monitoring Indicator
Denominator	<p>INCLUDE all assessments for chronic patients in fiscal 2006-2007 that meet general inclusion/exclusion criteria for incidence indicators; and if:</p> <ul style="list-style-type: none"> • G1eA = 0-3 on the prior assessment.

	<p>EXCLUDE if any of the following apply:</p> <ul style="list-style-type: none"> • Data are missing for any of the items needed for the numerator or denominator; • G1eA = 4 or 8 on the prior assessment; • B1 = 1 or is missing; • J5c = 1 or is missing; • P1ao = 1 or is missing.
Numerator	INCLUDE if G1eA on the target assessment is greater than the score on the prior assessment.

Cognitive and Psychosocial Functioning Indicators

Communication Decline

Description	This outcome indicator can be interpreted as an estimate of the percentage of CCC patients who experienced a decline in their ability to communicate, over a typical 90-day period during the fiscal year. Lower values on this indicator are expected to reflect better performance.
HAA Indicator	2008-2009 Monitoring Indicator
Denominator	<p>INCLUDE all assessments for chronic patients in fiscal 2006-2007 that meet general inclusion/exclusion criteria for incidence indicators.</p> <p>EXCLUDE if any of the following apply:</p> <ul style="list-style-type: none"> • Data are missing for either C4 or C6 on the target assessment; • Data are missing for either C4 or C6 on the prior assessment and $C4 + C6 > 0$ on the target assessment; • C4 = 3 and C6 = 3 on the prior assessment; • B1 = 1 or is missing; • J5c = 1 or is missing; • P1ao = 1 or is missing.
Numerator	INCLUDE if the combined score of C4 and C6 on the target assessment is greater than the score on the prior assessment.

Increase in Depression or Anxiety

Description	<p>This outcome indicator can be interpreted as an estimate of the percentage of CCC patients who showed increased signs of depressed mood or anxiety over a typical 90-day period during the fiscal year. It is important to note that this indicator is not based on a diagnosis of depression or anxiety disorder, and that many items used as signs of depression are also behaviours manifested due to dementia, a common diagnosis in the CCC population. Lower values on this indicator are expected to reflect better performance.</p> <p>This indicator uses the RAI Mood Scale, which is a summative scale of the following RAI-MDS 2.0 items, where each contributes one point:</p> <ul style="list-style-type: none"> • E1a is checked; • E1c is checked; • E1e is checked; • E1f is checked; • E1g is checked; • E1h is checked; • E1m is checked; • E1n is checked; • K4c is checked; • E2 = 2.
HAA Indicator	2008-2009 Monitoring Indicator
Denominator	<p>INCLUDE all assessments for chronic patients in fiscal 2006-2007 that meet general inclusion/exclusion criteria for incidence indicators; and if:</p> <ul style="list-style-type: none"> • Mood Scale score < 10 on prior assessment. <p>EXCLUDE if any of the following apply:</p> <ul style="list-style-type: none"> • Data are missing for any of the items needed for the numerator or denominator on the prior or target assessment. • Mood Scale score = 10 on the prior assessment (the maximum score so no increase in mood problems possible); • B1 = 1 or is missing.
Numerator	INCLUDE if the Mood Scale score on the target assessment is greater than the score on the prior assessment.

Catheter and Continence Indicators

Decrease in Bladder Continence

Description	This outcome indicator can be interpreted as an estimate of the percentage of CCC patients who declined in urinary continence over a typical 90-day period during the fiscal year. Lower values on this indicator are expected to reflect better performance.
HAA Indicator	2008-2009 Monitoring Indicator
Denominator	<p>INCLUDE all assessments for chronic patients in fiscal 2006-2007 that meet general inclusion/exclusion criteria for incidence indicators; and if:</p> <ul style="list-style-type: none"> • H1b < 4 on prior assessment. <p>EXCLUDE if any of the following apply:</p> <ul style="list-style-type: none"> • H1b = 4 on prior assessment (making no decrease possible); • H1b is missing on the target assessment; • H1b is missing on the prior assessment; • B1 = 1 or is missing; • J5c = 1 or is missing; • P1ao = 1 or is missing.
Numerator	INCLUDE if H1b on the target assessment is greater than the score on the prior assessment.

Clinical Complexity Indicators

Patients with New Falls

Description	This outcome indicator can be interpreted as an estimate of the percentage of CCC patients without a recent prior history of falling, who fell during a typical 90-day period during the fiscal year. Lower values on this indicator are expected to reflect better performance.
HAA Indicator	2008-2009 Monitoring Indicator
Denominator	<p>INCLUDE all assessments for chronic patients in fiscal 2006-2007 that meet general inclusion/exclusion criteria for incidence indicators; and if:</p> <ul style="list-style-type: none"> • J4a = 0 on prior assessment. <p>EXCLUDE if any of the following apply:</p>

	<ul style="list-style-type: none"> • J4a = 1 on prior assessment; • J4a is missing on the target assessment; • J4a is missing on the prior assessment.
Numerator	INCLUDE if J4a = 1 on the target assessment.

New Stage 2 or Greater Skin Ulcers

Description	This outcome indicator can be interpreted as an estimate of the percentage of ulcer-free CCC patients who developed stage 2 or greater skin ulcers (of any kind) over a typical 90-day period. Lower values on this indicator are expected to reflect better performance.
HAA Indicator	2008/2009 Performance Indicator
Denominator	<p>INCLUDE all assessments for chronic patients in fiscal 2006-2007 that meet general inclusion/exclusion criteria for incidence indicators; and if:</p> <ul style="list-style-type: none"> • M1b=0 and M1c=0 and M1d=0 on prior assessment. <p>EXCLUDE if any of the following apply:</p> <ul style="list-style-type: none"> • M1b>0 on prior assessment; • M1c>0 on prior assessment; • M1d>0 on prior assessment; • M1b, M1c or M1d is missing on the prior assessment; • M1b, M1c or M1d is missing on the target assessment.
Numerator	<p>INCLUDE if any of the following apply:</p> <ul style="list-style-type: none"> • M1b>0 on the target assessment; • M1c>0 on the target assessment; • M1d>0 on the target assessment.

Prevalence Indicator for Short-Stay Patients

As described earlier, this indicator uses the admission full assessment for those short-stay patients who stayed in the CCC facility only long enough to receive a single assessment. All short-stay patients without an assessment during their stay are excluded.

Short-Stay Patients with Disruptive or Severe Pain

Description	This outcome indicator can be interpreted as an estimate of the percentage of MDS-assessed short-stay patients in a typical 90-day period who experienced moderate pain daily, or severe/excruciating pain at any point, during the seven-day RAI-MDS 2.0© assessment period. Lower values on this indicator are expected to reflect better performance.
HAA Indicator	2008-2009 Monitoring Indicator
Denominator	<p>INCLUDE all assessments for short-stay patients in the 2006 calendar year that meet general inclusion/exclusion criteria.</p> <p>EXCLUDE if any of the following apply:</p> <ul style="list-style-type: none"> • J2a or J2b is missing; • J2a and J2b have values that are inconsistent with each other (J2a=0 and J2b=1-3).
Numerator	INCLUDE if (J2b = 2 and J2a = 2) or (J2b = 3 and J2a = 1 or 2).

Risk Adjustment

A technical description is given here of the mechanics of calculating the risk-adjusted indicator values with only a limited and simplified discussion of the theory behind the process. For further details on the theory, please refer to Section 7 of the document "Identification and Evaluation of Existing Quality Indicators that are Appropriate for Use in Long-Term Care Settings" available at <http://interrai.org/applications/qireport1.pdf>. Please note that all indicators in the e-Scorecard for the CCC-CUO quadrant are risk-adjusted with the exception of two indicators, Presence of Patients in Daily Physical Restraints and Increase in Depression or Anxiety.

The risk-adjusted indicators as calculated for the e-Scorecard are "indirectly standardized" values. In essence, a ratio of the raw (observed) indicator value to the expected indicator value (from a predictive model based on the risk-adjustment covariates) is calculated for each hospital. This ratio can be called the "performance ratio". With the exception of the Improvement in Performance of ADL indicator (this is the only indicator where higher values indicate better performance),

- If the performance ratio (observed/expected indicator values) has a value greater than one (> 1), this indicates that the hospital had poorer performance on the indicator than would be predicted on the basis of the patient characteristics described by the risk-adjustment covariates.
- If the performance ratio has a value less than one (< 1), it indicates that the hospital had better performance on the indicator than would be predicted based on the patient characteristics.

A performance ratio with a value greater than one for the Improvement in Performance of ADL indicates better performance whereas a value less than one indicates poorer performance.

To calculate the risk-adjusted indicator value for a hospital, the performance ratio is multiplied by a "standard" indicator value in common to the population of hospitals for which the risk-adjusted indicator is being calculated. The standard value used in calculating the risk-adjusted indicators for *Hospital e-Scorecard Report 2008: Complex Continuing Care* was the overall provincial expected value, calculated as the average of all hospitals' observed indicator values, weighted by the number of records contributed by each (the "provincial average"). Thus, if a hospital had performed worse than expected based on the risk profile of its patients, the risk-adjusted indicator value would be higher than the standard value (provincial average), because a performance ratio value of greater than one (> 1) would be multiplied by the standard value. If a hospital had better performance than expected, based on the risk profile of its patients, the ratio would be less than one (< 1) and the risk-adjusted indicator value would be less than the provincial average. If a hospital had a raw indicator value equal to the value predicted by the risk-adjustment model, the hospital's adjusted indicator value would be equal to the all hospitals' average. This way, the indicator value reported in e-Scorecard is adjusted to reflect hospitals' performance relative to the different risk profiles of their patient populations.

The description above describes the essence of the process of how the risk-adjusted indicators were calculated. Unfortunately the actual process is not quite as direct as that

because extreme values of the performance ratio, when multiplied by the all hospitals' average indicator value, may result in adjusted indicator values greater than one (or greater than 100%, if expressed as a percentage). For this reason, the calculation described above is done on a transformed scale that will not permit values of the risk-adjusted indicator score to exceed one (or 100%). For the e-Scorecard, we used the Probit transformation and calculated the risk-adjusted indicator in terms of values of the Normal distribution (Z-scores), then transformed back the result to obtain the final risk-adjusted indicator value.

In *Hospital e-Scorecard Report 2008: Complex Continuing Care* indicators in all of the balanced scorecard quadrants were calculated and reported at the hospital level. This level of analysis and reporting could be achieved across all quadrants, given that many multi-site hospitals report financial data to the Ontario Ministry of Health and Long-Term Care at the hospital level, not all multi-site hospitals have site-specific reporting numbers for their clinical (MDS) data, and the data for the other two quadrants were generally collected at the hospital level. Therefore, when different sites of multi-site hospitals have separate facility numbers in the CCRS database, we combine the data from all sites under a single hospital identifier in order to calculate the clinical indicators at the hospital-level.

The following details the steps required to calculate risk-adjusted Clinical Utilization and Outcomes (CUO) quadrant indicator values for a given fiscal year. In order to simplify the description, the calculation of risk-adjusted indicator values for 2006-2007 is given as an example.

- Steps 1 to 8 relate to the development and analyses of a MDS record-level database.
 - Steps 9 and 10 involve analyses of data in the record-level database to create a hospital-level database.
 - Steps 11 to 13 involve analyses within the hospital-level database.
1. Create an analytical database containing all MDS records from fiscal years 2005-2006 through 2006-2007 after all data cleaning rules are applied.
 2. Each record should contain:
 - a. all the relevant MDS items needed for indicator calculation and risk-adjustment covariates;
 - b. the carried forward values for MDS items that are needed for the risk-adjustment covariates or for indicator calculation from the MDS assessment immediately prior to each MDS assessment in fiscal years 2005-2006 and 2006-2007. (If the prior MDS assessment is a quarterly assessment and the needed item is not found in quarterly assessments, it is carried forward from the most recent prior full assessment). These carried forward MDS items are held in a record as new variables (named with the prefix "pre" before the item name).
 3. Keep for further analysis only one record (the last) per patient in each fiscal quarter in the dataset. (In relatively rare instances individual patients have more than one assessment in a fiscal quarter. This step ensures that only one record per patient per fiscal quarter is included in the indicator calculations.)
 4. Use indicator definition algorithms to determine for each MDS assessment record in the

analysis dataset whether the record will be counted in the numerator, denominator or both for the CUO indicator. The indicator definition algorithms can be found in Appendix F of Hospital Report 2003: Complex Continuing Care (available at <http://www.hospitalreport.ca/>). At this point all records will have the following:

- a. the raw MDS data specified in 2a and 2b above, plus
 - b. two (2) binary variables for each clinical indicator; one indicating whether or not the record is counted in the numerator, the other indicating whether or not the record is counted in the denominator. These will be called the numerator and denominator “counter” variables. They have values of zero (0) or one (1).
5. Calculate the risk-adjustment covariates for each record, using the MDS items carried forward from the previous (or prior full) assessments. Algorithms defining the covariates used for each indicator are given in Appendix F of Hospital Report 2003: Complex Continuing Care (available at <http://www.hospitalreport.ca/>).
 6. For developing the risk-adjustment models, select one record per patient from the fiscal year prior to the year for which we are calculating risk-adjusted indicators (In this case, we were calculating indicators based on the fiscal year 2006-2007 data, so risk-adjustment models were based on records selected from the 2005-2006 data). If an individual patient has more than one MDS record in the year, use random selection to select only one record.
 7. Run an ordinary logistic regression model with the selected records from 2005-2006, regressing the binomial outcome variable (which indicates whether or not that record is counted or is not counted in the indicator numerator) on the risk-adjustment covariates.
 8. Calculate a predicted numerator counter variable for each record in 2006-2007 (the target year) by “plugging in” the values of the risk-adjustment covariates from the target year MDS records into the logistic regression model equation derived from the previous year’s data (step 7). The predicted numerator counter variable can be any value between zero (0) and one (1).

That is, the regression parameters from step 7 are multiplied by their respective covariate values in the 2006/2007 records and are summed to obtain the logit of the predicted status of the record with respect to the numerator of the clinical indicator. The logit is then transformed to a proportion (value between zero and one).

9. Calculate the observed indicator value for each hospital in 2006-2007:
 - a. Calculate the numerator = sum of the numerator counter variable across all records for that hospital in the year.
 - b. Calculate the denominator = sum of the denominator counter variable across all records for that hospital in the year.
 - c. Divide numerator by denominator.
 - d. Save the observed indicator value in a hospital-level data file
10. Calculate the predicted (expected) indicator value for each hospital in 2006-2007:
 - a. Numerator = average of the predicted numerator counter variable values (from step 8) across all records for that hospital in the year
 - b. Denominator = sum of the denominator counter variable (which has value of one for all records having a valid value in the predicted numerator counter) across all

- records for that hospital in the year.
- c. Divide numerator by denominator.
 - d. Save the predicted (expected) indicator value in the hospital-level data file
11. Calculate the standard indicator value as the weighted average of all hospitals' observed indicator values. Technically, this is done by summing the numerator counter variable (from Step 4) across all MDS assessment records in the dataset and then dividing by the total number of assessments. Assign this value to all records of the hospital-level data file.
 12. Apply the Probit transformation to the observed (9d), expected (10d) and standard (11) indicator values.
 13. Calculate the adjusted indicator for each hospital as follows:
 - a. $\text{Probit (adjusted)} = \text{Probit (observed)} - \text{Probit (expected)} + \text{Probit (standard)}$
 - b. Calculate the risk-adjusted indicator value by back-transforming the Probit (adjusted) to get a proportion value again. The Probit (adjusted) is a value of the Z distribution (standard Normal). The back-transformation involves identifying the total proportion of the Normal distribution under the curve at a Z-value equal to Probit (adjusted).
 - c. Where the observed indicator value = zero, the risk-adjusted indicator value is set to = zero (0). Where the observed indicator value = one, the adjusted value is set to = one (1).

Risk Adjustment Covariates

The definitions for the covariates used in risk-adjustment models are given in Appendix F of Hospital Report 2003: Complex Continuing Care. The following erratum for that table is noted here:

The following covariate was listed in that Appendix but not defined:

Indicator: Percent of Chronic Patients with New Stage 2 or Greater Skin Ulcers

Covariate: Dependence in transfers

Definition: Covariate = 1 if MDS item G1bA = 3, 4, or 8

Covariate = 0 if G1bA = 0, 1, or 2

Goodness of Fit of Risk-Adjusted Regression Models

Statistics on the goodness of fit and predictive accuracy of the logistic regression models were used in risk adjustment for each risk-adjusted indicator.

Performance Allocation

In *Hospital e-Scorecard Report 2008: Complex Continuing Care*, three levels of shading determine whether a hospital's performance on each indicator was above average, average or below average. Hospitals had to have an effective sample size of at least 30 to be included in the performance allocation process. Only hospitals that volunteered to participate in the e-Scorecard were included in the hospital-specific reporting. However, data from all hospitals with MDS data available in the CCRS, except for hospitals with data quality issues, were used to calculate the provincial average used in the calculation of the risk-adjusted indicators and to which hospitals' performance was compared. There was

one hospital excluded from provincial and LHIN average calculations for all indicators because this hospital was out-of-scope. Also, one hospital was excluded from provincial and LHIN averages for two of the thirteen indicators due to data quality concerns. There was one hospital that had sites in two different LHIN regions. The site-level and LHIN level results were calculated based on the LHIN of each patient (no re-coding was done). When hospital-level results were calculated by LHIN for this hospital, the number of patients in each LHIN was calculated and the LHIN with the greatest number of patients from that hospital was chosen so that there was only one LHIN associated with each hospital. During fiscal year 2006-2007, there were administrative changes to CCC sites that affected e-Scorecard. If a site merged with another site or hospital during the year and therefore took on a new name, the data before the merger took place were reported under the old name and the data from the effective date of the merger onwards were reported under the new name.

Effective Sample Size

In order to maximize sample size and precision of the indicator estimates, the indicator denominator was based on all available MDS assessment records for each patient during a given fiscal year, up to a maximum of four per patient (one per fiscal quarter). This produces an annualized indicator value that is the same as a weighted average of indicator values calculated separately for each fiscal quarter. (Recall that the MDS assessment is generally done once per quarter on all patients.) Indicators based on MDS data were calculated this way in *Hospital e-Scorecard Report 2008: Complex Continuing Care* and in other reports published by the Canadian Institute for Health Information.

The effective sample size (ESS) was the sample size used in calculating the confidence interval for an indicator. It was not always the same as the denominator used to calculate the indicator; for some indicators it was a smaller value. Statistical theory and formulae for the calculation of confidence intervals assume that each observation in the sample is independent of the others. However, since multiple observations from individual patients are included in the calculation of an indicator, the assumption of independence may not hold because an individual's status on the indicator may be similar across their multiple observations. Therefore, determination of the ESS for a given indicator was based on consideration of the degree of independence among the multiple observations on individuals. Independence of observations was measured by the correlation of the indicator status (that is, correlation of the numerator counter variable) between observations of individual patients.

For the "prevalence-type" indicators for chronic patients the correlation of the indicator status variable between observations (MDS assessments) within individuals was generally strong (rho in the range of 0.6 to 0.8). For the "incidence-type" indicators the correlation between separate observations of a patients' status on the indicator was weak or non-existent (rho less than 0.15). On the basis of this analysis, the multiple observations for individuals could not be considered independent of each other for the prevalence-type indicators, but could be considered independent for the incidence-type indicators. Therefore, the number of observations to use in the formula to calculate confidence intervals (the ESS) was as follows:

- For prevalence-type indicators: the count of patients included in the indicator

calculation;

- For incidence-type indicators: the actual indicator denominator (number of MDS assessment records)

Assigning Performance Classifications

Two criteria were used to assess each hospital's performance relative to the other hospitals on each indicator. First, a determination was made of whether or not the hospital's indicator value was statistically different from the provincial average. If a hospital's indicator value was statistically different than the provincial average in the direction that is considered better performance (i.e., lower values than average value, except for the ADL Improvement indicator) this was sufficient to assign the hospital to the above average performance category. However, the criterion of statistical difference alone was considered insufficient when designating hospitals as having below average performance.

The calculation of the width of the confidence interval depends heavily on sample size; the greater the sample (denominator) size, the narrower the confidence interval. Given equal-sized differences from the average indicator value, a hospital with a larger sample size (narrower confidence interval) is more likely to be found significantly different from the average. Given the wide range of complex continuing care programs at hospitals in the province, there were dramatically different sample sizes for the indicators. Therefore, in order not to "penalize" hospitals from which larger samples of data were available, a second criterion, described below, was used for assigning hospitals to the below average performance category.

Procedure for Determination of a Hospital's Performance Category

1. Calculate the provincial average indicator value as the average of hospital scores, weighted by the number of assessments from each hospital.
2. For prevalence-type indicators, calculate the 95% confidence interval around the indicator value using the number of patients included in the indicator calculation as the ESS.
3. For incidence-type indicators, calculate the 95% confidence interval around the indicator value using the number of MDS records included in the indicator calculation (the denominator) as the ESS.
4. At this point, proceed in the performance allocation process only with hospitals that have an ESS of 30 or more. Hospitals with smaller sample sizes will have confidence intervals that are much too wide.
5. If the hospital risk-adjusted indicator value was on the "better performance" side of the provincial average and the 95% confidence interval did not include the provincial average, the hospital was said to have a significantly above average performance.
6. If the hospital risk-adjusted indicator value was on the "worse performance" side of the provincial average and the 95% confidence interval did not include the provincial average, the hospital was considered to have potentially below average performance. Steps 8 and 9 were done to determine whether the hospital was allocated to the below average performance category.

7. If neither conditions of step 5 nor 6 are true, the hospital was designated as having average performance.
8. Define the low performance cut-point as the highest indicator score (lowest, in the case of the ADL Improvement indicator) among the hospitals identified in step 7 (those with indicator value not statistically discernible from the all hospitals' average). Recall, higher scores are reflective of poorer performance, except for Improvement in Performance of ADL.
9. Hospitals that met the condition of step 6 were assigned the below average designation if the hospital's indicator value was further from the provincial average than the low performance cut-point.

Reporting Results by Sex

Provincial-level means for the hospital-specific indicators (stratified by sex) described in this summary were included in the e-Scorecard. In addition, the e-Scorecard included an analysis of the rates for women and men, the values of the differences between women and men on mean rates and the statistical significance of these differences at a provincial level. The indicator quantifying the difference between rates for women and men [i.e. $(F-M)/F$] is the value of the difference between women and men attributable to sex - or a value for "equity". This calculation was done for each indicator and it gave an indication of the direction (i.e. $F > M$ or $M > F$) and the statistical significance of these values at a hospital level. This indicator is only calculated when there are a minimum of five males and five females included in the calculation.

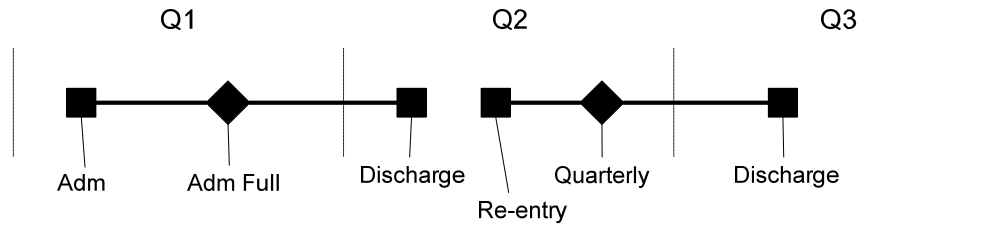
In terms of interpretation, if this value [i.e. $(F-M)/F$] is negative (i.e. it may be the full range of negative values to infinity), males have higher rates than females; if this value is positive (i.e. it may be positive up to a value of 1), females have higher rates than males. A value of "0" is used as the benchmark as it represents true equity between women and men. Furthermore, if a hospital's 95% confidence interval around their specific value of the difference between women and men for a given indicator includes zero, then the hospital is said to have no statistically significant sex difference for that indicator (which is preferred). If a hospital's 95% confidence interval around their specific value of the difference between women and men for a given indicator does not include zero and is negative, then the hospital is said to have unequal (i.e. $M > F$) performance or a statistically significant sex difference, in which males have a higher rates than females. If a hospital's 95% confidence interval around their specific value of the difference between women and men for a given indicator does not include zero and is positive, then the hospital is said to have unequal ($F > M$) performance or a statistically significant sex difference, in which females have a significantly higher rate than males.

Appendix A

Record Sequences

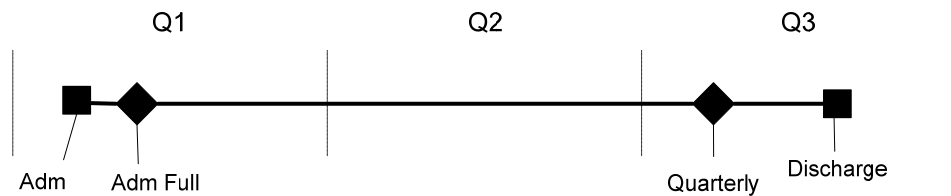
Criteria for Chronic Patients

Example 1

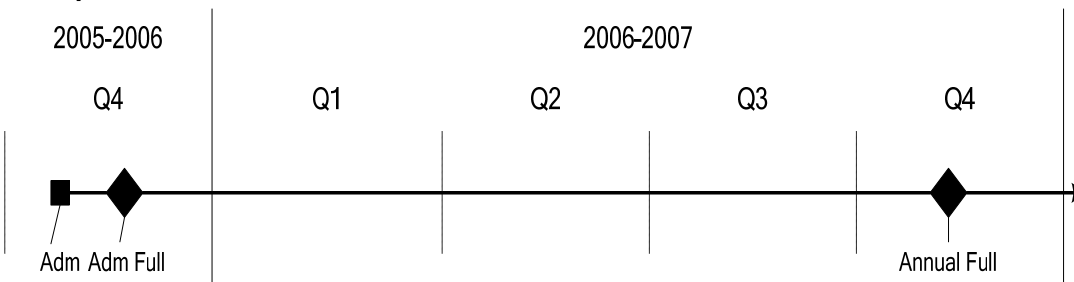


In this example, the patient fulfills the condition for a chronic patient as they have stayed in the facility long enough to have two assessments in two continuous quarters, even though the patient had a "temporary transfer" out of the CCC facility between the assessments (shown by the discharge and re-entry).

Example 2

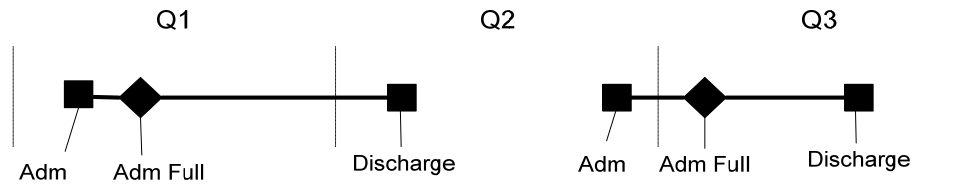


Example 3



The patients in Examples 2 and 3 are both classified as chronic patients. According to the CCRS standards, the patients should have quarterly assessments. However, these types of situations may occur if there were data quality issues with the intervening quarterly assessments, so they could not be successfully submitted to CIHI or they were excluded during the data cleaning processes.

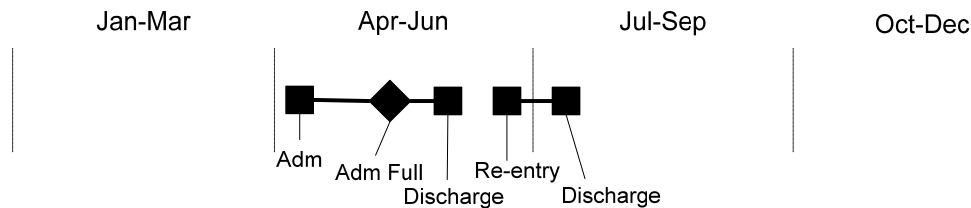
Example 4



However, the patient in Example 4 does not fulfill the conditions for chronic patients: although the patient has two assessments, they were not in continuous quarters and neither occurred 80 days after the date of entry (the admission full assessments are carried out within 14 days of admission).

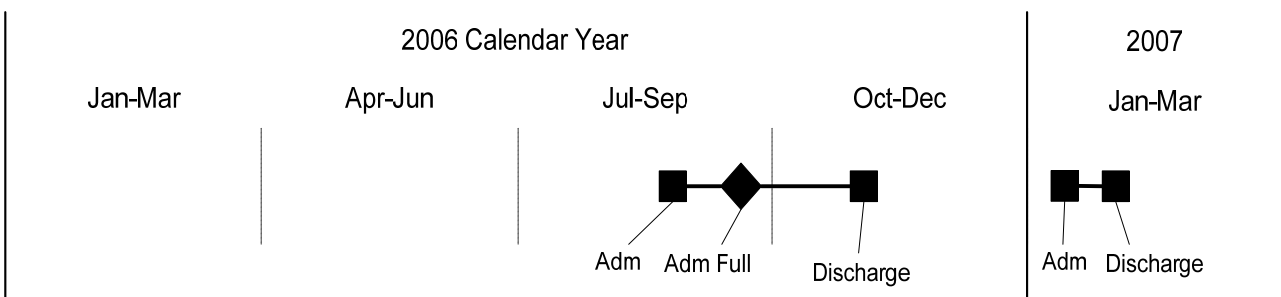
Criteria for Short-Stay Patients

Example 5



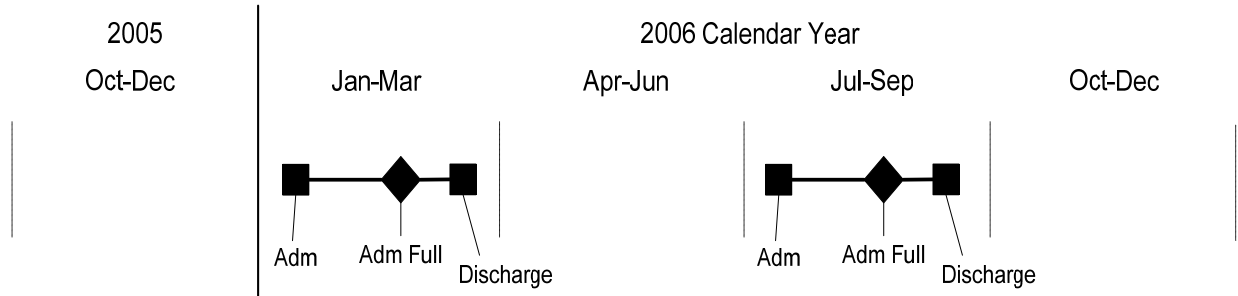
The patient in Example 5 is classified as "short-stay". Even though the patient had two stays, the discharge with the subsequent re-entry is considered a "temporary transfer". The patient has only one admission full assessment and has no other stays 90 days before or after these stays.

Example 6



In this example, the patient does not meet the criteria for a short-stay patient. Although the patient has only one admission (with an admission full assessment) in the 2006 calendar year, they had a subsequent admission (which was not a re-entry) in the first quarter of the next calendar year.

Example 7



Both stays for this patient meet the criteria for short-stay: the patient had only an admission full assessment for each stay and spent more than 90 days outside of the facility between stays. Both admission full assessments would be used in the calculation of the short-stay indicator.