

***Hospital Report e-Scorecard 2007: Rehabilitation***  
**Clinical Utilization and Outcomes Technical Summary**

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## Table of Contents

Overview.....	1
Methodology.....	1
Data Source.....	1
Selection of Cases.....	2
Hospital Participation.....	3
Indicator Definitions.....	4
Data Analysis.....	6
Verification Procedures.....	6
Performance Classification.....	6
Identifying High Performing “Benchmark” Hospitals.....	8
Risk Adjustment.....	8
 Table 1. Number of Female and Male Inpatient Rehabilitation Clients by Rehabilitation Client Group (RCG), Ontario, 2005-2006.....	 3
 Table 2. Indicator Definitions and Formulae at the Hospital Level.....	 5

## Overview

*The Hospital Report e-Scorecard 2007: Rehabilitation Clinical Utilization and Outcomes* provides stakeholders with an enhanced understanding of the clinical performance of hospitals with designated rehabilitation beds in Ontario. Indicators in the Hospital Report e-Scorecard can be used for both quality improvement and accountability purposes. These indicators reflect elements of clinical outcomes and efficiency during the rehabilitation stay from admission to discharge and give a broad picture of performance. Outcomes represent changes in a client's health status between admission to and discharge from a designated inpatient rehabilitation program.

The Clinical Utilization and Outcomes Technical Summary presents detailed information regarding the methodology for the *Hospital Report e-Scorecard 2007: Rehabilitation Clinical Utilization and Outcomes*. Sex-stratified data are provided at the provincial level, local health integration network (LHIN) level, and hospital level in the e-Scorecard. The primary data source for indicators in this quadrant is the National Rehabilitation Reporting System (NRS), which was developed by the Canadian Institute for Health Information (CIHI). Data submission to the NRS was mandated for designated rehabilitation beds in Ontario in October 2002, providing for province-wide inpatient rehabilitation clinical utilization and outcomes indicators for all hospitals. In Ontario, the NRS contains data on adult clients (primarily 18 years and over) receiving care in designated rehabilitation beds. The focus is on clients who have a time-limited episode of service, individualized and documented rehabilitation plans, predicted discharge date, and expected improvements in functional status.

## Methodology

### Data Source

The primary assessment instrument used in the NRS is the FIM<sup>TM</sup> instrument<sup>1</sup>. The FIM<sup>TM</sup> instrument is a proprietary instrument used to measure functional independence. It is comprised of 18 items (13 motor items and 5 cognitive items) that are rated on a seven level scale representing gradations from independent (7) to dependent (1) function, for an overall maximum score of 126 (18 items x 7). The FIM<sup>TM</sup> instrument is a measure caregiver burden associated with the level of disability. The overall FIM<sup>TM</sup> instrument score can be broken down into motor and cognitive subscales to provide further detail on identifying areas of functional loss.

Data are collected at admission to and discharge from hospitals for each inpatient rehabilitation stay, with the option of collecting data three to six months following discharge from inpatient rehabilitation. Admission data must be completed within 72

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<sup>1</sup> The 18-item FIM<sup>TM</sup> instrument referenced herein is the property of Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc.

hours after admission and data must be collected within 72 hours before discharge from the rehabilitation program. Follow-up assessment data are collected between 80 and 180 days after discharge from the program if the hospital decides to collect data for this voluntary component of the data set. Data on socio-demographic information, rehabilitation length of stay, and pre-admission and post-discharge living arrangements included in the NRS are derived from a variety of sources including the chart, other staff, the client, or family members.

### **Selection of Cases – Inclusion Criteria**

The data included in the e-Scorecard 2007 are based on 27,694 records with complete admission and discharge FIM<sup>TM</sup> instrument information for the period April 1, 2005 to March 31, 2006. Data collected for various NRS admission classes (initial rehabilitation, continuing rehabilitation, short stay evaluation, and re-admissions) are included. Records where sex was not clearly identified as either male or female were excluded.

Unlike acute care discharge information that classifies clients according to diagnostic codes, each client in the NRS is classified into a Rehabilitation Client Group (RCG)<sup>2</sup>, which includes those with impairments, activity limitations, and/or participation restrictions associated with the 17 groupings in Table 1. For purposes of the NRS, RCGs may be collected at a greater level of detail than these 17 categories, providing more specific information about the condition such as the type of stroke or orthopaedic condition. In the e-Scorecard, information is provided for all 17 RCGs combined and this group is referred to as “All RCGs”. From the 17 RCG categories, information is also provided separately for Stroke and for Orthopaedic Conditions. Orthopaedic Conditions are further subdivided into Post Hip Fracture and Post Hip and Knee Replacement. Stroke and Orthopaedic Conditions were chosen as the primary RCGs to report because they represented 65% of all inpatient rehabilitation activity in Ontario hospitals in 2005-2006.

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<sup>2</sup> Rehabilitation Client Groups (RCGs) adapted with permission from the UDS<sub>MR</sub> impairment codes. Copyright © 1997 Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc., all rights reserved.

**Table 1. Number of Female and Male Inpatient Rehabilitation Clients by Rehabilitation Client Group (RCG), Ontario, 2005-2006**

Rehabilitation Client Group (RCG)	Females	Males
Orthopedic Conditions	10,484	4,513
Stroke	1,888	2,009
Medical Complex	1,228	1,051
Debility	534	386
Amputation of Limb	286	608
Brain Dysfunction	358	515
Cardiac	453	389
Pulmonary	426	306
Neurological Condition	346	292
Spinal Cord Dysfunction	207	352
Major Multiple Trauma	195	183
Pain Syndrome	198	90
Arthritis	194	54
Other Disabling Impairment	58	48
Burns	5	14
Developmental Disabilities	9	*
Congenital Deformities	7	*
Total	16,876	10,818

Source: NRS, CIHI 2005-2006

Note : \* Indicates data suppressed to reduce potential for residual disclosure due to small cell sizes.

## Hospital Participation

The Clinical Utilization and Outcomes data templates include data from 57 of 58 hospital corporations with designated rehabilitation beds for the period April 1, 2005, to March 31, 2006. Data from all 58 corporations with designated rehabilitation beds were used to calculate provincial and LHIN averages. In the e-Scorecard, corporate and site level data are broken down by sex for both the indicators and components. Provincial and LHIN level data are broken down by sex for the indicators only.

## Indicator Definitions

There are two main types of indicators calculated for the Rehabilitation Clinical Utilization and Outcomes data templates - those that measure service utilization and those that measure functional outcomes. The two indicators in the e-Scorecard that measure service utilization are:

- Average Days Waiting for Admission to Rehabilitation; and
- Average Active Rehabilitation Length of Stay.

The four indicators in the e-Scorecard that measure clinical outcomes using the FIM<sup>TM</sup> instrument are:

- Average Total Function Score Change;
- Average Motor Function Change;
- Average Cognitive Function Change; and
- Length of Stay Efficiency.

In the e-Scorecard, all six indicators are reported for each of the following three groups: All RCGs; Stroke; and Orthopaedic Conditions. In addition, information specific to Post Hip Fracture and Post Hip and Knee Replacement are provided for further detail of the Orthopaedic Conditions RCG. The indicator definitions, as well as the formulae for indicator calculation at the hospital level, are presented in Table 2. As noted previously, only episodes with complete admission and discharge FIM<sup>TM</sup> instrument information are included. The total number of clients (n) was based on the total number of episodes and was therefore constant for all six indicators for individual hospital sites/corporations.

**Table 2. Indicator Definitions and Formulae at the Hospital Level**

Indicator Name	Indicator Definition and Formula
Average Days Waiting for Admission to Rehabilitation	<p>Definition: The average days waiting for admission to rehabilitation is the average number of days between the Date Ready for Admission and the Date of Admission to rehabilitation. It is a measure for the length of time clients are waiting for a rehabilitation bed and identifies whether wait time is adversely affecting length of stay in acute care.</p> <p>Formula*: Average days waiting for admission to rehabilitation = <math>\text{Sum}[\text{Admission date} - \text{Date ready for admission}]/n</math></p>
Average Active Rehabilitation Length of Stay	<p>Definition: The average active rehabilitation length of stay is the number of days between the date on which the client is admitted to the rehabilitation facility and the date on which the client is discharged from the rehabilitation facility, minus any service interruption days and days waiting for discharge from inpatient rehabilitation.</p> <p>Formula**: Average active rehabilitation length of stay = <math>\text{Sum}[(\text{Discharge date} - \text{admission date}) - \text{Service interruption days} - \text{Waiting days for discharge from inpatient rehabilitation}]/n</math></p>
Average Total Function Score Change	<p>Definition: The average total function score change is the average difference between the sum of all 18 elements on the FIM<sup>TM</sup> instrument at discharge and the sum of all 18 elements on the FIM<sup>TM</sup> instrument at admission.</p> <p>Formula: Average total function score change = <math>\text{Sum}[\text{Discharge total function score} - \text{Admission total function score}]/n</math></p>
Average Motor Function Change	<p>Definition: The average motor function change is the average difference between the sum of all 13 elements on the FIM<sup>TM</sup> instrument that measure motor activities at discharge from and admission to an inpatient rehabilitation facility.</p> <p>Formula: Average motor function change = <math>\text{Sum}[\text{Discharge motor function score} - \text{Admission motor function score}]/n</math></p>
Average Cognitive Function Change	<p>Definition: The average cognitive function change is the average difference between the sum of all 5 elements on the FIM<sup>TM</sup> instrument that measure cognitive activities at discharge from and admission to an inpatient rehabilitation facility.</p> <p>Formula: Average cognitive function change = <math>\text{Sum}[\text{Discharge cognitive function score} - \text{Admission cognitive function score}]/n</math></p>
Length of Stay Efficiency	<p>Definition: Length of stay efficiency is the average change in total function score per day of clients participating in a rehabilitation program where the total function score is the total score as measured by the FIM<sup>TM</sup> instrument. LOS efficiency is calculated for each individual client by dividing the individual's total function score gain by that individual's length of stay, then averaging the individual rates across all clients.</p> <p>Formula***: Length of stay efficiency = <math>\text{Sum}[\text{Total function change}/\text{Length of stay}]/n</math></p>

\*If the 'Ready for Admission Date' was missing, then 'Ready for Admission Date' was set equal to 'Admission Date'.

\*\*If there were no service interruption dates recorded, then the value for 'Service interruption days' was set equal to zero.

\*\*\*Length of stay = Discharge date – Admission date – Total service interruption days

## **Data Analysis**

All analyses were performed using SAS Version 9.1.3 . Means of the indicators were calculated at three levels: provincial; LHIN; and hospital. The e-Scorecard includes hospital corporation and site-level indicator means and components by sex. Averages for a sex difference category, defined as the ratio (F-M)/F, are included.

## **Verification Procedures**

Prior to finalizing the data to be presented in the e-Scorecard, each participating hospital was asked to verify their data. Since many hospitals did not have the capability in-house to statistically analyze their NRS data they were asked to verify their data by referring to their CIHI Reports 2A, 2B and 3 from April 1, 2005 to March 31, 2006. Hospitals were asked to verify the following data: total number of cases with complete admission and discharge FIM<sup>TM</sup> instrument information; average age; percent males; percent females; average admission function score; average discharge function score; average total function score change, average admission motor function score, average discharge motor function score, average motor function change; average admission cognitive function score, average discharge cognitive function score, average cognitive function change; average days waiting for admission to rehabilitation; average active rehabilitation length of stay, and length of stay efficiency.

Some indicators could not be independently verified by the hospitals due to differences in reporting categories. Admission and discharge motor and cognitive function scores are not provided for all the clients in the NRS Q4 2005-2006 Report 2B report and, therefore, were not verifiable for some RCGs. Lastly, Hip and Knee Replacements are reported separately in the CIHI quarterly reports whereas in the e-Scorecard these categories are combined and thus not verifiable.

## **Performance Classification**

Hospitals were compared with the provincial average and classified into the following three categories based on their performance: above average; average; and below average. A score of above average performance or below average performance means that the hospital's score was statistically different than the average score for all participating hospitals. Colors were used to indicate performance as follows:

- Green - the hospital's score reflected above average performance
- Yellow - the hospital's score reflected average performance
- Red - the hospital's score reflected below average performance.

For each hospital, the mean and the corresponding 95 percent confidence intervals for each of the six key indicators were calculated for the following RCG classifications: All



RCGs; Stroke; Orthopaedic Conditions; Post Hip Fracture; and Post Hip and Knee Replacement.

For all of the indicators, an above average performance classification is desirable. For *Average total function score change*, *Average motor function change*, *Average cognitive function change*, and *Length of stay efficiency* a comparatively higher indicator score is desirable, while for *Average active rehabilitation length of stay* and *Average days waiting for admission to rehabilitation*, a comparatively lower indicator score is desirable.

A performance classification of above average was assigned when the hospital's entire 95% confidence interval exceeded the mean provincial score for the following indicators: *Average total function score change*, *Average motor function change*, *Average cognitive function change*, and *Length of stay efficiency*. For example, for *Average total function score change*, a performance classification of above average was assigned when the lower bound of the hospital's 95% confidence interval exceeded the mean provincial score. A performance classification of above average was assigned when the hospital's entire 95% confidence interval was less than the mean provincial score for the following indicators: *Average active rehabilitation length of stay* and *Average days waiting for admission to rehabilitation*.

A performance classification of below average had to satisfy two conditions. First, a performance classification of below average was assigned when the hospital's entire 95% confidence interval was lower than the mean provincial score for the following indicators: *Average total function score change*, *Average motor function change*, *Average cognitive function change*, and *Length of stay efficiency*. A performance classification of below average was assigned when the hospital's entire 95% confidence interval was more than the mean provincial score for the following indicators: *Average active rehabilitation length of stay* and *Average days waiting for admission to rehabilitation*. Second, a performance classification of below average was assigned when the hospital's mean score was less than the mean score for every hospital that was rated as average for the following indicators: *Average total function score change*, *Average motor function change*, *Average cognitive function change*, and *Length of stay efficiency*. A performance classification of below average was assigned when the hospital's mean score was greater than the mean score for every hospital that was rated as average for the following indicators: *Average active rehabilitation length of stay* and *Average days waiting for admission to rehabilitation*. If the hospital met the first criterion but not the second, the hospital's performance was classified as average.

A performance classification of average was also assigned when the mean provincial score fell within the hospital's 95% confidence interval for that indicator.

No performance classifications are provided for the Clinical and Utilization Outcomes indicators stratified by sex.

## **Identifying High Performing “Benchmark” Hospitals**

High performing “benchmark” hospitals were identified in the using the following methodology, which is the same as used in *Hospital Report e-Scorecard 2005*:

For the Clinical Utilization and Outcomes quadrant, a hospital was considered a high performing “benchmark” hospital if they had a combination of: above average on Total Function Change; average or above average on Average Active Rehabilitation Length of Stay; and average or above average on Length of Stay Efficiency for at least one of the following RCGs ( All RCGs, Total Stroke, Total Orthopaedic Conditions, Post Hip Fracture, Post Hip and Knee Replacement). When hospitals had above average Total Function Change, it was considered acceptable for Active Rehabilitation Length of Stay and Length of Stay Efficiency to be average. These criteria take into account the complexity of client needs within some of the RCG groups, as well as the importance placed on achieving optimal total function change. When considering function change and length of stay combined, a higher priority was placed on achieving gains in total function. For some of the RCG categories where client needs may be more complex, a longer length of stay may be required in order to achieve optimal change in function during inpatient rehabilitation.

## **Risk Adjustment**

Similar to the e-Scorecard 2005 and 2006, unadjusted values are presented in the Hospital Report e-Scorecard 2007: Rehabilitation Clinical Utilization and Outcomes.