

Hospital Report 2005: Rehabilitation
Clinical Utilization and Outcomes Technical Summary

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Overview

Hospital Report 2005: Rehabilitation is comprised of four quadrants, including the Clinical Utilization and Outcomes quadrant. This quadrant provides stakeholders with a better understanding of the clinical performance for hospitals with designated rehabilitation beds in Ontario. Indicators in this quadrant can be used for both quality improvement and accountability purposes. These indicators reflect elements of clinical success and efficiency during the rehabilitation admission and at discharge to give a broad picture of performance. Outcomes represent those changes in a client's health status that can be attributed to the care they have received.

In addition, for the first time, a Women's Health section is integrated into the Rehabilitation Report. This section includes descriptive information about the inpatient rehabilitation population, and all indicators in the Clinical and Utilization Outcomes quadrant stratified by sex. Sex-stratified data are provided at a provincial level in the Executive Report, and hospital level in the E-Scorecard.

The Clinical Utilization and Outcomes Technical Summary presents detailed information regarding the methodology for the Clinical Utilization and Outcomes quadrant of *Hospital Report 2005: Rehabilitation*. The primary data source for indicators in this quadrant is the National Rehabilitation Reporting System (NRS). This data collection 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 by 2005. The NRS data for Ontario is targeted to adult clients (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 rehabilitation data are collected at admission to and at discharge from hospitals for each rehabilitation visit, with the option of a Follow-up Assessment record¹. The primary outcome measure used in the NRS is the Functional Independence Measure (FIMTM instrument). This is a global assessment measure that was developed for use as part of the Uniform Data System for Medical Rehabilitation (UDSMRSM) in the United States in 1995 on which the NRS is based. The FIMTM is an 18-item, seven-level functional assessment scale that measures the amount of assistance required by a person to perform a skill safely and effectively and contains both motor and cognitive dimensions (self-care, sphincter control, transfers, locomotion, communication, and social cognition). By adding the points for each item, the possible total score ranges from 18 (lowest) to 126 (highest level of independence). The Admission FIMTM must be completed within 72 hours after

¹ National Rehabilitation Reporting System, Canadian Institute for Health Information (CIHI) – December 2002

admission and the Discharge FIM™ within 72 hours before discharge from the rehabilitation program. Only admissions with a minimum length of stay of three days are included in the NRS. The Follow-up Assessment must be completed between 80 and 180 days after discharge from the program if the hospital decides to collect data for this component of the data set. The socio-demographic, length of stay, and pre and post-hospital discharge living arrangement elements 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

Only records with complete admission and discharge FIM™ information for the period April 1, 2003 to March 31, 2004 were included for analysis, including initial rehabilitation, continuing rehabilitation, short stay evaluation, and re-admissions. There were no further exclusion criteria. For this time period there were a total of 22,785 records with complete admission and discharge FIM™ information and 1,029 without a discharge FIM™ record. Of these, 80% did not meet their service goals and were transferred to another unit or facility.

Unlike acute care discharges that classify clients according to diagnostic codes, each client in the NRS is classified into a Rehabilitation Client Group (RCG), which includes those with impairments, activity limitations, and/or participation restrictions associated with the 17 groupings below (Table 1). In the NRS, the RCGs are 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. This higher level RCG is a mandatory field. In this Report, we provide information for all 17 RCGs combined; this group is referred to as “All RCGs”. From the 17 RCG categories, we also provide information for Total Stroke and Total Orthopaedic Conditions. Total Orthopaedic Conditions are further subdivided into Post Hip Fracture and Post Hip and Knee Replacement, for which we also provide information. Total Stroke and Total Orthopaedic Conditions were chosen as the primary RCGs to report because they represent 68% of all inpatient rehabilitation discharges.

Table 1. Number of Discharges with Complete Admission and Discharge FIM™ Data by RCG and by Sex.

RCG	Number of Discharges (Total)		RCG	Number of Discharges (Total)	
Total Orthopaedic Conditions	11,953*		Neurological Conditions	517	
	Female 8246	Male 3705		Female 274	Male 243
Total Stroke	3,506		Major Multiple Trauma	294	
	Female 1648	Male 1858		Female 126	Male 168

RCG	Number of Discharges (Total)		RCG	Number of Discharges (Total)	
Medically Complex	1,551**		Arthritis	244	
	Female 837	Male 713		Female 183	Male 61
Debility	907		Pain Syndromes	224	
	Female 553	Male 354		Female 161	Male 63
Amputation of Limb	833		Other Disabling Impairments	83	
	Female 275	Male 558		Female 49	Male 34
Brain Dysfunction	696		Burns	23	
	Female 271	Male 425		Female 11	Male 12
Pulmonary Conditions	669		Congenital Deformities	< = 5	
	Female 395	Male 274		Female < = 5	Male < = 5
Cardiac Conditions	661		Developmental Disabilities	< = 5	
	Female 370	Male 291		Female < = 5	Male < = 5
Spinal Cord Dysfunction	618				
	Female 241	Male 377			

*For Total Orthopaedic Conditions, there were two cases where the sex-specific data were missing.

** For Medically Complex, there was one case where the sex-specific data were missing.

Hospital Participation

Since participation in the NRS is mandated by the Ontario Ministry of Health and Long-Term Care, in the Clinical Utilization and Outcomes Quadrant we have data on all 54 corporations with designated rehabilitation beds for the period April 1, 2003 to March 31, 2004. Data from all of these 54 corporations with designated rehabilitation beds were used to calculate provincial and regional means, including provincial means by sex. However, not all hospitals agreed to be part of *Hospital Report 2005: Rehabilitation*. As a result we present hospital-specific data for 45 of 54 hospital corporations across Ontario with adult clients of varying ages and diagnoses who were discharged from designated rehabilitation beds who voluntarily agreed to participate in this Report.

In the e-scorecard, data by sex (indicators and components) were provided at the corporate level. Small samples precluded the inclusion of site-level sex-stratified data.

Indicator Definitions

There are two main types of indicators calculated for this quadrant - those that measure service utilization and those that measure functional outcomes. The two indicators in this Report that measure service utilization are:

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

The four indicators that measure clinical outcomes using the FIM™ are:

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

It should be noted that only the following three indicators are reported in the Executive Report:

- Average Total Function Change;
- Average Active Rehabilitation Length of Stay; and
- Length of Stay Efficiency

for All RCGs, Total Stroke, and Total Orthopaedic Conditions. Two additional indicators are also reported in the Women's Health Perspective section of the Executive Report. They are:

- Average Days Waiting for Admission to Rehabilitation; and
- Average Cognitive Function Change.

In the e-scorecard, all six indicators are reported for each of the following RCG groups: All RCGs; Total Stroke; Total Orthopaedic Conditions; Post Hip Fracture; and Post Hip and Knee Replacement. The indicator definitions as well as the formulae for indicator calculation at the hospital level are presented below (Table 2). As noted previously, we only included episodes or clients for whom there were complete admission and discharge FIM™ assessments, including initial rehabilitation, continuing rehabilitation, short stay evaluation, and readmissions. Our total number of clients (n) was based on this number and was therefore constant for all six of our 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: Waiting time for admission to inpatient rehabilitation is a measure of access to the inpatient rehabilitation system. This indicator will be a yardstick for the length of time clients are waiting for a rehabilitation bed and can identify whether wait time is adversely affecting length of stay in acute care.</p> <p>Formula*: Average days waiting for admission to rehabilitation = $\text{Sum}[\text{Admission date} - \text{Date ready for admission}]/n$</p>
Average Active Rehabilitation Length of Stay	<p>Definition: Active rehabilitation length of stay is a measure of the number of days the client required an inpatient rehabilitation stay to become ready for discharge.</p> <p>Formula**: Average active rehabilitation length of stay = $\text{Sum}[(\text{Discharge date} - \text{admission date}) - \text{Service interruption days} - \text{Waiting days for discharge from inpatient rehabilitation}]/n$</p>
Average Total Function Change	<p>Definition: Total function score change is a measure of how much the client's functional status improved from admission to discharge while in inpatient rehabilitation. The purpose of this indicator is to provide a measure of the impact of rehabilitation on both motor and cognitive skills.</p> <p>Formula: $\text{Sum}[\text{Discharge total function score} - \text{Admission total function score}]/n$</p>
Average Motor Function Change	<p>Definition: Motor function score change is a measure of how much the client's functional status improved from admission to discharge while in inpatient rehabilitation, with respect to motor skills. The purpose of this indicator is to provide a measure of the impact of rehabilitation on motor skills.</p> <p>Formula: Average motor function change = $\text{Sum}[\text{Discharge FIM}^{\text{TM}} \text{ motor score} - \text{Admission FIM}^{\text{TM}} \text{ motor score}]/n$</p>
Average Cognitive Function Change	<p>Definition: Cognitive function score change is a measure of how much the client's functional status improved from admission to discharge while in inpatient rehabilitation, with respect to cognitive skills. The purpose of this indicator is to provide a measure of the impact of rehabilitation on cognition skills.</p> <p>Formula: Average cognitive function change = $\text{Sum}[\text{Discharge FIM}^{\text{TM}} \text{ cognitive score} - \text{Admission FIM}^{\text{TM}} \text{ cognitive score}]/n$</p>
Length of Stay Efficiency	<p>Definition: Length of stay efficiency is the average change in function score per day of clients participating in a rehabilitation program where the function score is the total score as measured by the FIMTM. LOS efficiency is calculated for each individual client by dividing the individual's FIMTM gain by that individual's length of stay, then averaging the individual rates across all clients.</p> <p>Formula***: Length of stay efficiency = $\text{Sum}[\text{Total function change}/\text{Length of stay}]/n$</p>

*When calculating *Average Days Waiting for Admission to Rehabilitation*, if the 'Ready for Admission Date' was missing, which it was for approximately 20% of records, 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 8.0 and StataSE8. Means of the indicators were calculated at three levels: provincial; OHA region; and hospital. Box plots are also used to display hospital-level data (refer to page 16 of the Executive Report for a description of interpretation of box plots).

Provincial-level means for women and men were included in the women's health section of the Executive Report. In addition, the Report included an analysis of the values of the differences between means for women and men (F-M), and the statistical significance of these differences at a provincial level. The E-scorecard includes hospital-level indicator means and components by sex. As the E-scorecard is updated, it will include the difference values (F-M) and an indication of the statistical significance of these values at a hospital level.

All boxplots and correlations in the Women's Health section of the Executive Report were weighted by sample size.

Verification Procedures

Prior to finalizing the data to be presented in the Report 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 Canadian Institute for Health Information (CIHI) reports 2A and 2B from April 1, 2003 to March 31, 2004. The following data were verified: total number of cases with completed admission and discharge FIMTM data; average age; percent males; percent females; average admission function score; average discharge function score; average motor function change; average cognitive function change; average days waiting for admission to rehabilitation; and average active rehabilitation length of stay. The *length of stay efficiency* indicator could not be verified against the CIHI report because of differences in the calculations used by our team and CIHI. We have discussed the importance of aligning processes for indicator calculation between the Hospital Report Research Collaborative and CIHI and have plans to collaborate further with CIHI so that their processes and methods for indicator calculation are in alignment with our processes and methods.

Performance Classification

Hospitals were classified into the following three categories based on 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. Coloured shading for performance is assigned as follows:

- dark green - the hospital's score reflected above average performance
- medium green - the hospital's score reflected average performance
- light green - the hospital's score reflected below average performance.

For each hospital, the mean and the corresponding 95 percent confidence interval for each of the six key indicators were calculated for the following RCG classifications: All RCGs; Total Stroke; Total 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 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 change*, *Average motor function change*, *Average cognitive function change*, and *Length of stay efficiency*. For example, for *Average total function 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 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 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.

Please note that due to space constraints in the Report, performance classification data are presented for only three indicators: *Average total function change*; *Average active rehabilitation length of stay*; and *Length of stay efficiency*. These three indicators are

reported for the following three RCG classifications: All RCGs; Total Stroke; and Total Orthopaedic Conditions.

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

Identifying High Performing “Benchmark” Hospitals

Criteria were developed to identify high-performing hospitals. Although high performing hospitals had to meet the criteria in at least two of three quadrants (System Integration and Change, Clinical Utilization and Outcomes, and Client Perspectives), the criteria for the Clinical Utilization and Outcomes quadrant are as follows: 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 RCG categories (All RCGs, Total Stroke, Total Orthopaedic Conditions, Post Hip Fracture, Post Hip and Knee Replacement). If hospitals had above average *Total function change* we considered it acceptable for *Active rehabilitation length of stay* and *Length of stay efficiency* to be average. These criteria take into account the complexity of some of the RCG groups as well as the importance of 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 more complex RCG categories such as stroke and hip fracture, it may be necessary to accept a longer length of stay to achieve optimal change in function.

The Executive Report also indicates whether high performing hospitals have statistically significant sex differences across indicators, including those in the Clinical Utilization and Outcomes quadrant.

Risk Adjustment

Initially the indicator *Average active rehabilitation length of stay* was risk adjusted for age, sex, and admission FIMTM score and the indicators *Total function change* and *Length of stay efficiency* were adjusted for age and sex but not admission FIMTM score since it is part of the indicator calculation. The risk adjustment did not have an impact on the performance classification; therefore the unadjusted values are presented in the Report.

Risk-adjustment did impact comparisons between women and men and therefore was used in the calculation of hospital-level means by sex. All Clinical and Utilization Outcome indicators stratified by sex were risk-adjusted for age and admission FIMTM score.