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Analysis in Brief
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# Clients Transitioning From Inpatient Rehabilitation to Complex Continuing Care or Home

## Summary

This Analysis in Brief examines the clinical and demographic characteristics of inpatient rehabilitation clients in Ontario hospitals between 2004 and 2006, and identifies the factors that contribute to the likelihood that an inpatient rehabilitation client was discharged home or to complex continuing care (CCC). CCC is a level of care in Ontario provided in either freestanding hospitals or in designated beds or units within acute care hospitals. An enhanced understanding of which clients move from inpatient rehabilitation to CCC versus going home may help inform decisions regarding resource allocation, admission criteria and discharge planning.

A number of variables that may contribute to a client being discharged from inpatient rehabilitation to CCC were considered for this analysis. Characteristics found to have the most impact on whether a client goes home or to CCC included a client's level of function at admission to inpatient rehabilitation, the amount of gain in function during the course of inpatient rehabilitation and the client's living situation prior to admission to rehabilitation.

Health care facilities strive to ensure that clients have smooth and predictable transitions across the continuum of care. Ensuring that clients are in the right place at the right time along the care continuum is an important aspect of discharge and care planning. A better understanding of the transitions between one level of care and another may help in finding opportunities to make the health care system more efficient and more effective.

## Methods

To confirm which clients moved from inpatient rehabilitation to CCC from 2004 to 2006, data from two of CIHI's databases, the National Rehabilitation Reporting System (NRS) and the Continuing Care Reporting System (CCRS), were linked.

**About the NRS**
The NRS was developed by CIHI in 2001 to support data collection by hospitals for rehabilitation clients who are aged 18 years and older. The rehabilitation services are provided in specialized rehabilitation hospitals and in general hospitals within rehabilitation units, programs or designated rehabilitation beds. In Ontario, all hospitals with Ministry of Health and Long-term Care (MOHLTC)–designated rehabilitation beds participate in the NRS.

**About the CCRS**
The Continuing Care Reporting System (CCRS) contains information on individuals in publicly funded facilities with beds designated and funded as continuing care beds, as well as clients in residential care facilities such as nursing homes, personal care homes or long-term care facilities. In Ontario, hospitals with MOHLTC-designated CCC beds, either in free-standing CCC and rehabilitation hospitals or in designated beds or units within general hospitals, participate in the CCRS.

A total of 1,118 pairs of inpatient rehabilitation admission and discharge records (that is, complete episodes) in the NRS from Ontario had a first-time admission to a CCRS participating facility between April 2004 and March 2006. This represented 2% of all Ontario NRS clients within that time period. By comparison, a total of 40,918 complete episodes (82%) were for inpatient rehabilitation clients who were discharged home during that same time period. The remaining 16%, not considered in this analysis, were discharged to a residential care facility other than a CCC facility or an assisted living setting, or an "other" or "unknown" (2%) environment. Further details on the linkage results and selection of records for analysis can be found in Tables 2 to 4 in the technical notes at the end of this Analysis in Brief.

In addition to using descriptive statistics to analyze differences between clients discharged home and those discharged to CCC, logistic regression analysis was conducted to determine the extent to which clinical and demographic variables explained the likelihood of discharge to a CCC facility relative to home. Detailed statistical information on the logistic regression results can be found in Table 5 in the technical notes.

A review of the literature suggests that the strongest predictors of discharge destination are clinical variables, such as functional status at admission[1–5] and change in functional status from admission to and discharge from inpatient rehabilitation.[3, 4]

There are divergent findings on the impact that demographic variables have on discharge destination: age, sex, living arrangements and living setting were found to be significant in some studies,[1–4,7–9] but insignificant in others.[2–4,6–7,10]

**About Logistic Regression Models**
When interpreting the results of logistic regression models, focus should be given to the odds ratio, which is the ratio that compares the odds of an event (in this case, discharge to CCC) happening in one group to the odds of the event happening in another group. Thus, each of the independent variables (for example, age) was analyzed by grouping the data into different categories, and comparing the likelihood of a CCC discharge for each group to a reference group. In this analysis, the higher the odds ratio, the more likely it is that clients in the subject group were discharged to CCC. An odds ratio of one indicates that the event is equally likely to occur in the subject group and the reference group.

Because this Analysis in Brief focuses on inpatient rehabilitation clients who were discharged to Ontario CCC facilities, care should be taken in generalizing the results beyond Ontario, as there is differentiation in how provinces and territories define levels of care.

## Demographic Characteristics of Clients Who Are Discharged to Complex Continuing Care

As previously mentioned, only a small percentage (2%) of inpatient rehabilitation clients are referred to CCC after their stay in inpatient rehabilitation; most (82%) go home. Table 1 presents demographic data on inpatient rehabilitation clients who were discharged to CCC facilities and those who were discharged home. As the table shows, clients discharged to CCC tended to be older, on average (76 versus 70 years). Almost half (46%) of clients discharged to CCC were aged 81 or older.

Half (50%) of the clients discharged to CCC did not live with a spouse, partner or other family member prior to admission to inpatient rehabilitation. In contrast, under a third (31%) of all clients discharged home did not live with a spouse, partner or other family member.

The majority of inpatient rehabilitation clients for both discharge destinations lived in a private residence prior to inpatient rehabilitation, either with or without paid health services. Of all clients discharged to CCC, 86% lived in a private residence prior to admission to inpatient rehabilitation, compared to 99% of those who were discharged home. Furthermore, 13% of clients discharged to complex CCC lived in assisted living or residential care prior to admission to rehabilitation.

**Table 1. Demographic Profiles of Inpatient Rehabilitation Clients Discharged Home and to Complex Continuing Care (CCC), 2004–2006**

| | Discharge Destination | |
|---|---|---|
| | Home | CCC |
| **Median Age** | 70 | 76 |
| **Age Group (%)** | | |
| <60 | 20.3 | 13.4 |
| 61–70 | 20.8 | 12.1 |
| 71–80 | 34.4 | 28.8 |
| 80+ | 24.5 | 45.7 |
| | | |
| **Lived With Spouse/Partner/Family (%)** | | |
| Yes | 69.1 | 50.4 |
| No | 30.9 | 49.6 |
| | | |
| **Pre-Admission Living Setting (%)** | | |
| Lived at Home | 98.9 | 85.7 |
| Without Paid Services | 84.6 | 65.2 |
| With Paid Health Services | 14.3 | 20.5 |
| Lived in Assisted Living/ Residential Care | 0.8 | 12.5 |
| Other | 0.3 | 1.8 |

Table 5 in the technical notes provides additional details on demographic factors, such as pre-admission living setting, pre-admission living arrangements and advanced age, which had an impact on the likelihood of being discharged to CCC. A client who did not live at home at the time of admission to an inpatient rehabilitation facility was almost six times more likely to be discharged to a CCC facility when compared with clients who lived at home. Similarly, a client who did not live with a spouse, partner or family member before admission to inpatient rehabilitation was more than twice as likely to go to CCC after inpatient rehabilitation when compared with those who had spousal or family support prior to admission. Age had a lesser impact, with the likelihood of being discharged to CCC greatest for those 81 years or older when compared with those aged 60 or less.

## Low Functional Abilities on Admission Related to Discharge to Complex Continuing Care

For the NRS, clients' functional abilities are assessed at admission and discharge. Someone with a lower level of function may not be able (or would need the assistance of one or more people) to eat, walk or bathe herself or himself, for example. A person with a higher level of function, as measured in this way, would be able to do most or all of these personal activities safely and without assistance. In this analysis, a lower level of function indicated by lower admission Total Function Scores[i] was found to be a significant characteristic of clients going to CCC after inpatient rehabilitation. For example, more clients who were discharged to CCC had admission Total Function Scores of 76 and under (71%), when compared with those who were discharged home (19%).

**About the FIM™ Instrument and Total Function Scores**
In this Analysis in Brief, functional status at inpatient rehabilitation admission and discharge was measured using the FIM™ instrument. The FIM™ instrument is a measure of disability and caregiver burden associated with the level of disability and is composed of 18 items (13 motor items and 5 cognitive items) that are rated on a scale representing gradations from independent (7) to dependent (1) function. Adding the ratings for these 18 items provides a Total Function Score, which has an overall maximum of 126 (18 items x 7).

Figure 1 shows the distribution of inpatient rehabilitation clients who were discharged home and to CCC by admission Total Function Score. The data show that as admission Function Scores increased, clients were less likely to be discharged to CCC. Conversely, the percentage of clients discharged home gradually increased as admission Function Scores increased. Once admission Total Function Scores surpassed 77, the proportion of clients discharged home remained high.

i. Function Scores referenced in this list are based on data collected using the FIM™ instrument. The 18-item FIM™ instrument referenced herein is the property of Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc.

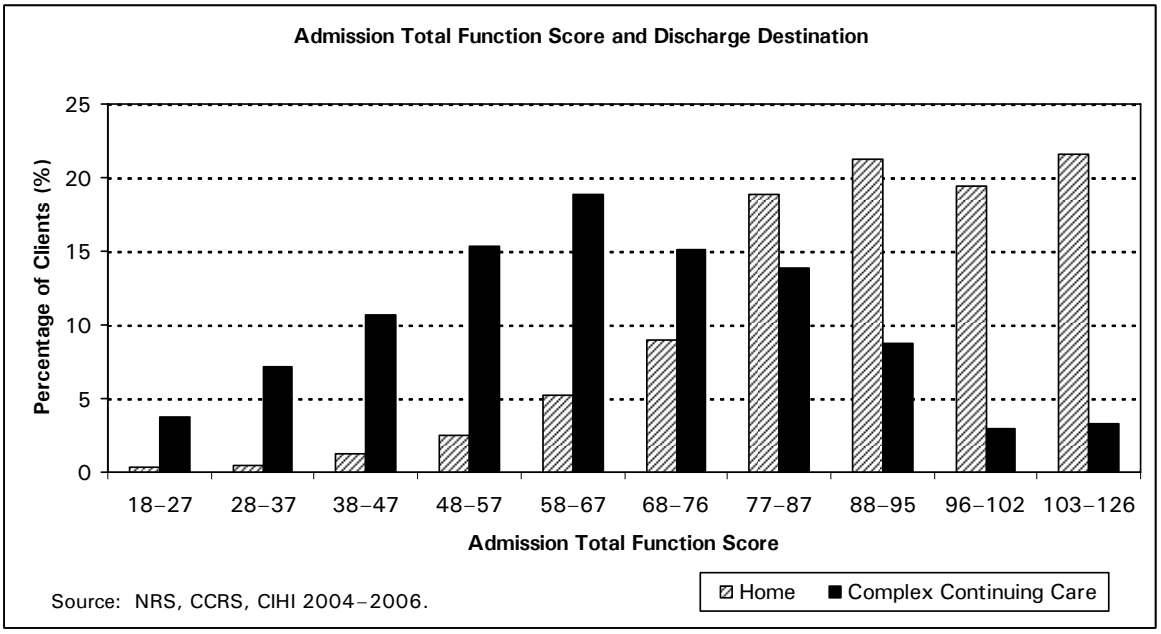


**Figure 1: Inpatient Rehabilitation Admission Total Function Score and Discharge Destination, 2004–2006**

The logistic regression results included in Table 5 at the end of this Analysis in Brief show that admission Total Function Scores contributed the most to the likelihood of discharge to CCC. When compared to clients with admission scores of 103 or greater, clients with admission scores between 18 and 76 were 58 times more likely to be discharged to CCC. Clients with admission scores between 77 and 87 were 12 times more likely to be discharged to CCC when compared with the reference group. Since the odds ratios are relative to one another, another way to interpret the two results is that the odds of being discharged to CCC increase by more than four times if a client is in the lowest functioning group when compared with clients who had admission scores between 77 and 87.

## Clients Showing Little or No Functional Improvements More Likely Discharged to Complex Continuing Care

Almost half (48%) of inpatient rehabilitation clients who were discharged to CCC showed little or no improvement in functional ability while in rehabilitation. Figure 2 shows the distribution of inpatient rehabilitation clients who were discharged home and to CCC by change in Total Function Score between rehabilitation admission and discharge. More clients discharged to CCC made no improvement in function or showed a decline in function from rehabilitation admission to discharge compared to those discharged home (19% versus 3%). Similarly, clients who demonstrated an increase of less than 10 points between rehabilitation admission and discharge were over-represented in clients discharged to CCC (29%) compared to those discharged

home (14%). The figure also shows that increases of 10 points or greater between rehabilitation admission and discharge tended to be more frequent in clients discharged home than in those discharged to CCC.

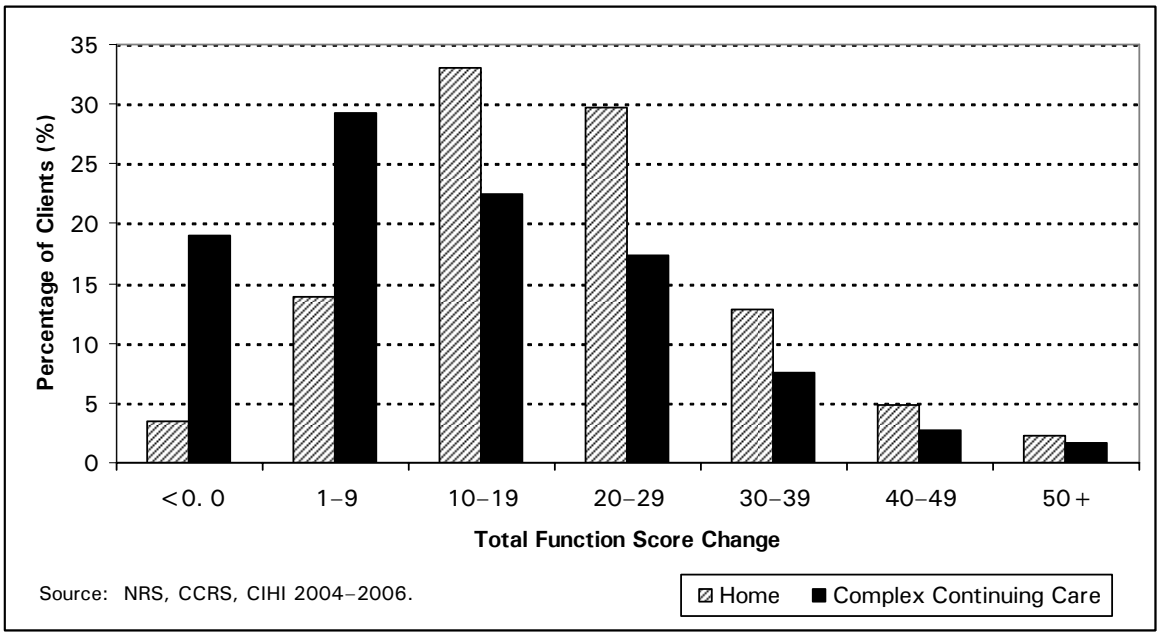


**Figure 2: Inpatient Rehabilitation Total Function Score Change and Discharge Destination, 2004–2006**

The logistic regression results in Table 5 also show that the change in Total Function Score between inpatient rehabilitation admission and discharge explained some of the variation in discharge destination. Clients who showed smaller improvements between admission and discharge (a change in Total Function Score between 1 and 20) were more than 10 times more likely to be discharged to a CCC facility than to home. This probability increases threefold if the client made no improvement in function or if the client's overall function deteriorated between admission to and discharge from inpatient rehabilitation.

# Conclusion

This Analysis in Brief examines the clinical and demographic characteristics of inpatient rehabilitation clients who were discharged to CCC versus home. It demonstrates the impact of lower levels of function upon admission to rehabilitation on the eventual discharge destination. Specifically, the likelihood of an inpatient rehabilitation client being discharged to a CCC facility increased dramatically with a Total Function Score under 77 as measured using the FIM™ instrument.

Demographic variables, such as the client's pre-admission living setting and living arrangements, as well as advanced age, can be used in conjunction with Function Scores as an indication that a client might require the type of care offered in a CCC facility after his or her course of inpatient rehabilitation. While statistically significant, it is important to emphasize that these factors alone explain only a portion of the variance in discharge destination, and should not be used without other clinical information in making discharge decisions.

Early identification of inpatient rehabilitation clients who may require discharge to a CCC facility can be useful for clinicians, case managers and system planners. The results of this analysis could potentially be useful in the following ways:

- Contributing to enhanced discharge planning for clients identified as a having greater likelihood of discharge to CCC versus home;
- Modifying rehabilitation programs to address the rehabilitation needs of clients with an increased likelihood of discharge to CCC with the goal of increasing the number of clients who go home; and
- Adjusting admission criteria for inpatient rehabilitation to better ensure clients are accessing the appropriate level of care at the right time.

*For additional information on the National Rehabilitation Reporting System (NRS) and the Continuing Care Reporting System (CCRS) and other NRS and CCRS publications, please contact rehab@cihi.ca and ccrs@cihi.ca or visit the NRS website at www.cihi.ca/nrs and the CCRS website at www.cihi.ca/ccrs.*

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# Technical Notes

**Table 2. Pre-Linkage Population Selection**

| Database (2004–2006) | NRS | CCRS |
|---|---|---|
| Episodes | 67,328 | 43,186 |
| Episodes Excluded[1] | -13,172 | -4,718 |
| Total Episodes | 54,156 | 38,468 |
| Total Persons[2] | 50,017 | 35,963 |

1. Both databases: Episodes with unknown health card number, non-Ontario facility. NRS: Unplanned discharges and episodes of care with incomplete FIM™ instrument data on admission and discharge.
2. For rehabilitation clients with multiple admissions, the most recent episode of care was considered for analysis; for CCC clients with multiple admissions, the earliest admission date was selected to determine admission to CCC.

**Table 3. NRS to CCRS Linkage Results**

| | |
|---|---|
| Health Card Number, Province issuing Health Card Number, Date of Birth, Sex[1] | 4,023 |
| Matches Excluded[2] | -2,902 |
| Total Discharged to CCC | 1,121 |

1. Linkage was based on health card number, province issuing the health card, date of birth and sex.
2. Exclusion criteria: Matches were excluded if CCRS admission date preceded NRS discharge date or if time between NRS discharge and CCRS admission exceeded one day.

| **Table 4. Inclusion Criteria for Analysis** | # | % |
|---|---|---|
| Total Persons in NRS, 2004–2006 | 50,017 | 100.0 |
| Not in Exclusion Category[1] | 49,939 | 99.8 |
| Discharged Home or to CCC | 42,036 | 84.0 |
| Home | 40,918 | 81.8 |
| CCC | 1,118 | 2.2 |

1. NRS clients were excluded from the analysis population if pre-hospital living arrangements were unknown, pre-hospital living setting was unknown or sex was coded as "Other."

**Table 5. Effects of Independent Variables on Likelihood of Discharge to Complex Continuing Care** (n values: CCC = 1,118 vs. Home = 40,918)

| Predictor Variable | n | Odds Ratio | 95% Confidence Intervals Lower | Upper | p value[1] |
|---|---|---|---|---|---|
| Admission Total Function Score (Ref group = 103+) | | | | | |
| 18–76 | 8,479 | 58.4 | 41.2 | 82.8 | <.0001 |
| 77–87 | 7,904 | 12.7 | 8.7 | 18.4 | <.0001 |
| 88–95 | 8,831 | 5.2 | 3.5 | 7.6 | <.0001 |
| 96–102 | 7,958 | 1.4 | 0.8 | 2.2 | .2139 |
| Change in Total Function Score* (Ref group = 28+) | | | | | |
| -58–0 | 1,639 | 32.2 | 25.0 | 41.4 | <.0001 |
| 1–20 | 21,271 | 10.7 | 8.8 | 13.0 | <.0001 |
| 21–27 | 8,996 | 3.2 | 2.5 | 4.0 | <.0001 |
| Did not live at home | 623 | 5.8 | 4.5 | 7.5 | <.0001 |
| Did not live with spouse/partner family | 13,178 | 2.4 | 2.1 | 2.8 | <.0001 |
| Length of stay (Ref group = <15 days) | | | | | |
| 15–28 | 10,589 | 1.0 | 0.9 | 1.3 | .5927 |
| 29–42 | 5,265 | 1.2 | 0.9 | 1.5 | .1536 |
| 43+ | 6,372 | 1.9 | 1.6 | 2.3 | <.0001 |
| Age group (Ref group = <61) | | | | | |
| 61–70 | 9,156 | 1.2 | 0.9 | 1.5 | .1938 |
| 71–80 | 14,683 | 1.4 | 1.2 | 1.8 | .0008 |
| 80+ | 9,114 | 1.9 | 1.5 | 2.3 | <.0001 |
| Rehabilitation Client Group: | | | | | |
| Stroke | 5,568 | 1.5 | 1.2 | 1.8 | <.0001 |
| Orthopaedic Conditions | 23,932 | 0.8 | 0.7 | 1.0 | .0505 |
| Medically Complex | 3,014 | 1.3 | 1.0 | 1.6 | .0431 |

1. Chi-square test of significance
* Change in Total Function Score is calculated by taking the difference in Total Function Score between admission and discharge