*RESPONSE TO AN ONTARIO MINISTRY OF HEALTH AND LONG-TERM CARE APPLIED HEALTH RESEARCH QUESTION*

# Resource Utilization Among Young and Midlife Ontarians Following Discharge from Complex Continuing Care


# Resource Utilization Among Young to Midlife Ontarians Following Discharge from Complex Continuing Care

Prepared by

Sima Gandhi, MSc

Kerry Kuluski, MSW, PhD

Christina Diong, MSc

Susan Bronskill, PhD

Final

November 2015

Submitted To

Bridgepoint Collaboratory for Research & Innovation

ICES Project No.

2013 0900 407 000

# Acknowledgement

This study was supported by the Institute for Clinical Evaluative Sciences (ICES) which is funded by the Ontario Ministry of Health and Long-Term Care (MOHLTC).

Dr. Kuluski is supported by the Health System Performance Research Network which is funding her work on young and mid-life adults with complex chronic conditions.



Citation:

Gandhi S, Kuluski K, Diong C, Bronskill S. Resource Utilization Among Young to Midlife Ontarians Following Discharge from Complex Continuing Care. Toronto: Institute for Clinical Evaluative Sciences; 2015.

# Background

- Complex Continuing Care (CCC) in Ontario is described as hospital-based care that provides services to those with complex medical needs
    - Designated beds within acute care facilities
    - Freestanding institutions
- A recent CIHI report showed that nearly 20% of CCC recipients were between the ages of 19-64.
    - Findings differ from previous perceptions suggesting that CCC population was similar to long-term care and intended for seniors.
- Current research tends to be focused on the older adult population (age 65+). Little is known about the characteristics of the young and midlife population with complex health needs
    - Often cited as costly ‘frequent flyers’ in health care system, and may have potential years of costly health care and social service use.
    - It is projected that those with complex needs are likely to require lifelong health services, including acute care, rehabilitation, pharmacy, etc.

# Objective

To explore health service use among young and midlife Ontarians with complex health needs, five years following discharge from a complex continuing care (CCC) facility.

# Methods: Data Sources

## Demographic

- Ontario Registered Persons Database (RPDB)
- Ontario Registrar General Death (ORGD)

## Health Service Use

- Continuing Care Reporting System (CCRS)
- Ontario Health Insurance Plan (OHIP)
- National Ambulatory Care Reporting System (NACRS)
- Discharge Abstract Database (DAD)
- National Rehabilitation Reporting System (NRS)
- Ontario Mental Health Reporting System (OMHRS)
- Home Care Database (HCD)
- Client Profile Database (CPRO)

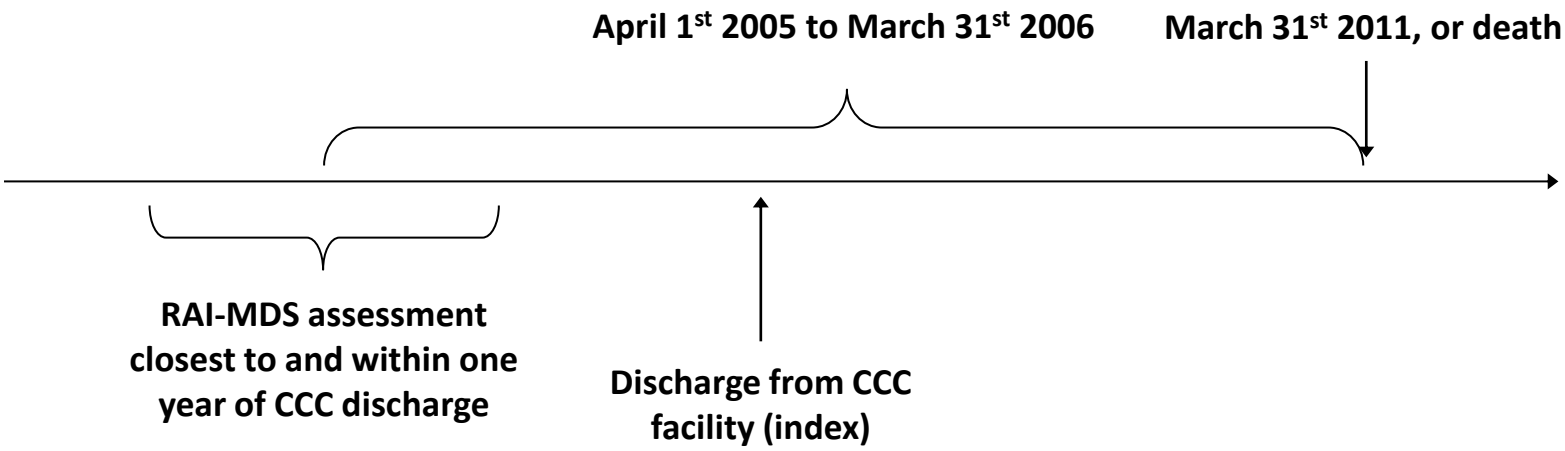
# Study Population

## Inclusion Criteria

- We looked at all young and midlife adults, aged 18 to 64 years, that were discharged from a complex continuing care facility in Ontario between April 1st 2005 and March 31st 2006.

## Exclusion Criteria

- Death prior to discharge from CCC
- Invalid ICES Key Number (IKN)
- Missing age or sex
- Invalid age (age <18 or >64 years)
- Non-Ontario resident
- Date of last contact > 5 years prior to index date



# Methods: Measures (1 of 2)

## Demographic characteristics

- Age, sex, income, geography, living status

## Health status (RAI-MDS 2.0)

- *Functional characteristics (ADL, CPS, ISE, DRS, CHESS, ABS)*: Various scales and indices that may be used to evaluate clinical status
- *Clinical assessment protocols*: Items used to trigger key issues during the assessment process; important to support decision-making and appropriate interventions to guide care planning
- *Diseases and health conditions*
- *Resource Utilization Groups (RUG-III Group)*: Consists of seven groups ordered in a clinical hierarchy, based on similar clinical characteristics and resource use (most complex to least)

# Methods: Measures (2 of 2)

## Health service utilization

- Physician visits
- Acute care admissions
- Emergency department visits
- Psychiatric care admissions
- Rehabilitation admissions
- Complex continuing care admissions
- Home care service visits
- Long-term care placement

## Mortality & Primary Cause of Death

# Methods: Analyses

- Demographic, clinical and functional characteristics were explored using the RAI-MDS assessment closest to and within one year of the date of discharge from complex continuing care.
- Health service utilization and mortality were examined within the first year following discharge, and cumulatively over a five-year period.
- Health service utilization over five years was stratified by age and sex, rurality, neighbourhood income level, RUG-III group, and number of conditions.

# Findings: Baseline characteristics

# Summary: Baseline characteristics

- More than half of young and midlife individuals discharged from complex continuing care were age 55 years and older, and fell within the two lowest income neighbourhood income quintiles. The majority resided in major urban (66%) or urban (23%) areas.
- Almost half had a neurological condition; more than a third had a heart or circulatory condition, such as hypertension or cardiovascular disease.
- Almost two-thirds of the cohort required supervision with activities of daily living, including personal hygiene, eating, etc. One-third scored low on the index of social engagement, which reflects verbal and body language behaviours. More than a quarter experienced moderate to severe cognitive impairment.
- More than half of the cohort triggered the ADL (58%) and cognitive loss CAPs (57%), suggesting risk of functional and cognitive decline. Over 40% of the cohort triggered the mood CAP with a slightly higher proportion triggering the social relationships CAP signalling challenges related to mental and social health.
- Findings suggest high intensity of resource utilization, as half of the cohort fell into the Special Rehabilitation category. These individuals require a combination of speech, occupational or physiotherapy and restorative nursing care.

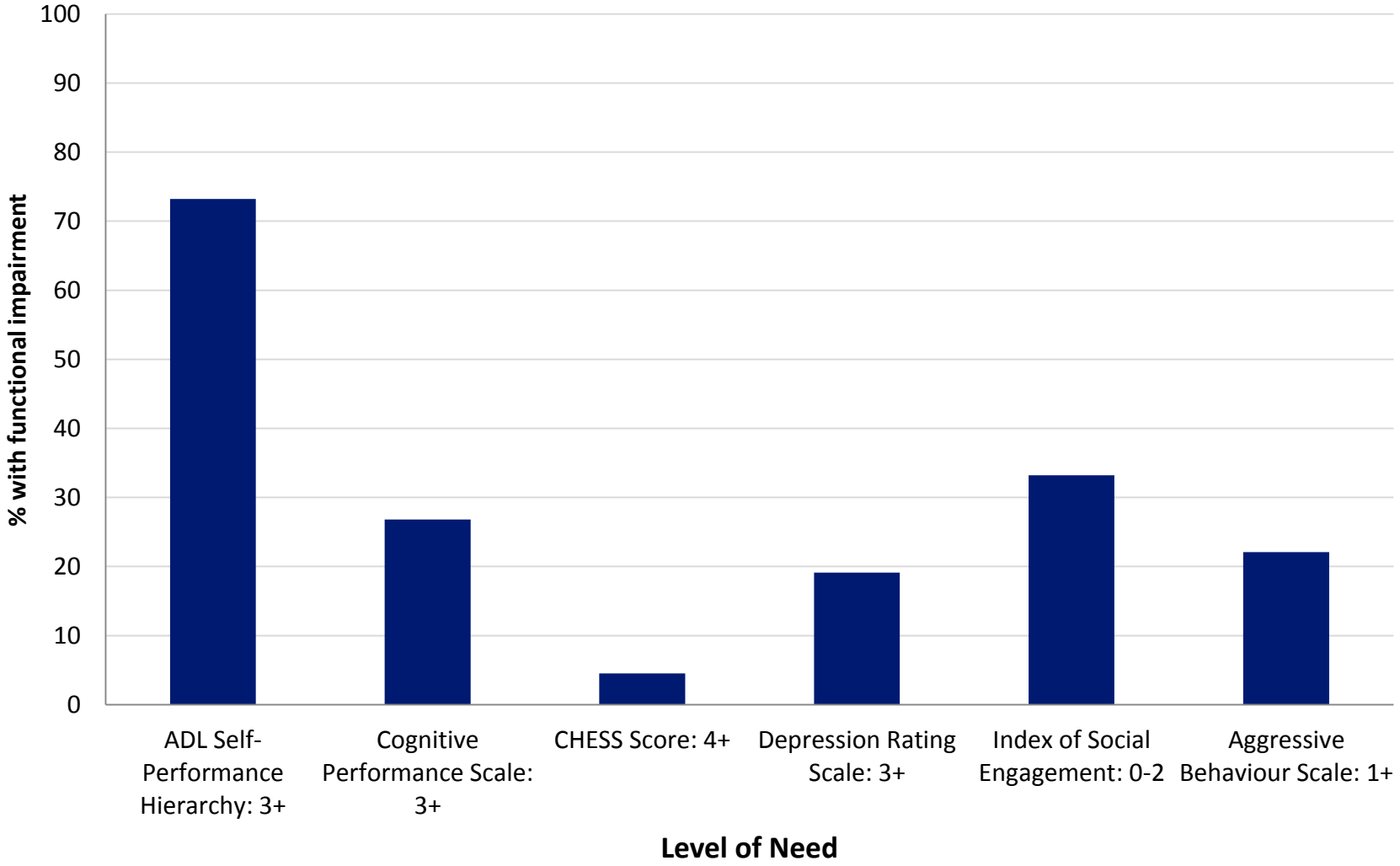
# Baseline demographic characteristics of young and midlife adults, discharged from complex continuing care facility between April 1st, 2005 and March 31st, 2006.

| Young to midlife adults discharged from complex continuing care, N | 1,906 |
|---|---|
| **Age group (years)** | |
| Mean ± SD | 52.0 ± 10.2 |
| 18-24 | 51 (2.7%) |
| 25-29 | 42 (2.2%) |
| 30-34 | 42 (2.2%) |
| 35-39 | 86 (4.5%) |
| 40-44 | 172 (9.0%) |
| 45-49 | 210 (11.0%) |
| 50-54 | 330 (17.3%) |
| 55-59 | 479 (25.1%) |
| 60-64 | 494 (25.9%) |
| **Sex** | |
| Male | 987 (51.8%) |
| Female | 919 (48.2%) |
| **Neighbourhood income level** | |
| Q1 (Lowest) | 547 (29.0%) |
| Q2 | 396 (21.0%) |
| Q3 | 367 (19.4%) |
| Q4 | 327 (17.3%) |
| Q5 (Highest) | 250 (13.2%) |
| **Geography** | |
| Major urban | 1230 (66.2%) |
| Urban | 427 (23.0%) |
| Rural | 201 (10.8%) |
| **Living Status** | |
| Reported living alone | 458 (25.6%) |
| **Length of Stay in CCC** | |
| Mean ± SD | 214.2 ± 797.5 |
| < 30 days | 851 (44.6%) |
| 30 to 90 days | 542 (28.4%) |
| 91 days to 1 year | 339 (17.8%) |
| > 1 year | 174 (9.1%) |

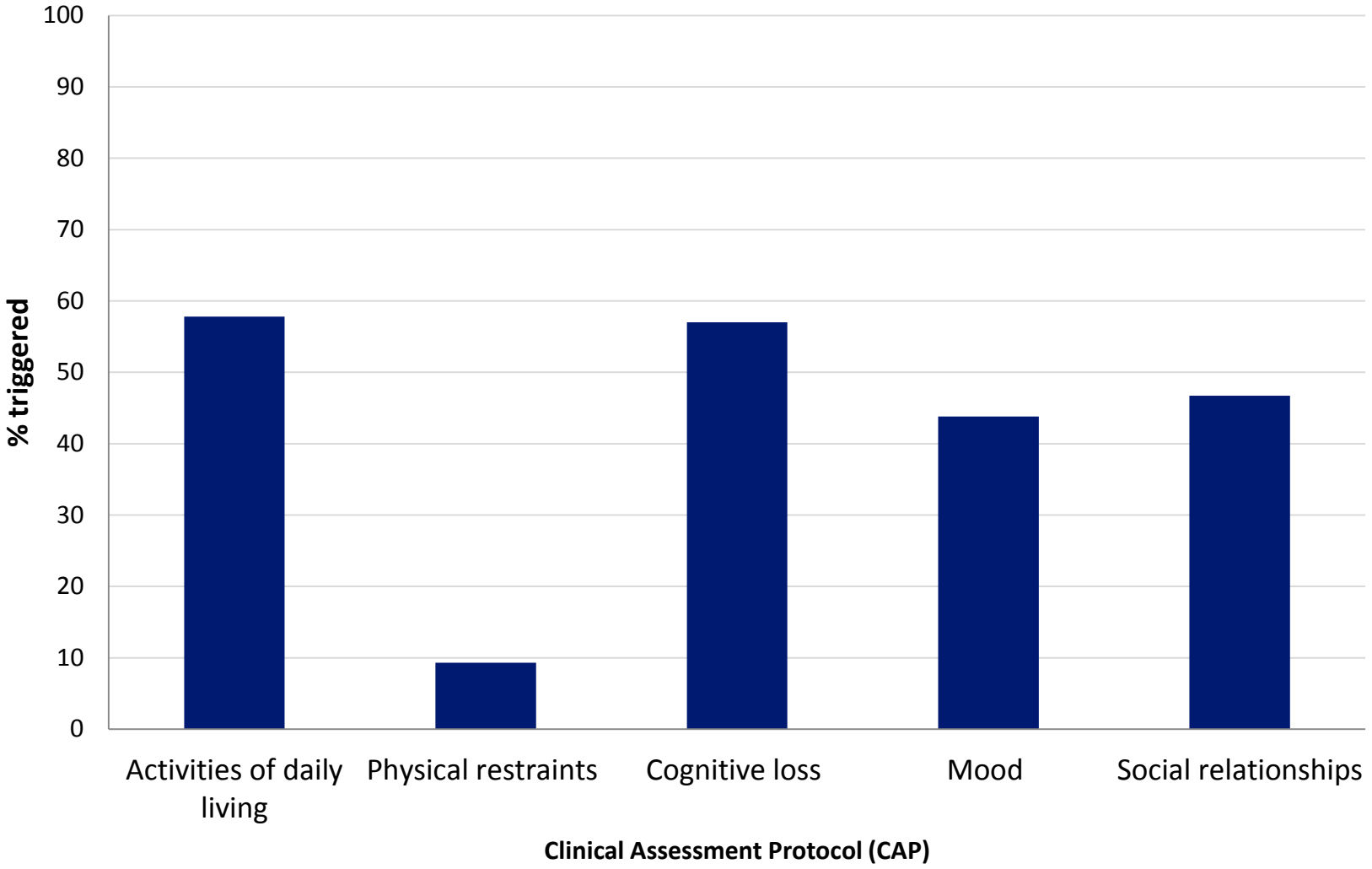
# Most common diagnostic categories and diseases reported on RAI-MDS closest to discharge from a complex continuing care facility between April 1st 2005 and March 31st 2006.

| Conditions | N (%) |
|---|---|
| **Neurological disorders** | **889 (46.6)** |
| Hemiplegia/hemiparesis | 189 (9.9) |
| Seizure disorder | 187 (9.8) |
| Aphasia | 174 (9.1) |
| **Other** | **817 (42.8)** |
| Allergies | 461 (24.2) |
| Anemia | 202 (10.6) |
| Gastrointestinal disease | 176 (9.2) |
| Cancer | 164 (8.6) |
| **Heart/Circulation** | **689 (36.1)** |
| Hypertension | 475 (24.9) |
| Other cardiovascular disease | 196 (10.3) |
| **Psychiatric/Mood** | **534 (28.1)** |
| Depression | 407 (21.4) |
| **Endocrine** | **527 (27.6)** |
| Diabetes | 451 (23.7) |
| **Musculoskeletal** | **428 (22.5)** |
| Arthritis | 190 (10.0) |
| **Pulmonary** | **212 (11.1)** |
| Emphysema/COPD | 148 (7.8) |
| **Sensory** | **83 (4.4)** |

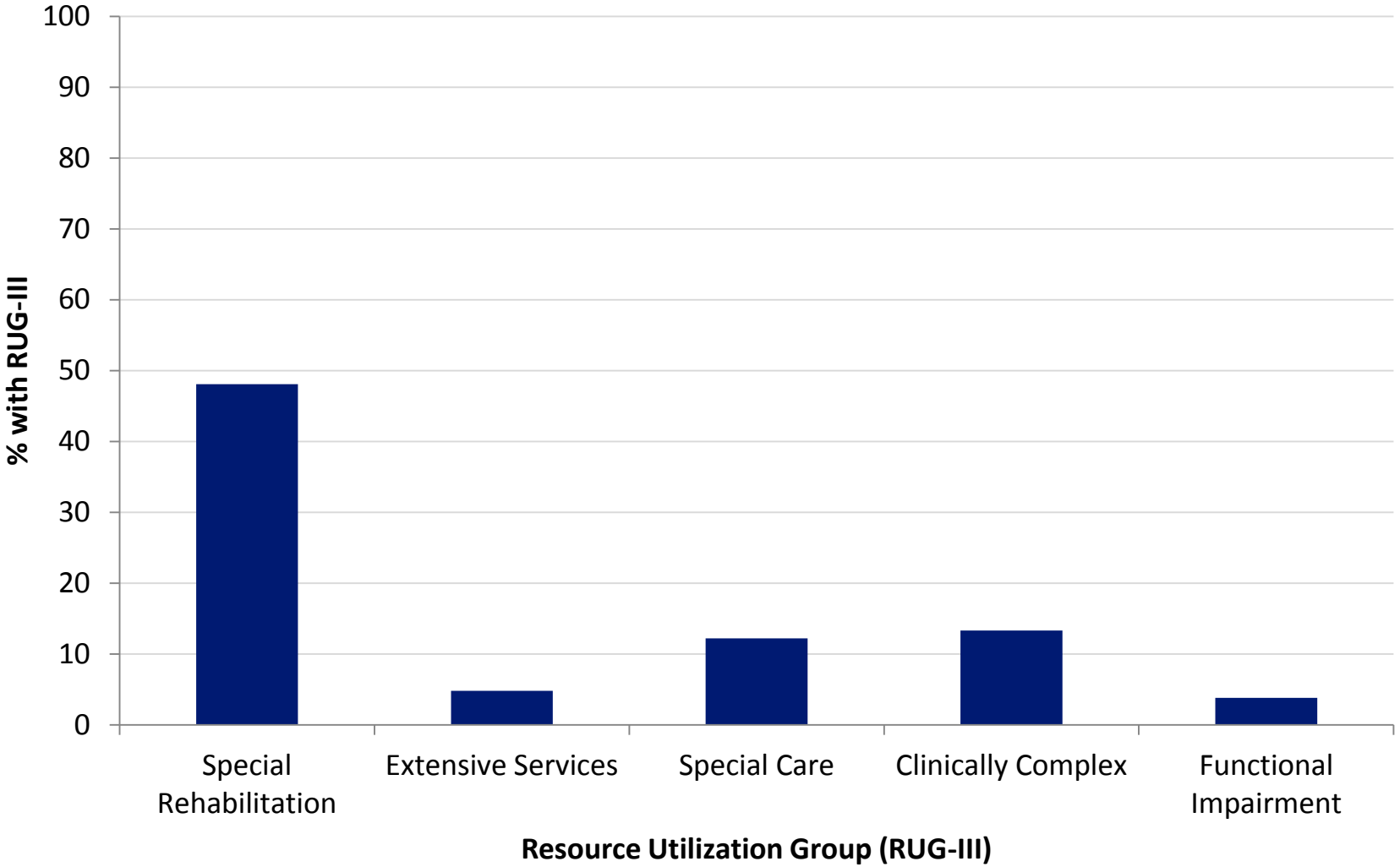
# Functional characteristics of young and midlife adults in Ontario discharged from a complex continuing care facility between April 1st, 2005 and March 31st, 2006.



# Functional characteristics of young and midlife adults in Ontario discharged from complex continuing care facility between April 1st, 2005 and March 31st, 2006.



# Resource intensity of young and midlife adults in Ontario discharged from a complex continuing care facility between April 1st, 2005 and March 31st, 2006.




Note: Functional impairment group includes (1) behaviour problems; (2) cognitive impairment; (3) reduced physical function

# Findings: Health service use and morality

# Summary: Health service use and mortality

- Home care service use and long-term care placement was lower with less than half using homecare over 5 years, and 21.7% placed into a long-term care facility within the five years.
- Within one and five years following discharge 50.8% and 73.5% of patients respectively had at least one acute care admission with 20.4% became ALC within the five year time frame.
- Almost all (93.8%) of the CCC patients had at least one emergency room visit within the 5 year timeframe with the typical range of visits between 3-16 visits in the 5 year follow-up period.
- Over one quarter of the CCC population was re-admitted to CCC within the 5 year follow-up period while rehabilitation and psychiatric facility admissions were lower.
- Within five years, 41% of the cohort had died. Neoplasms (cancer) were the most common cause of death in the first year following discharge (46%) and over the five-year period (27%).

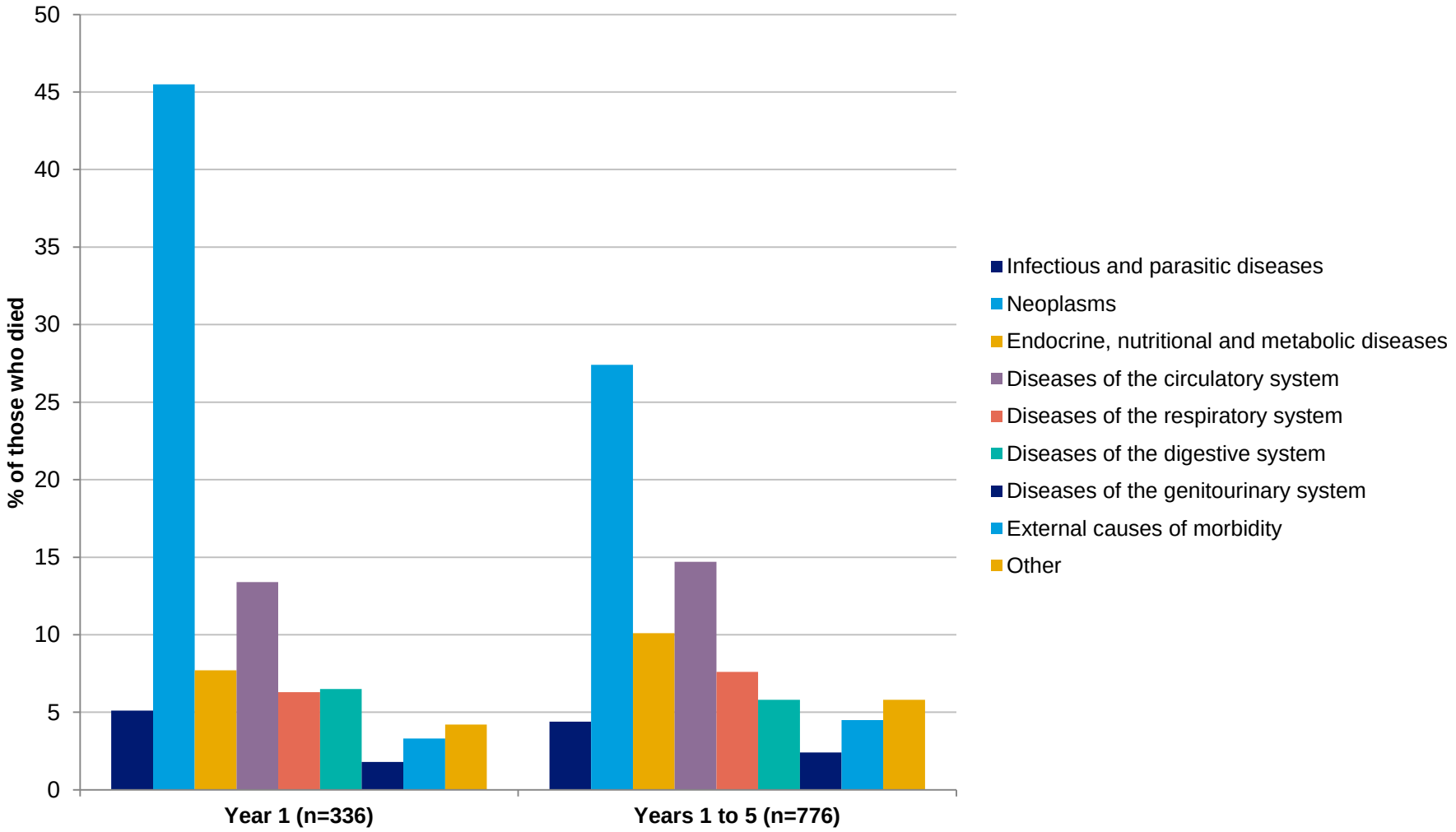
# Health service utilization over one and five years among young and midlife adults in Ontario discharged from a complex continuing care facility between April 1st, 2005 and March 31st, 2006

| Young to midlife adults discharged from complex continuing care, N | 1,906 | |
|---|---|---|
| **Mortality, all cause** | 336 (17.6%) | 776 (40.7%) |
| **Health Service Utilization** | **Year 1** | **Years 1 to 5** |
| **GP/FP Visits** | | |
| No. of visits, mean ± SD | 28.42 ± 30.60 | 85.89 ± 106.99 |
| No. of visits, median (IQR) | 18 (8-38) | 54 (24-101) |
| **Specialist Visits** | | |
| No. of visits, mean ± SD | 26.34 ± 37.44 | 82.25 ± 119.47 |
| No. of visits, median (IQR) | 13 (5-32) | 43 (17-101) |
| **Home Care Service Use** | | |
| Any home care visit, n (%) | 683 (35.8%) | 909 (47.7%) |
| No. of monthly visits, mean ± SD | 17.06 ± 18.84 | 14.96 ± 16.44 |
| No. of monthly visits, median (IQR) | 10 (4-24) | 9 (4-21) |
| **Long-Term Care Use** | | |
| Any long-term care applications | 138 (7.2%) | 331 (17.4%) |
| Any long-term care placements | 300 (15.7%) | 413 (21.7%) |

# Health service utilization over one and five years among young and midlife adults in Ontario discharged from a complex continuing care facility between April 1st, 2005 and March 31st, 2006

| Young to midlife adults discharged from complex continuing care, N | 1,906 | |
|---|---|---|
| **Health Service Utilization** | **Year 1** | **Years 1 to 5** |
| **Acute Care Hospital Admissions** | | |
| Any admission, n (%) | 968 (50.8%) | 1,400 (73.5%) |
| No. of admissions, mean ± SD | 1.82 ± 1.49 | 3.43 ± 3.42 |
| No. of admissions, median (IQR) | 1 (1-2) | 2 (1-4) |
| **Emergency Department Visits** | | |
| Any visit, n (%) | 1,204 (63.2%) | 1,787 (93.8%) |
| No. of visits, mean ± SD | 10.58 ± 29.37 | 31.48 ± 111.49 |
| No. of visits, median (IQR) | 2 (1-5) | 7 (3-16) |
| **Inpatient Rehabilitation Admissions** | | |
| Any admission, n (%) | 266 (14.0%) | 327 (17.2%) |
| No. of admissions, mean ± SD | 1.10 ± 0.33 | 1.21 ± 0.50 |
| No. of admissions, median (IQR) | 1 (1-1) | 1 (1-1) |
| **Complex Continuing Care Admissions** | | |
| Any admission, n (%) | 389 (20.4%) | 531 (27.9%) |
| No. of admissions, mean ± SD | 6.97 ± 7.56 | 8.23 ± 8.77 |
| No. of admissions, median (IQR) | 4 (2-9) | 4 (1-13) |
| **Psychiatric Hospital Admissions** | | |
| Any admission, n (%) | 53 (2.8%) | 117 (6.1%) |
| No. of admissions, mean ± SD | 1.57 ± 1.50 | 2.37 ± 2.35 |
| No. of admissions, median (IQR) | 1 (1-2) | 1 (1-3) |

# Distribution of cause of death over one and five years among young and midlife adults in Ontario discharged from a complex continuing care facility between April 1st, 2005 and March 31st, 2006




Other cause of death include diseases of the blood and blood-forming organs, mental health, skin and subcutaneous tissue, musculoskeletal system; perinatal, congenital anomalies, and symptoms not elsewhere classified

# Findings: Stratified analyses

# Summary: By age and sex

- Overall, younger men also had the highest number of specialist visits. Compared to older women in the cohort, younger women had a higher number of visits to family physician.
- More than half (53.1%) of older women in the cohort had at least one home care service visit. One-fifth of younger women had an application to long-term care; however, placements among older men and women were more common.
- Within five years following discharge, ALC stays were more common among older men and women, between the ages of 45 and 64 (20.8% and 21.9%, respectively).
- Admissions to complex continuing care were highest among younger men (36.4%) and women (35.8%), in addition to the number of admissions over the five year period. Younger men had a considerably higher number of admissions to CCC (median 9, IQR 2-21), compared to older men. Similar patterns were found between younger and older women.
- Admissions to rehabilitation and psychiatric care facilities were more common among younger men between the ages of 18 and 44 (19.5% and 8.7%).

# Health system utilization and costs by young and midlife adults five years following discharge from a complex continuing care facility between April 1, 2005 and March 31, 2006, by age and sex.

| | Male | | Female | |
|---|---|---|---|---|
| | 18-44 | 45-64 | 18-44 | 45-64 |
| **Young to midlife adults discharged from complex continuing care, N** | **231** | **756** | **162** | **757** |
| **Health Service Use,** | | | | |
| **Primary Care Visits** | | | | |
| No. of visits, mean ± SD | 106.52 ± 137.37 | 80.71 ± 100.23 | 106.89 ± 139.70 | 80.41 ± 93.20 |
| No. of visits, median (IQR) | 51 (23-119) | 51 (21-93) | 63 (25-131) | 55 (25-100) |
| **Specialist Visits** | | | | |
| No. of visits, mean ± SD | 93.88 ± 124.38 | 74.49 ± 93.34 | 101.61 ± 166.15 | 82.19 ± 128.17 |
| No. of visits, median (IQR) | 57 (23-125) | 39 (14-94) | 49 (20-107) | 44 (16-97) |
| **Home Care Services** | | | | |
| Any home care service use, n(%) | 99 (42.9%) | 331 (43.8%) | 77 (47.5%) | 402 (53.1%) |
| No. of monthly visits, mean ± SD | 18.11 ± 19.10 | 14.09 ± 15.70 | 15.77 ± 21.29 | 14.74 ± 15.18 |
| No. of monthly visits, median (IQR) | 11 (3-27) | 9 (3-20) | 8 (3-21) | 10 (4-20) |
| **Long-Term Care Use** | | | | |
| Any long-term care applications, n(%) | 34 (14.7%) | 132 (17.5%) | 31 (19.1%) | 134 (17.7%) |
| Any long-term care placements, n(%) | 24 (10.4%) | 182 (24.1%) | 28 (17.3%) | 179 (23.6%) |

# Health system utilization and costs by young and midlife adults five years following discharge from a complex continuing care facility between April 1, 2005 and March 31, 2006, by age and sex.

| | Male | | Female | |
|---|---|---|---|---|
| | 18-44 | 45-64 | 18-44 | 45-64 |
| **Young to midlife adults discharged from complex continuing care, N** | **N=231 (23.4%)** | **N=756 (76.6%)** | **N=162 (17.6%)** | **N=757 (82.4%)** |
| **Health Service Use, n (%)** | | | | |
| **Acute Care Hospital Admissions** | | | | |
| Any acute care admissions, n (%) | 168 (72.7%) | 545 (72.1%) | 118 (72.8%) | 569 (75.2%) |
| No. of admissions, mean ± SD | 3.74 ± 3.31 | 3.35 ± 3.37 | 3.59 ± 3.33 | 3.39 ± 3.51 |
| No. of admissions, median (IQR) | 3 (1-5) | 2 (1-4) | 2 (1-5) | 2 (1-4) |
| Acute length of stay (days) | | | | |
| No. of days, mean ± SD | 10.19 ± 17.34 | 9.62 ± 12.09 | 9.56 ± 10.52 | 10.18 ± 21.99 |
| No. of days, median (IQR) | 6 (4-10) | 7 (4-10) | 7 (3-12) | 7 (4-11) |
| Any ALC, n (%) | 38 (16.5%) | 157 (20.8%) | 28 (17.3%) | 166 (21.9%) |
| ALC length of stay | | | | |
| No. of days, mean ± SD | 24.34 ± 41.55 | 29.29 ± 58.25 | 44.49 ± 84.52 | 19.38 ± 26.76 |
| No. of days, median (IQR) | 9 (4-33) | 11 (4-26) | 10 (6-42) | 10 (4-22) |
| **Emergency Department Visits** | | | | |
| Any ED visits, n (%) | 213 (92.2%) | 719 (95.1%) | 146 (90.1%) | 709 (93.7%) |
| No. of visits, mean ± SD | 35.46 ± 101.13 | 33.60 ± 125.85 | 27.18 ± 98.17 | 29.01 ± 101.18 |
| No. of visits, median (IQR) | 9 (4-20) | 7 (3-14) | 8 (4-15) | 7 (3-16) |
| **Inpatient Rehabilitation Admissions** | | | | |
| Any rehabilitation hospital admissions, n (%) | 45 (19.5%) | 124 (16.4%) | 26 (16.0%) | 132 (17.4%) |
| No. of admissions, mean ± SD | 1.13 ± 0.46 | 1.18 ± 0.46 | 1.23 ± 0.59 | 1.27 ± 0.52 |
| No. of admissions, median (IQR) | 1 (1-1) | 1 (1-1) | 1 (1-1) | 1 (1-1) |
| **Complex Continuing Care Admissions** | | | | |
| Any complex continuing care admissions, n (%) | 84 (36.4%) | 183 (24.2%) | 58 (35.8%) | 206 (27.2%) |
| No. of admissions, mean ± SD | 11.60 ± 9.73 | 8.19 ± 8.56 | 9.88 ± 8.86 | 6.43 ± 8.07 |
| No. of admissions, median (IQR) | 9 (2-21) | 4 (2-12) | 6 (3-18) | 2 (1-8) |
| **Psychiatric Hospital Admissions** | | | | |
| Any psychiatric hospital admissions, n (%) | 20 (8.7%) | 40 (5.3%) | 11 (6.8%) | 46 (6.1%) |
| No. of admissions, mean ± SD | 2.90 ± 2.90 | 1.98 ± 1.51 | 2.91 ± 3.81 | 2.35 ± 2.26 |
| No. of admissions, median (IQR) | 1 (1-4) | 1 (1-2) | 2 (1-3) | 1 (1-3) |

# Summary: By income

- Individuals from the low and medium quintile groups tended to have a greater number of family physician and specialist visits than their higher income (Q4, Q5) counterparts.
- Individuals in the lowest income quintile group used more home care services compared to their higher income counterparts; long-term care placement was highest for those from the medium income quintile neighborhood.
- Inpatient rehabilitation and psychiatric admissions were higher among individuals from the lowest income group.
- While little variation was found in rates of acute care admissions, ED visits, and ALC stays, the number of admissions and visits were higher among those in the lowest income quintile. Individuals in the lowest income quintile group tended to have a longer acute care stay and a higher rate of ALC compared to those in the higher neighborhood income quintiles.

# Health system utilization and costs by young and midlife adults five years following discharge from a complex continuing care facility between April 1, 2005 and March 31, 2006, by income level.

| | Neighbourhood income level | | |
|---|---|---|---|
| | **Low** | **Medium** | **High** |
| **Young to midlife adults discharged from complex continuing care, N** | **943** | **367** | **577** |
| **Health Service Use** | | | |
| **Primary Care Visits** | | | |
| No. of visits, mean ± SD | 88.34 ± 113.80 | 88.39 ± 107.68 | 75.35 ± 95.84 |
| No. of visits, median (IQR) | 54 (25-106) | 55 (24-103) | 50 (20-86) |
| **Specialist visits** | | | |
| No. of visits, mean ± SD | 94.01 ± 136.78 | 74.50 ± 89.59 | 69.82 ± 117.32 |
| No. of visits, median (IQR) | 49 (18-118) | 42 (16-101) | 38 (13-80) |
| **Home Care Services** | | | |
| Any home care service use, n (%) | 290 (53.0%) | 159 (43.3%) | 145 (44.3%) |
| Average number of monthly home care visits | | | |
| No. of monthly visits, mean ± SD | 15.76 ± 16.60 | 14.86 ± 16.51 | 13.69 ± 14.84 |
| No. of monthly visits, median (IQR) | 9 (4-22) | 9 (3-20) | 9 (3-20) |
| **Long-Term Care Use** | | | |
| Any long-term care applications, n (%) | 98 (17.9%) | 64 (17.4%) | 63 (19.3%) |
| Any long-term care placements, n (%) | 116 (21.2%) | 99 (27.0%) | 74 (22.6%) |

# Health system utilization and costs by young and midlife adults five years following discharge from a complex continuing care facility between April 1, 2005 and March 31, 2006, by income level.

| | Neighbourhood income level | | |
|---|---|---|---|
| | Low | Medium | High |
| **Young to midlife adults discharged from complex continuing care, N** | **N=943** | **N=367** | **N=577** |
| **Health Service Use** | | | |
| **Acute Care Hospital Admissions** | | | |
| Any acute care admissions, n (%) | 415 (75.9%) | 279 (76.0%) | 230 (70.3%) |
| No. of admissions, mean ± SD | 4.10 ± 4.17 | 3.30 ± 3.19 | 2.71 ± 3.03 |
| No. of admissions, median (IQR) | 3 (1-5) | 2 (1-4) | 2 (1-3) |
| **Acute length of stay** | | | |
| No. of days, mean ± SD | 10.21 ± 25.15 | 10.54 ± 15.69 | 9.13 ± 12.87 |
| No. of days, median (IQR) | 7 (4-10) | 7 (4-11) | 6 (3-11) |
| Any ALC, n (%) | 415 (75.9%) | 279 (76.0%) | 230 (70.3%) |
| ALC length of stay | | | |
| No. of days, mean ± SD | 30.27 ± 63.81 | 19.24 ± 26.03 | 17.05 ± 18.09 |
| No. of days, median (IQR) | 8 (4-27) | 12 (6-24) | 10 (5-22) |
| **Emergency Department Visits** | | | |
| Any visits, n (%) | 516 (94.3%) | 343 (93.5%) | 305 (93.3%) |
| No. of visits, mean ± SD | 34.49 ± 113.62 | 26.93 ± 91.63 | 29.55 ± 116.32 |
| No. of visits, median (IQR) | 9 (4-18) | 8 (3-14) | 6 (3-13) |
| **Inpatient Rehabilitation Admissions** | | | |
| Any rehabilitation hospital admissions, n (%) | 105 (19.2%) | 53 (14.4%) | 53 (16.2%) |
| No. of admissions, mean ± SD | 1.32 ± 0.63 | 1.17 ± 0.43 | 1.17 ± 0.43 |
| No. of admissions, median (IQR) | 1 (1-1) | 1 (1-1) | 1 (1-1) |
| **Complex Continuing Care Admissions** | | | |
| Any complex continuing care admissions, n (%) | 150 (27.4%) | 105 (28.6%) | 82 (25.1%) |
| No. of admissions, mean ± SD | 7.06 ± 8.31 | 7.83 ± 8.61 | 7.66 ± 8.30 |
| No. of admissions, median (IQR) | 3 (1-10) | 4 (1-12) | 4 (1-12) |
| **Psychiatric Hospital Admissions** | | | |
| Any psychiatric hospital admissions, n (%) | 42 (7.7%) | 23 (6.3%) | 14 (4.3%) |
| No. of admissions, mean ± SD | 2.33 ± 1.96 | 2.74 ± 3.45 | 2.71 ± 2.64 |
| No. of admissions, median (IQR) | 2 (1-3) | 1 (1-3) | 1 (1-4) |

# Summary: By geography

- The number of family physician and specialist visits were highest among those living in major urban areas, whereas home care service use was lower.
- The proportion of individuals with an ED visit, as well as the number of ED visits over a five-year period was highest among those residing in rural areas.
- Inpatient rehabilitation admissions were more common in major urban and urban areas, as were continuing care admissions in major urban areas.
- The number of readmissions to continuing care within the five-year was considerably higher among those in major urban areas.

# Health system utilization and costs by young to midlife adults five years following discharge from a complex continuing care facility between April 1, 2005 and March 31, 2006, by rurality.

| | Geography | | |
|---|---|---|---|
| | **Major Urban** | **Urban** | **Rural** |
| **Young to midlife adults discharged from complex continuing care, N** | **N=1,230** | **N=427** | **N=201** |
| **Health Service Use** | | | |
| **Primary Visits** | | | |
| No. of visits, mean ± SD | 95.96 ± 124.44 | 65.94 ± 61.63 | 71.49 ± 61.34 |
| No. of visits, median (IQR) | 55 (23-109) | 50 (22-89) | 54 (29-98) |
| **Specialist visits** | | | |
| No. of visits, mean ± SD | 91.98 ± 131.75 | 64.90 ± 92.92 | 57.70 ± 73.58 |
| No. of visits, median (IQR) | 51 (19-111) | 36 (12-78) | 28 (11-80) |
| **Home Care Services** | | | |
| Any home care service use, n (%) | 565 (45.9%) | 225 (52.7%) | 99 (49.3%) |
| No. of monthly visits, mean ± SD | 14.63 ± 15.86 | 17.25 ± 19.12 | 12.18 ± 13.19 |
| No. of monthly visits, median (IQR) | 9 (3-21) | 10 (4-22) | 8 (3-17) |
| **Long-Term Care Use** | | | |
| Any long-term care applications. n (%) | 219 (17.8%) | 76 (17.8%) | 29 (14.4%) |
| Any long-term care placements, n (%) | 251 (20.4%) | 106 (24.8%) | 46 (22.9%) |

# Health system utilization and costs by young to midlife adults five years following discharge from a complex continuing care facility between April 1, 2005 and March 31, 2006, by rurality.

| | Geography | | |
|---|---|---|---|
| | Major Urban | Urban | Rural |
| **Young to midlife adults discharged from complex continuing care, N** | **N=1,230** | **N=427** | **N=201** |
| **Health Service Use** | | | |
| **Acute Care Hospital Admissions** | | | |
| Any acute care admissions, n (%) | 893 (72.6%) | 323 (75.6%) | 151 (75.1%) |
| No. of admissions, mean ± SD | 3.29 ± 3.07 | 3.47 ± 3.64 | 3.81 ± 4.37 |
| No. of admissions, median (IQR) | 2 (1-4) | 2 (1-4) | 2 (1-5) |
| Acute length of stay | | | |
| No. of days, mean ± SD | 10.50 ± 19.75 | 8.49 ± 10.19 | 9.15 ± 13.38 |
| No. of days, median (IQR) | 7 (4-11) | 6 (4-10) | 6 (3-10) |
| Any ALC, n (%) | 255 (20.7%) | 82 (19.2%) | 38 (18.9%) |
| ALC length of stay | | | |
| No. of days, mean ± SD | 28.93 ± 56.25 | 20.59 ± 32.44 | 17.68 ± 20.26 |
| No. of days, median (IQR) | 10 (4-28) | 12 (6-21) | 7 (4-28) |
| **Emergency Department Visits** | | | |
| Any ED visits, n (%) | 1,143 (92.9%) | 405 (94.8%) | 192 (95.5%) |
| No. of visits, mean ± SD | 28.09 ± 102.35 | 24.05 ± 92.82 | 54.07 ± 160.06 |
| No. of visits, median (IQR) | 7 (3-14) | 8 (3-15) | 9 (4-22) |
| **Inpatient Rehabilitation Admissions** | | | |
| Any rehabilitation hospital admissions, n (%) | 212 (17.2%) | 81 (19.0%) | 24 (11.9%) |
| No. of admissions, mean ± SD | 1.21 ± 0.50 | 1.21 ± 0.47 | 1.21 ± 0.59 |
| No. of admissions, median (IQR) | 1 (1-1) | 1 (1-1) | 1 (1-1) |
| **Complex Continuing Care Admissions** | | | |
| Any complex continuing care admissions, n (%) | 385 (31.3%) | 92 (21.5%) | 40 (19.9%) |
| No. of admissions, mean ± SD | 9.75 ± 9.31 | 4.20 ± 5.37 | 4.35 ± 5.63 |
| No. of admissions, median (IQR) | 5 (2-18) | 2 (1-5) | 2 (1-4) |
| **Psychiatric Hospital Admissions** | | | |
| Any psychiatric hospital admissions, n (%) | 79 (6.4%) | 23 (5.4%) | 13 (6.5%) |
| No. of admissions, mean ± SD | 2.25 ± 2.23 | 2.91 ± 3.01 | 1.69 ± 1.44 |
| No. of admissions, median (IQR) | 1 (1-3) | 2 (1-4) | 1 (1-2) |

# Summary: By Resource Utilization Group (RUG-III)

- Utilization tended to be highest overall in the extensive services group, particularly physician visits, homecare visits, acute care and complex continuing care admissions (patients in this RUG group may require IV feeding, tracheostomy care and ventilation).
- ED visits were highest among the special rehabilitation group (those requiring a combination of speech, occupational or physiotherapy and restorative nursing care).
- Long-term care placements were highest among those in the clinical complex group (those requiring clinical treatments such as like dialysis, chemotherapy, transfusions and oxygen).

# Health system utilization and costs by young and midlife adults five years following discharge from a complex continuing care facility between April 1, 2005 and March 31, 2006, by resource utilization group (RUG-III).

| | Resource Utilization Group (RUG-III) | | | |
|---|---|---|---|---|
| | Special Rehabilitation | Extensive services | Special care | Clinically complex |
| **Young to midlife adults discharged from complex continuing care, N** | **917** | **91** | **232** | **253** |
| **Health Service Utilization** | | | | |
| **GP/FP Visits** | | | | |
| No. of visits, mean ± SD | 80.69 ± 93.40 | 172.00 ± 184.82 | 97.35 ± 113.98 | 72.36 ± 84.95 |
| No. of visits, median (IQR) | 55 (26-98) | 90 (27-257) | 61 (26-116) | 51 (20-92) |
| **Specialist Visits** | | | | |
| No. of visits, mean ± SD | 84.95 ± 111.92 | 151.84 ± 246.60 | 72.98 ± 88.66 | 66.85 ± 87.27 |
| No. of visits, median (IQR) | 49 (21-106) | 61 (22-147) | 39 (15-102) | 32 (11-79) |
| **Home Care Service Use** | | | | |
| Any home care visit, n (%) | 475 (51.8%) | 37 (40.7%) | 111 (47.8%) | 122 (48.2%) |
| No. of monthly visits, mean ± SD | 14.86 ± 16.60 | 23.58 ± 24.05 | 18.22 ± 15.59 | 13.24 ± 16.73 |
| No. of monthly visits, median (IQR) | 9 (4-20) | 15 (2-40) | 14 (7-26) | 8 (3-17) |
| **Long-Term Care Use** | | | | |
| Any long-term care applications, n (%) | 172 (18.8%) | 12 (13.2%) | 38 (16.4%) | 49 (19.4%) |
| Any long-term care placements, n (%) | 196 (21.4%) | 10 (11.0%) | 49 (21.1%) | 83 (32.8%) |

# Health system utilization and costs by young and midlife adults five years following discharge from a complex continuing care facility between April 1, 2005 and March 31, 2006, by resource utilization group (RUG-III).

| | Resource Utilization Group (RUG-III) | | | |
|---|---|---|---|---|
| | Special Rehabilitation | Extensive services | Special care | Clinically complex |
| **Young to midlife adults discharged from complex continuing care, N** | **917** | **91** | **232** | **253** |
| **Health Service Utilization** | | | | |
| **Acute Care Hospital Admissions** | | | | |
| Any admission, n (%) | 666 (72.6%) | 77 (84.6%) | 177 (76.3%) | 186 (73.5%) |
| No. of admissions, mean ± SD | 3.35 ± 3.05 | 3.75 ± 3.27 | 3.31 ± 2.97 | 3.54 ± 3.52 |
| No. of admissions, median (IQR) | 2 (1-4) | 3 (1-4) | 2 (1-5) | 2 (1-5) |
| **Emergency Department Visits** | | | | |
| Any visit, n (%) | 866 (94.4%) | 84 (92.3%) | 210 (90.5%) | 234 (92.5%) |
| No. of visits, mean ± SD | 32.29 ± 118.57 | 30.05 ± 121.94 | 33.48 ± 105.46 | 32.41 ± 111.06 |
| No. of visits, median (IQR) | 6 (3-14) | 7 (4-13) | 8 (3-17) | 9 (4-20) |
| **Inpatient Rehabilitation Admissions** | | | | |
| Any admission, n (%) | 184 (20.1%) | 12 (13.2%) | 25 (10.8%) | 21 (8.3%) |
| No. of admissions, mean ± SD | 1.20 ± 0.46 | 1.17 ± 0.39 | 1.24 ± 0.52 | 1.29 ± 0.56 |
| No. of admissions, median (IQR) | 1 (1-1) | 1 (1-1) | 1 (1-1) | 1 (1-1) |
| **Complex Continuing Care Admissions** | | | | |
| Any admission, n (%) | 225 (24.5%) | 54 (59.3%) | 88 (37.9%) | 60 (23.7%) |
| No. of admissions, mean ± SD | 6.72 ± 7.94 | 14.07 ± 9.13 | 10.77 ± 9.31 | 4.67 ± 6.26 |
| No. of admissions, median (IQR) | 3 (1-9) | 12 (6-23) | 7 (3-19) | 2 (1-5) |
| **Psychiatric Hospital Admissions** | | | | |
| Any admission, n (%) | 58 (6.3%) | < 6 | 6 (2.6%) | 26 (10.3%) |
| No. of admissions, mean ± SD | 2.16 ± 1.82 | | 1.50 ± 1.22 | 2.12 ± 1.86 |
| No. of admissions, median (IQR) | 1 (1-3) | | 1 (1-1) | 1 (1-2) |

# Summary: By number of conditions

- Overall, health service use within five years increased with the number of health conditions/diagnoses. The number of family physician and specialist visits among those with three or more conditions was nearly twice that of individuals without any health conditions.
- Rates of home care use and long-term care placement were greater; however average number of homecare visits was slightly lower among those with 3+ health conditions.
- A greater proportion of individuals with 3+ conditions had an acute care admission. Acute and ALC length of stay, and number of ED visits increased with the number of health conditions.

# Health system utilization and costs by young to midlife adults five years following discharge from a complex continuing care facility between April 1, 2005 and March 31, 2006, by number of conditions.

| | Number of diagnoses | | | |
|---|---|---|---|---|
| | 0 | 1 | 2 | 3+ |
| **Young to midlife adults discharged from complex continuing care, N** | **N=51** | **N=241** | **N=272** | **N=1,034** |
| **Health Service Use, n (%)** | | | | |
| **Primary care visits** | | | | |
| No. of visits, mean ± SD | 40.00 ± 53.72 | 72.59 ± 93.29 | 87.09 ± 108.27 | 92.44 ± 106.20 |
| No. of visits, median (IQR) | 26 (15-41) | 45 (24-90) | 54 (22-101) | 63 (29-113) |
| **Specialist visits** | | | | |
| No. of visits, mean ± SD | 38.65 ± 44.89 | 71.31 ± 116.98 | 66.36 ± 103.53 | 93.91 ± 130.22 |
| No. of visits, median (IQR) | 23 (11-45) | 33 (15-87) | 36 (16-82) | 52 (19-116) |
| **Home Care Services** | | | | |
| Any home care service use, n (%) | 16 (31.4%) | 105 (43.6%) | 121 (44.5%) | 541 (52.3%) |
| No. of monthly visits, mean ± SD | 16.30 ± 15.98 | 17.34 ± 19.89 | 16.26 ± 18.01 | 14.74 ± 16.00 |
| No. of monthly visits, median (IQR) | 13 (3-23) | 11 (4-21) | 9 (4-23) | 9 (3-21) |
| **Long-Term Care Use** | | | | |
| Any long-term care applications, n (%) | < 6 | 38 (15.8%) | 39 (14.3%) | 201 (19.4%) |
| Any long-term care placements, n (%) | < 6 | 51 (21.2%) | 59 (21.7%) | 264 (25.5%) |

# Health system utilization and costs by young to midlife adults five years following discharge from a complex continuing care facility between April 1, 2005 and March 31, 2006, by number of conditions.

| | Number of diagnoses | | | |
|---|---|---|---|---|
| | 0 | 1 | 2 | 3+ |
| **Young to midlife adults discharged from complex continuing care, N** | **N=51** | **N=241** | **N=272** | **N=1,034** |
| **Health Service Use** | | | | |
| **Acute Care Hospital Admissions** | | | | |
| Any acute care admissions, n (%) | 25 (49.0%) | 155 (64.3%) | 201 (73.9%) | 796 (77.0%) |
| No. of admissions, mean ± SD | 2.28 ± 1.77 | 2.96 ± 2.53 | 3.31 ± 3.37 | 3.55 ± 3.30 |
| No. of admissions, median (IQR) | 1 (1-3) | 2 (1-4) | 2 (1-4) | 2 (1-5) |
| Acute length of stay | | | | |
| No. of days, mean ± SD | 7.69 ± 7.04 | 7.73 ± 7.76 | 9.42 ± 14.95 | 10.92 ± 20.66 |
| No. of days, median (IQR) | 6 (4-9) | 6 (3-9) | 6 (4-10) | 7 (4-12) |
| Any ALC, n (%) | < 6 | 35 (14.5%) | 55 (20.2%) | 235 (22.7%) |
| ALC length of stay | | | | |
| No. of days, mean ± SD | | 43.46 ± 76.75 | 22.05 ± 33.63 | 23.20 ± 35.73 |
| No. of days, median (IQR) | | 10 (4-38) | 8 (3-28) | 11 (5-26) |
| **Emergency Department Visits** | | | | |
| Any ED visits, n (%) | 49 (96.1%) | 226 (93.8%) | 244 (89.7%) | 971 (93.9%) |
| No. of visits, mean ± SD | 5.33 ± 4.75 | 15.63 ± 45.24 | 15.65 ± 37.63 | 41.03 ± 137.70 |
| No. of visits, median (IQR) | 4 (2-7) | 7 (3-15) | 6 (3-14) | 8 (3-16) |
| **Inpatient Rehabilitation Admissions** | | | | |
| Any rehabilitation hospital admissions, n (%) | 10 (19.6%) | 36 (14.9%) | 31 (11.4%) | 177 (17.1%) |
| No. of admissions, mean ± SD | 1.20 ± 0.63 | 1.14 ± 0.42 | 1.16 ± 0.37 | 1.24 ± 0.53 |
| No. of admissions, median (IQR) | 1 (1-1) | 1 (1-1) | 1 (1-1) | 1 (1-1) |
| **Complex Continuing Care Admissions** | | | | |
| Any complex continuing care admissions, n (%) | < 6 | 56 (23.2%) | 87 (32.0%) | 302 (29.2%) |
| No. of admissions, mean ± SD | | 8.29 ± 8.57 | 9.01 ± 9.28 | 7.99 ± 8.60 |
| No. of admissions, median (IQR) | | 4 (2-13) | 5 (1-16) | 4 (2-12) |
| **Psychiatric Hospital Admissions** | | | | |
| Any psychiatric hospital admissions, n (%) | < 6 | 18 (7.5%) | 18 (6.6%) | 61 (5.9%) |
| No. of admissions, mean ± SD | | 2.89 ± 2.45 | 1.89 ± 1.78 | 2.07 ± 1.87 |
| No. of admissions, median (IQR) | | 2 (1-3) | 1 (1-2) | 1 (1-2) |

# Limitations

- Data challenges included missing values in RAI-MDS functional characteristics, and incomplete assessment data
- From an analytical perspective, an additional limitation was the relatively low cohort size, with high mortality rate within five years of discharge.

# Conclusion

- The young and midlife population in complex continuing care represents a highly complex population
    - Multi-morbidity
    - High resource users (particularly hospital, physician and ED use)
    - Disproportionate use among a small proportion requiring complex treatments
    - Social complexity (indications of low income, mental health challenges and social isolation)
- High mortality; 41% of the cohort died within 5 years following discharge

*Also see related manuscript.