



# Health System Use by Frail Ontario Seniors

*An in-depth examination of four vulnerable cohorts*

---

November 2011

# Health System Use by Frail Ontario Seniors

*An in-depth examination  
of four vulnerable cohorts*

---

Editors

*Susan E. Bronskill, PhD*

*Ximena Camacho, MMath*

*Andrea Gruneir, PhD*

*Minnie M. Ho, MHS*

---

November 2011

## PUBLICATION INFORMATION

Published by the Institute for Clinical Evaluative Sciences (ICES)

© 2011 Institute for Clinical Evaluative Sciences

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any format or by any means, electronic, mechanical, photocopying, recording or otherwise, without the proper written permission of the publisher.

The opinions, results and conclusions included in this report are those of the authors and are independent from the funding sources. No endorsement by the Institute for Clinical Evaluative Sciences (ICES) or the Ontario Ministry of Health and Long-Term Care (MOHLTC) is intended or should be inferred.

## Canadian Cataloguing in Publication Data

Health System Use by Frail Ontario Seniors: An In-Depth Examination of Four Vulnerable Cohorts.

ISBN: 978-1-926850-21-4 (Online)

### **Institute for Clinical Evaluative Sciences (ICES)**

G1 06, 2075 Bayview Avenue

Toronto, ON M4N 3M5

Telephone: 416-480-4055

[www.ices.on.ca](http://www.ices.on.ca)

## How to Cite This Publication

The production of *Health System Use by Frail Ontario Seniors* was a collaborative venture. Accordingly, to give credit to individual authors, please cite individual chapters and title, in addition to editors and book title.

Bronskill SE, Corbett L, Gruneir A, Stevenson, JE. Introduction. In: Bronskill SE, Camacho X, Gruneir A, Ho MM, editors. *Health System Use by Frail Ontario Seniors: An In-Depth Examination of Four Vulnerable Cohorts*. Toronto, ON: Institute for Clinical Evaluative Sciences; 2011.

## AUTHORS' AFFILIATIONS

### **Susan E. Bronskill, PhD**

*Scientist, Institute for Clinical Evaluative Sciences / Assistant Professor, Department of Health Policy, Management and Evaluation, University of Toronto*

### **Ximena Camacho, MMath**

*Epidemiologist, Institute for Clinical Evaluative Sciences*

### **Laura Corbett, PhD**

*Health Policy Consultant*

### **Sudeep S. Gill, MD, MSc, FRCPC**

*Associate Professor, Departments of Medicine (Geriatric Medicine) and Community Health and Epidemiology, Queen's University / Adjunct Scientist, Institute for Clinical Evaluative Sciences*

### **Andrea Gruneir, PhD**

*Scientist, Women's College Research Institute / Assistant Professor, Department of Health Policy, Management and Evaluation, University of Toronto / Adjunct Scientist, Institute for Clinical Evaluative Sciences*

### **Minnie M. Ho, MHS**

*Epidemiologist, Institute for Clinical Evaluative Sciences*

### **Jeffrey W. Poss, PhD**

*Assistant Research Professor, Department of Health Studies and Gerontology, University of Waterloo / Adjunct Scientist, Institute for Clinical Evaluative Sciences*

### **Jacqueline E. Stevenson, BA**

*Research and Communications Assistant, Institute for Clinical Evaluative Sciences*

### **Walter P. Wodchis, PhD**

*Associate Professor, Department of Health Policy, Management and Evaluation, University of Toronto / Research Scientist, Toronto Rehabilitation Institute / Adjunct Scientist, Institute for Clinical Evaluative Sciences*

## ACKNOWLEDGEMENTS

This document is the product of many collaborative efforts. The authors wish to acknowledge the contributions of the following individuals at the Institute for Clinical Evaluative Sciences:

### Research Practice

**Jessica Leah, MPH**

*Epidemiologist*

**Qi Li, MSc**

*Analyst*

### Communications

**Susan Shiller, MSc**

*Director, Communications*

**Nancy MacCallum, MLIS**

*Editor and Publications Coordinator*

## Additional Support

The authors also wish to express appreciation to the following people for their assistance:

David Henry (ICES), Larry Chambers (Élisabeth Bruyère Research Institute), John Hirdes (Ontario Home Care Research Network), Pat Stoddart (formerly Central West Local Health Integration Network), Barbara Liu (Regional Geriatric Program of Toronto), Georgina White and Rod Millard (Ontario Association of Community Care Access Centres), Rebecca Comrie and Valerie Hopson (formerly ICES), Grace Karam and Kathryn Mosley (Women's College Hospital) and Deborah Sattler (Ontario Ministry of Health and Long-Term Care).

## Funding Support

This research was funded by the Ontario Ministry of Health and Long-Term Care (Grant No. 04601AC).

## ABOUT OUR ORGANIZATION

The Institute for Clinical Evaluative Sciences (ICES) is an independent, non-profit organization that produces knowledge to enhance the effectiveness of health care for Ontarians. Internationally recognized for its innovative use of population-based health information, ICES evidence supports health policy development and guides changes to the organization and delivery of health care services.

Key to our work is our ability to link population-based health information, at the patient-level, in a way that ensures the privacy and confidentiality of personal health information. Linked databases reflecting 13 million of 33 million Canadians allow us to follow patient populations through diagnosis and treatment and to evaluate outcomes.

ICES brings together the best and the brightest talent across Ontario. Many of our scientists are not only internationally recognized leaders in their fields but are also practicing clinicians who understand the grassroots of health care delivery, making the knowledge produced at

ICES clinically focused and useful in changing practice. Other team members have statistical training, epidemiological backgrounds, project management or communications expertise. The variety of skill sets and educational backgrounds ensures a multi-disciplinary approach to issues and creates a real-world mosaic of perspectives that is vital to shaping Ontario's future health care system.

ICES receives core funding from the Ontario Ministry of Health and Long-Term Care. In addition, our faculty and staff compete for peer-reviewed grants from federal funding agencies, such as the Canadian Institutes of Health Research, and receive project-specific funds from provincial and national organizations. These combined sources enable ICES to have a large number of projects underway, covering a broad range of topics. The knowledge that arises from these efforts is always produced independent of our funding bodies, which is critical to our success as Ontario's objective, credible source of *Evidence Guiding Health Care*.

---

*“ICES brings together the best and the brightest talent across Ontario. Many of our scientists are not only internationally recognized leaders in their fields but are also practicing clinicians who understand the grassroots of health care delivery.”*

<b>TABLE OF CONTENTS</b>	
II	Publication Information
III	Authors' Affiliations
IV	Acknowledgements
V	About Our Organization
VII	List of Exhibits
<b>1</b>	<b>KEY FINDINGS</b>
<b>2</b>	<b>CHAPTER 1 / INTRODUCTION</b>
<b>6</b>	<b>CHAPTER 2 / OVERVIEW OF COHORTS</b> <b>Definitions and study methodology</b>
6	Introduction
6	Population Definition
23	Measures
<b>29</b>	<b>CHAPTER 3 / OLDER WOMEN</b> <b>A look at gender differences</b> <b>in health system use</b>
29	Introduction
30	Methods
31	Results
45	Conclusion
<b>47</b>	<b>CHAPTER 4 / COMMUNITY-DWELLING</b> <b>OLDER ADULTS WITH DEMENTIA</b> <b>Tracking encounters with the</b> <b>health system</b>
47	Introduction
48	Methods
49	Results
68	Conclusion
<b>70</b>	<b>CHAPTER 5 / MEDICALLY COMPLEX</b> <b>HOME CARE CLIENTS</b> <b>Profiling risk following acute</b> <b>care hospitalization</b>
70	Introduction
71	Methods
73	Results
89	Conclusion
<b>91</b>	<b>CHAPTER 6 / OLDER ADULTS NEWLY</b> <b>PLACED IN LONG-TERM CARE</b> <b>An examination of service use and</b> <b>functional status during the wait</b>
91	Introduction
92	Methods
93	Results
115	Conclusion
<b>117</b>	<b>CHAPTER 7 / CONCLUDING REMARKS</b>
<b>118</b>	<b>APPENDICES</b>

## LIST OF EXHIBITS

- Exhibit 2.1** / Observation and follow-up windows for the cohort of older women
- Exhibit 2.2** / Contribution of each Local Health Integration Network in Ontario to the cohort of older women, 2007
- Exhibit 2.3** / Distribution of Ontario adults aged 76 and older by age group and sex, in Ontario and by Local Health Integration Network, 2007
- Exhibit 2.4** / Observation and follow-up windows for the cohort of community-dwelling older adults with physician-diagnosed dementia
- Exhibit 2.5** / Contribution of each Local Health Integration Network in Ontario to the cohort of community-dwelling older adults with physician-diagnosed dementia, 2007
- Exhibit 2.6** / Distribution of community-dwelling adults aged 66 and older with physician-diagnosed dementia by type of hospital use, in Ontario and by Local Health Integration Network, 2007/08
- Exhibit 2.7** / Observation and follow-up windows for the cohort of medically complex home care clients discharged from acute care
- Exhibit 2.8** / Contribution of each Local Health Integration Network in Ontario to the cohort of medically complex home care clients discharged from acute care, 2007/08
- Exhibit 2.9** / Distribution of medically complex home care clients aged 66 and older discharged from acute care by discharge location, in Ontario and by Local Health Integration Network, 2007/08
- Exhibit 2.10** / Observation and follow-up windows for the cohort of older adults newly placed in long-term care
- Exhibit 2.11** / Contribution of each Local Health Integration Network in Ontario to the cohort of older adults newly placed in long-term care, 2007/08
- Exhibit 2.12** / Distribution of adults aged 66 and older newly placed in long-term care by location at time of placement, in Ontario and by Local Health Integration Network, 2007/08
- Exhibit 3.1** / Demographic and broad health status measures of Ontario women aged 76 and older, overall and by age group, 2007
- Exhibit 3.2** / Number and relative percent of Ontario adults aged 76 and older, by age group and sex, 2007
- Exhibit 3.3** / Percentage of Ontario adults aged 76 and older, by neighbourhood income quintile and sex, 2007
- Exhibit 3.4** / Percentage of Ontario adults aged 76 and older receiving home care services and co-residing with a primary caregiver, by age group, sex and caregiver relationship, 2007
- Exhibit 3.5** / Percentage of Ontario adults aged 76 and older with a RAI-HC assessment and exhibiting high levels of need, by sex and level of need, 2007
- Exhibit 3.6** / Health service use by Ontario women in the year prior to April 1, 2007 (baseline), by age group
- Exhibit 3.7** / Percentage of Ontario adults aged 76 and older with an acute care admission in the year prior to April 1, 2007 (baseline), by age group, sex and presence of Alternate Level of Care (ALC) days
- Exhibit 3.8** / Percentage of Ontario adults aged 76 and older with long-term care use in the year following April 1, 2007 (baseline), by age group, sex and type of contact
- Exhibit 3.9** / Prevalence of health conditions with the potential to limit functioning in Ontario adults aged 76 and older, by sex, 2007
- Exhibit 4.1** / Demographic and broad health status measures of Ontario adults aged 66 and older living in the community, by sex and presence of physician-diagnosed dementia, 2007
- Exhibit 4.2** / Number and relative percent of Ontario adults aged 66 and older living in the community, by age group, sex and presence of physician-diagnosed dementia, 2007
- Exhibit 4.3** / Percentage of Ontario adults aged 66 and older living in the community and qualifying for low-income status, by age group and presence of physician-diagnosed dementia, 2007
- Exhibit 4.4** / Percentage of Ontario adults aged 66 and older living in the community with incidence of frailty markers, by age group and presence of physician-diagnosed dementia, 2007
- Exhibit 4.5** / Percentage of Ontario adults aged 66 and older with physician-diagnosed dementia and living in the community with a RAI-HC assessment, by age group and primary caregiver relationship, 2007
- Exhibit 4.6** / Percentage of Ontario adults aged 66 and older with a RAI-HC assessment living in the community and exhibiting high levels of need, by presence of physician-diagnosed dementia and level of need, 2007



**Exhibit 4.7** / Health service use by Ontario adults aged 66 and older living in the community in the year prior to April 1, 2007 (baseline), by presence of physician-diagnosed dementia and sex

**Exhibit 4.8** / Health service use by Ontario adults aged 66 and older living in the community in the year following April 1, 2007 (baseline), by presence of physician-diagnosed dementia and type of hospital use

**Exhibit 4.9** / Percentage of Ontario adults aged 66 and older living in the community with an acute care hospitalization in the year following April 1, 2007 (baseline), by age group, presence of physician-diagnosed dementia and relative use of Alternate Level of Care (ALC) beds

**Exhibit 4.10** / Number of informal care hours provided in the week prior to RAI-HC assessment for Ontario adults aged 66 and older living in the community, by presence of physician-diagnosed dementia, 2007/08

**Exhibit 5.1** / Demographic and broad health status measures of medically complex home care clients aged 66 and older in Ontario, by discharge location, 2007/08

**Exhibit 5.2** / Health service use by medically complex home care clients aged 66 and older in Ontario in the year prior to April 1, 2007–March 31, 2008 (baseline), by discharge location

**Exhibit 5.3** / Health service use by medically complex home care clients aged 66 and older in Ontario in the year following April 1, 2007–March 31, 2008 (baseline), by discharge location

**Exhibit 5.4a** / Hospital readmission and long-term care admission rates for medically complex home care clients aged 66 and older in Ontario, by MAPLe level, 2007/08–2008/09

**Exhibit 5.4b** / Hospital readmission and long-term care admission rates for medically complex home care clients aged 66 and older in Ontario, by RAI Aggregate Risk Score, 2007/08–2008/09

**Exhibit 5.4c** / Hospital readmission and long-term care admission rates for medically complex home care clients aged 66 and older in Ontario, by LACE score, 2007/08–2008/09

**Exhibit 5.5** / MAPLe and LACE risk scores for medically complex home care clients aged 66 and older in Ontario, by discharge outcome, 2007/08–2008/09

**Exhibit 5.6** / Distribution of hospital readmission and long-term care admission rates for medically complex older adults discharged to the community with home care in Ontario, by LACE and MAPLe risk scores, 2007/08–2008/09

**Exhibit 6.1** / Demographic and broad health status measures of Ontario adults aged 66 and older newly placed in long-term care, by location at placement, 2007/08

**Exhibit 6.2** / Number and relative percent distribution of Ontario adults aged 66 and older newly placed in long-term care, by age group and sex, 2007/08

**Exhibit 6.3** / Percentage of Ontario adults aged 66 and older newly placed in long-term care, by neighbourhood income quintile and location prior to admission, 2007/08

**Exhibit 6.4** / Percentage of Ontario adults aged 66 and older newly placed in long-term care and exhibiting high levels of need, by location prior to admission and level of need, 2007/08

**Exhibit 6.5** / Health service use by Ontario adults aged 66 and older newly placed in long-term care in the year prior to April 1, 2007–March 31, 2008 (baseline), by location at placement

**Exhibit 6.6** / Percentage of Ontario adults aged 66 and older newly placed in long-term care with emergency department visits in the year prior to placement, by sex, age group and type of visit, 2007/08

**Exhibit 6.7** / Health service use in the year following placement by Ontario adults aged 66 and older newly placed in long-term care, April 1, 2007–March 31, 2008 (baseline)

**Exhibit 6.8a** / Distribution of wait time to placement among Ontario adults aged 66 and older newly placed in long-term care, by CCAC priority level and location at placement, 2007/08

**Exhibit 6.8b** / Distribution of wait time to placement among Ontario adults aged 66 and older newly placed in long-term care, by sex, income level and location at placement, 2007/08

**Exhibit 6.8c** / Distribution of wait time to placement among Ontario adults aged 66 and older newly placed in long-term care, by presence of frailty, MAPLe level and location at placement, 2007/08

**Exhibit 6.8d** / Distribution of wait time to placement among Ontario adults aged 66 and older newly placed in long-term care, by measure of functional status and location at placement, 2007/08

**Exhibit 6.9** / Health service use in the year prior to placement by Ontario adults aged 66 and older newly placed in long-term care, by time spent waiting, 2007/08

# Key Findings

## OLDER WOMEN

### A look at gender differences in health system use

- A significant proportion of the “oldest old” are women.
- Older women and men use hospital and physician services at similar levels; however, older women are more likely to use long-term care services.
- Among older adults who receive long-stay home care services, a larger proportion of women live alone and rely on their children for support, whereas men also rely on a spouse.
- Older women have a higher prevalence of multi-morbidity than older men.

## COMMUNITY-DWELLING OLDER ADULTS WITH DEMENTIA

### Tracking encounters with the health system

- Community-dwelling older adults with physician-diagnosed dementia are high users of health system resources.
- Women account for a larger proportion of older adults with dementia than men across age categories.
- Older adults with dementia are more likely to experience a hospital stay over the course of a year than those without dementia, and they are more likely to have a larger proportion of their stay in alternate level of care beds than those without dementia.

## MEDICALLY COMPLEX HOME CARE CLIENTS

### Profiling risk following acute care hospitalization

- Medically complex home care clients discharged from acute care had high rates of multi-morbidity and high rates of readmission.
- Several screening tools are available to help identify high-risk individuals who would benefit from intervention—but each tool is best suited to measure a specific type of task.
- Interventions that aim to reduce long-term care admissions should target individuals by using the MAPLe algorithm (a measure of functional impairment associated with long-term care admission).
- Interventions aimed at reducing acute care readmissions should target individuals by using the LACE assessment tool (a measure of utilization and diagnoses associated with acute readmission and death).

## OLDER ADULTS NEWLY PLACED IN LONG-TERM CARE

### An examination of service use and functional status during the wait

- Older women account for an increasing proportion of long-term care placements as the population ages.
- While waiting for placement in long-term care, older adults make frequent contact with the health care system and have high rates of emergency department use. In the year following long-term care admission, these high rates persist.
- Wait times vary for long-term care placement; shorter wait times are associated with the highest priority levels and placement from inpatient settings.

# Introduction

## Lead Authors

*Susan E. Bronskill*

*Laura Corbett*

*Andrea Gruneir*

*Jacqueline E. Stevenson*

Changing demographic patterns in Canada continue to present important challenges to Ontario's health and social services. In 2009, 14% of Canada's population was aged 65 years or older; it is projected that by 2036 this age cohort could account for 24% of the population.<sup>1</sup> The proportion of the oldest Canadians (those aged 80 years and older) is increasing steadily, reaching 1.3 million in 2009 (twice as many as in 1990). The issues facing the provision of health and support services are not necessarily driven by these increases in volume,<sup>2</sup> as many older adults will not be burdened with a significant number of chronic health conditions and thus will only require minimal health system support as they age. Rather, concerns relate to how health care should be delivered to frail older adults who have particularly heavy needs. Already, discussions on where, when and how older adults can receive timely, appropriate care is moving to the forefront of health debates across Ontario, the nation and internationally.

For those older adults who require intensive health care services, there are three important challenges to providing care, including:

**1 / An increased number of coexisting chronic conditions.** The larger number of older adults living with multiple concurrent conditions will require greater emphasis on

the ability of this group to access appropriate care across the health services spectrum, as well as health care providers' ability to manage older adults' varied needs. Older people with high comorbidity (i.e., those who live with three or more chronic conditions) report poorer health, take more prescription medications and have the highest rate of health care visits among older adults with chronic conditions.<sup>3</sup> The amount of health care services used by older adults is driven mainly by the number of chronic conditions they have, not by their age.<sup>3</sup> Thus, health care providers will need to work actively with older adults to prevent the development of new chronic conditions and manage existing conditions to avoid complications.

**2 / Contact with an increased number of health care providers.** Another noticeable challenge, especially as older adults begin to live with an increased number of complex health conditions, is in the area of care transitions and continuity between the providers of health care services across different settings. Transitions in care occur when patients move between different levels of care, different providers and different settings. These settings can include primary care and specialty clinics, home and community care, hospital care and long-term residential care. The expectation is that care providers

meet the distinct needs of older adults while respecting their desire to live independently in their communities for as long as possible. In the effort to optimize desired functional autonomy, smooth navigation of the multiple transitions between different care settings can be challenging. Transitions are often complicated when patients have complex conditions that can include multiple conditions, complex medical regimens and/or limited self-management abilities.<sup>4</sup> For patients who experience transitions, good continuity of care is critical to ensure optimal outcomes. Continuity of care is dependent on clear and timely communication between all of the various providers and sites involved in a patient's care. When good continuity is in place, the results include greater patient satisfaction,<sup>5</sup> improved medical compliance,<sup>6</sup> decreased hospitalization rates<sup>7</sup> and lower costs.<sup>8</sup> Since older adults are more likely to have multiple health problems, the complexity posed by having different concurrent care providers treating these multiple health conditions demands both coordination and continuity of care.

### **3 / Addressing needs beyond health care.**

Many older adults with complex care needs require support from across the spectrum of health, social and community services. As their

ability to function independently changes, older adults require greater informal support systems and increased access to community programs offering assistance with everything from meals and home-making to transportation. Community programs tackling transportation and mobility concerns are of utmost importance to older adults and have been shown to alleviate loneliness and isolation, particularly among those who have recently lost a partner, live alone or are suffering from multiple chronic health problems.<sup>9</sup> In terms of informal support systems, most elderly people receive support from unpaid caregivers, including family members, friends or neighbours. As the population ages and most older adults desire to remain at home or in their community, these informal workers will be asked to take on increasingly complex and specialized tasks to support their loved ones. Many informal caregivers will find navigating the formal care system particularly challenging, as there are limited channels for providing knowledge, training and support to sustain the mental and emotional health of caregivers. This discordance illustrates the need to provide adequate and effective community-based support to those who are providing care informally, and thus improve the health and well-being of the senior care recipients.<sup>10</sup>

For a large proportion of older Ontarians, these challenges will not become critical obstacles to continuing to live successfully in the community. However for the population of frail older adults, the length and quality of time spent living in the community will be negatively affected, and their risk of entering a long-term care (LTC) facility will increase if left unaddressed.

### **Objectives of This Report**

The purpose of this report is to provide an in-depth description of how four cohorts with increased vulnerability use the health care system. These cohorts are vulnerable either because they are at greater risk for admission to LTC or because they have recently been placed into LTC. They include:

- **Frail older women.** [Chapter 3](#) considers factors relevant to maintaining older women's health and independence in the community and the disparities between women and men on key measures of healthy aging.
- **Community-dwelling older adults with dementia.** [Chapter 4](#) identifies and follows a cohort of community-dwelling older adults with physician-diagnosed dementia and examines their encounters with both health and community care providers.

- **Medically complex home care clients.** [Chapter 5](#) examines the patterns and prevalence of care for individuals discharged from acute care hospitals in Ontario after treatment for complex medical conditions; the best methods to target services for this population are identified.
- **Older adults newly placed in long-term care.** [Chapter 6](#) follows a cohort of older adults newly placed in long-term care with the goal of examining levels of need and describing health system use in the period of time preceding placement in order to identify common patterns of care.

By presenting multiple cohorts, we provide a multifaceted understanding of the older adults at risk for LTC placement and highlight the different factors that affect these groups. These cohorts represent older adults who require continuing care across a broad range of health care services for a wide array of health conditions. In addition, the cohort definitions demonstrate different approaches to identifying frail populations based on gender, clinical diagnoses, functional status and service use. These definitions range in scope

from the broad to the very specific, but each highlights important challenges related to frailty, need and the location where services are received. Introducing the adjective ‘frail’ to older adults further distinguishes those with diminished functional capacity who rely on others for activities of daily living—a development that increases with age but is not necessarily a condition of aging.

Since older adults often experience multiple chronic conditions, it bears mentioning that the subgroups studied in this report are not necessarily mutually exclusive, given that older women are more likely than men to develop such complex chronic diseases as dementia<sup>11</sup> and are less likely to have informal supports at home, thus requiring institutionalized care to meet their health needs.<sup>12</sup> This report provides an important glimpse into the often complex issues that frail older adults present to service providers. Ideally, its findings will lead to a greater understanding of the pressures confronting today’s health system by highlighting the challenges of caring for specific groups of individuals in the community or in institutional settings.

---

*“By presenting multiple cohorts, we provide a multifaceted understanding of the older adults at risk for long-term care placement and highlight the different factors that affect these groups.”*

## REFERENCES

- 1 Statistics Canada. *Population Projections for Canada, Provinces and Territories, 2009 to 2036*. Ottawa, ON: Statistics Canada; 2010.
- 2 McGrail KM, Evans RG, Barer ML, Kerluke KJ, McKendry R. Diagnosing senescence: Contributions to physician expenditure increases in British Columbia, 1996/97 to 2005/06. *Healthc Policy* 2011; 7(1):41-54.
- 3 Canadian Institute for Health Information. *Analysis in Brief. Seniors and the Health Care System: What Is the Impact of Multiple Chronic Conditions?* Ottawa, ON: CIHI; 2011. Accessed June 12, 2011 at [http://secure.cihi.ca/cihiweb/products/air-chronic\\_disease\\_aib\\_en.pdf](http://secure.cihi.ca/cihiweb/products/air-chronic_disease_aib_en.pdf).
- 4 Crilly J, Chaboyer W, Wallis M. Continuity of care for acutely unwell older adults from nursing homes. *Scand J Caring Sci* 2006; 20(2):122-34.
- 5 Saultz JW, Lochner J. Interpersonal continuity of care and care outcomes: a critical review. *Ann Fam Med* 2005; 3(2):159-66.
- 6 Kerse N, Buetow S, Mainous AG, III, Young G, Coster G, Arroll B. Physician-patient relationship and medication compliance: a primary care investigation. *Ann Fam Med* 2004; 2(5):455-61.
- 7 Naylor MD, Brooten DA, Campbell RL, Maislin G, McCauley KM, Schwartz JS. Transitional care of older adults hospitalized with heart failure: a randomized, controlled trial. *J Am Geriatr Soc* 2004; 52(5):675-84.
- 8 Beland F, Bergman H, Lebel P, Dallaire L, et al. Integrated services for frail elders (SIPA): a trial of a model for Canada. *Can J Aging* 2006; 25(1):5-42.
- 9 Bryant T, Brown I, Cogan T, Dallaire C, et al. What do Canadian seniors say supports their quality of life? Findings from a national participatory research study. *Can J Public Health* 2004; 95(4):299-303.
- 10 Wiles J. Informal caregivers' experiences of formal support in a changing context. *Health Soc Care Community* 2003; 11(3):189-207.
- 11 Fratiglioni L, Launer LJ, Andersen K, Breteler MM, et al. Incidence of dementia and major subtypes in Europe: A collaborative study of population-based cohorts. Neurologic Diseases in the Elderly Research Group. *Neurology* 2000; 54(11 Suppl 5):S10-15.
- 12 Katz SJ, Kabeto M, Langa KM. Gender disparities in the receipt of home care for elderly people with disability in the United States. *JAMA* 2000; 284(23):3022-7.

# Overview of Cohorts

## Definitions and study methodology

### Lead Authors

*Minnie M. Ho*

*Ximena Camacho*

*Andrea Gruneir*

*Susan E. Bronskill*

## INTRODUCTION

Four cohorts of Ontario seniors are highlighted in this report. Although these individuals account for less than one-third of adults aged 66 and older, they are intensive users of the health care system and are particularly vulnerable: they have more health conditions, require greater care across a broader range of health services and are most susceptible to long-term care admission. This chapter describes the methods used to identify the four cohorts and characterizes them using a number of measures, including general demographic characteristics, health status and health system utilization. Variations from the basic methodology for each cohort will be detailed in subsequent chapters. Distribution of these cohorts across Ontario's 14 Local Health Integration Networks (LHINs) will also be presented. The general approach for this report is to follow a standard method for presenting baseline characteristics and service use across each cohort, and then highlight a cohort-specific issue of interest in each chapter.

## POPULATION DEFINITION

Each cohort focuses on adults aged 66 or older (76 years for the older women cohort) living in Ontario and who were: 1) dwelling in the community on April 1, 2007 (baseline); or 2) entered their specified cohort in the year following April 1, 2007 (i.e., April 1, 2007, to March 31, 2008—baseline year). A single baseline date was used in order to give all cohort members the same opportunity for follow-up; it also allowed for a defined date from which we could look back to identify pre-existing medical conditions and historical health services use for each cohort member. We chose to restrict the cohorts to people aged 66 and older (aged 76 for older women) so that we could fully characterize cohort members starting at age 65 (age 75 for older women). Using linked, population-based administrative data sets ([Appendix A](#)), the following information is presented for each cohort:

- demographic information (age, sex, income level, LHIN);
- health status (functional and cognitive measures based on the Resident Assessment Instrument for Home Care; clinical diagnoses based on the Johns Hopkins Adjusted Clinical Groups system); and

- health service use for one year prior to and one year following baseline date or baseline year (emergency department and primary care visits; acute hospitalizations; home care, long-term care and drug use)

General exclusion criteria for each cohort are outlined in [Appendix B](#). In addition, each cohort presents measures that highlight its unique characteristics and challenges.

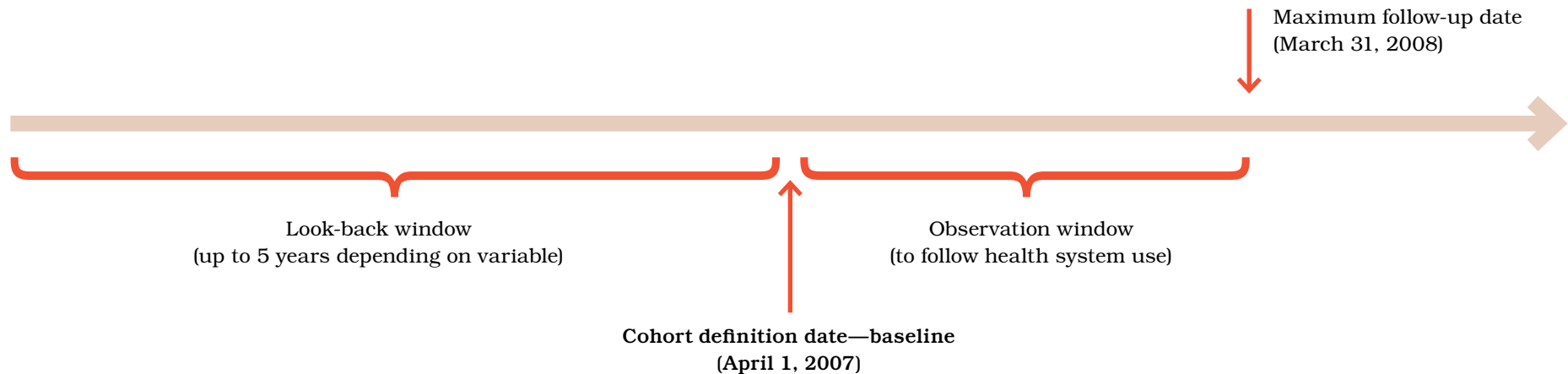
### Older Women

The focus of this chapter is Ontario women aged 76 and older who are living in the community. The intent of this chapter is to highlight specific health system challenges for women as they age and to contrast these challenges to those encountered by their male counterparts. Focusing on this older age group helps to better identify individuals who experience

health conditions that put them at risk of becoming frail and requiring admission to long-term care.

To create this cohort (and to compare with older men to highlight disparities), we identified all adults in Ontario aged 76 and older who were not residents of a long-term care (LTC) facility on April 1, 2007 (baseline).

#### EXHIBIT 2.1 Observation and follow-up windows for the cohort of older women





The variables assessed in the historical observation windows are outlined in [Appendix C.1](#). Additional cohort-specific measures on the prevalence of health conditions (allowing for a measure of multi-morbidity) with potential to limit functioning are presented in the chapter specific to frail older women. Health conditions of interest include:

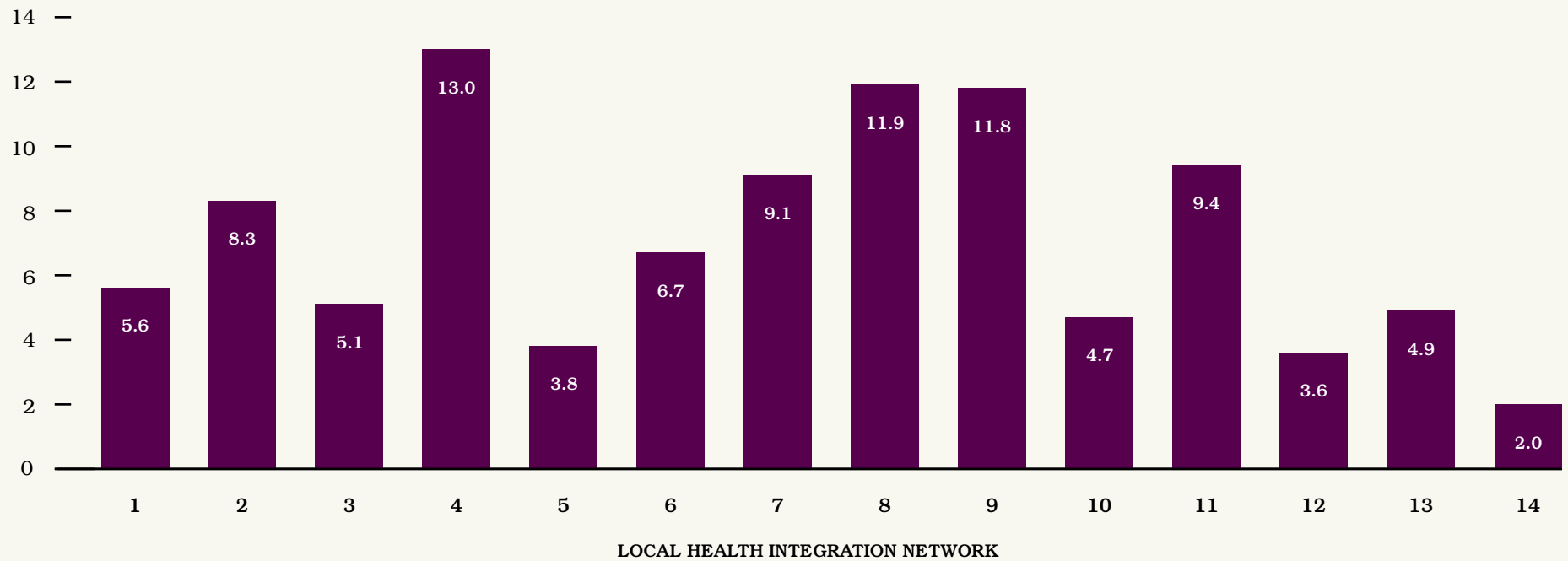
- general medical (asthma; chronic obstructive pulmonary disease; cardiovascular conditions including acute myocardial infarction, congestive heart failure and stroke; cancer and diabetes);
- physical functioning (arthritis, osteoporosis and urinary incontinence); and,
- mental health (dementia, depression and other mental health conditions).

Detailed definitions of these health conditions are provided in [Appendix C.2](#). Their window of observation is five years prior to and one year following the baseline date. Occurrence of fractures in the five years prior to April 1, 2007, is included as a final measure, as fractures are the most significant consequence of falls in older adults and have potentially devastating consequences on their ability to remain in the community.

For this cohort, 392,870 women aged 76 and older were identified in Ontario. The distribution of this cohort across the LHINs is detailed in [Exhibit 2.2](#) and stratified by age group in [Exhibit 2.3](#). Across all LHINs, the proportion of women relative to men within each age group increased with age. While the number of men decreased consistently across age groups after age 76, the decrease in the number of women was not as striking until age 80.

**EXHIBIT 2.2 Contribution of each Local Health Integration Network in Ontario to the cohort of older women, 2007**

PERCENT



- |                                    |                      |                         |
|------------------------------------|----------------------|-------------------------|
| 1 Erie St. Clair                   | 6 Mississauga Halton | 11 Champlain            |
| 2 South West                       | 7 Toronto Central    | 12 North Simcoe Muskoka |
| 3 Waterloo Wellington              | 8 Central            | 13 North East           |
| 4 Hamilton Niagara Haldimand Brant | 9 Central East       | 14 North West           |
| 5 Central West                     | 10 South East        |                         |

**EXHIBIT 2.3 Distribution of Ontario adults aged 76 and older by age group and sex, in Ontario and by Local Health Integration Network, 2007**

	76–79 Years		80–84 Years		85–89 Years		≥90 Years	
	WOMEN	MEN	WOMEN	MEN	WOMEN	MEN	WOMEN	MEN
<b>ONTARIO, N (%)</b>	144,721 (55.6)	115,733 (44.4)	140,505 (60.1)	93,333 (39.9)	74,668 (64.5)	41,023 (35.5)	32,976 (70.4)	13,877 (29.6)
<b>LOCAL HEALTH INTEGRATION NETWORK, n (%)</b>								
<b>1</b> Erie St. Clair	8,003 (55.4)	6,438 (44.6)	8,080 (60.8)	5,215 (39.2)	4,375 (67.0)	2,152 (33.0)	1,948 (75.0)	648 (25.0)
<b>2</b> South West	11,731 (55.6)	9,382 (44.4)	11,604 (60.0)	7,735 (40.0)	6,487 (64.5)	3,564 (35.5)	2,829 (71.4)	1,135 (28.6)
<b>3</b> Waterloo Wellington	7,396 (56.2)	5,754 (43.8)	7,184 (60.9)	4,621 (39.1)	3,954 (65.2)	2,109 (34.8)	1,723 (72.0)	669 (28.0)
<b>4</b> Hamilton Niagara Haldimand Brant	18,599 (55.7)	14,794 (44.3)	18,777 (60.0)	12,495 (40.0)	9,945 (65.2)	5,302 (34.8)	3,970 (70.1)	1,694 (29.9)
<b>5</b> Central West	5,890 (54.6)	4,906 (45.4)	5,188 (59.1)	3,594 (40.9)	2,446 (64.4)	1,350 (35.6)	1,094 (68.2)	510 (31.8)
<b>6</b> Mississauga Halton	9,991 (56.1)	7,823 (43.9)	9,382 (60.1)	6,229 (39.9)	4,583 (62.4)	2,756 (37.6)	2,129 (70.8)	877 (29.2)
<b>7</b> Toronto Central	12,670 (57.3)	9,442 (42.7)	13,324 (62.3)	8,050 (37.7)	7,157 (65.0)	3,846 (35.0)	3,773 (69.9)	1,622 (30.1)
<b>8</b> Central	17,513 (55.5)	14,052 (44.5)	16,386 (59.2)	11,310 (40.8)	8,185 (61.9)	5,032 (38.1)	3,703 (66.4)	1,878 (33.6)
<b>9</b> Central East	17,697 (55.6)	14,153 (44.4)	16,347 (59.3)	11,215 (40.7)	8,389 (63.7)	4,787 (36.3)	3,442 (69.0)	1,543 (31.0)
<b>10</b> South East	6,643 (53.9)	5,679 (46.1)	6,504 (59.8)	4,370 (40.2)	3,700 (64.0)	2,079 (36.0)	1,547 (71.3)	624 (28.7)
<b>11</b> Champlain	13,234 (56.7)	10,122 (43.3)	13,302 (61.3)	8,387 (38.7)	7,780 (66.3)	3,952 (33.7)	3,637 (73.1)	1,337 (26.9)
<b>12</b> North Simcoe Muskoka	5,265 (53.9)	4,500 (46.1)	4,934 (58.9)	3,444 (41.1)	2,639 (64.0)	1,487 (36.0)	1,190 (71.0)	486 (29.0)
<b>13</b> North East	7,372 (53.7)	6,348 (46.3)	6,677 (58.7)	4,696 (41.3)	3,437 (65.4)	1,820 (34.6)	1,349 (70.0)	578 (30.0)
<b>14</b> North West	2,680 (53.7)	2,312 (46.3)	2,782 (58.9)	1,940 (41.1)	1,566 (67.0)	773 (33.0)	625 (69.9)	269 (30.1)

## Community-Dwelling Older Adults with Dementia

The focus of this chapter is community-dwelling older adults with physician-diagnosed dementia. Dementia (including Alzheimer’s disease) is progressively debilitating and erodes cognitive and functional abilities. When these impairments become too prohibitive, institutional care (i.e., long-term care) is often required and acute care hospitalization often increases, resulting in individual costs due to lost independence and health system expenditures. Profiling seniors with diagnosed dementia will help to examine their health system use and aid planners in providing adequate community support, improving health system navigation and organizing service delivery for seniors with dementia—all which should extend time in the community for seniors with dementia.

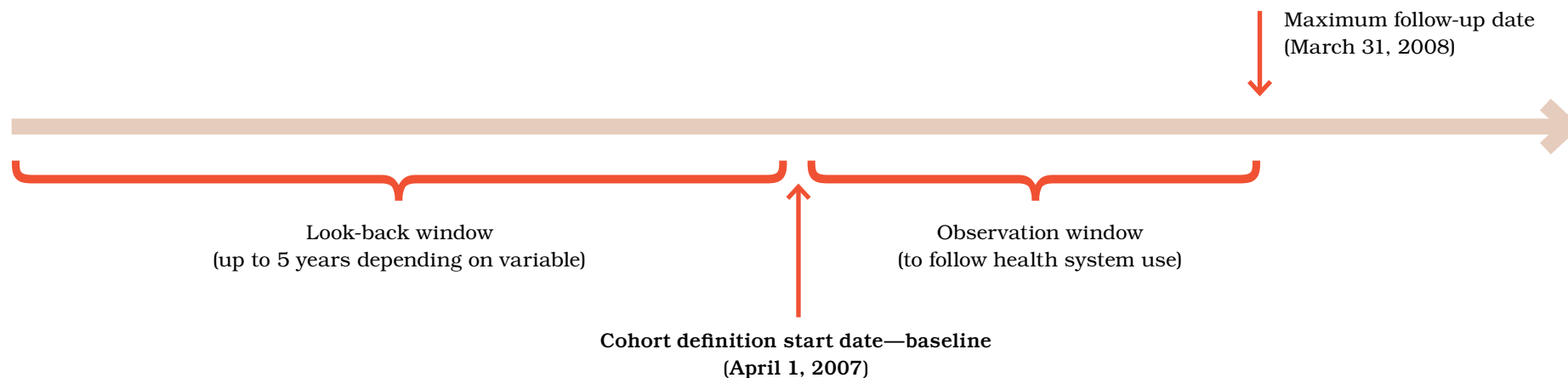
The foundation of the cohort is all Ontario older adults who were between 66 and 105 years of age on April 1, 2007 (baseline). The variables assessed in the historical observation windows are outlined in [Appendix D.1](#). Dementia diagnosis was based on the presence of at least one physician claim or hospitalization for dementia in the

five years prior to April 1, 2007; or on being dispensed medications specifically indicated for dementia (i.e., cholinesterase inhibitors) in the year prior to April 1, 2007. For specific claim codes and medications, see [Appendix D.2](#). Older adults with physician-diagnosed dementia were observed alongside older adults without physician-diagnosed dementia. Hospital use is reportedly higher in seniors with dementia, and use of alternate level of care (ALC) beds is a strong sign of a breakdown in the system’s ability to provide appropriate care in the appropriate setting for these individuals. Therefore, the dementia cohort was stratified based on evidence of hospitalization with ALC bed use, evidence of hospitalization without ALC bed use, or no hospitalization in the year following index. Cohort-specific issues are focused heavily on characterizing health system use (historical and follow-up) in those with dementia, and emphasizing caregiver burden—illustrating the point that older adults diagnosed with dementia are intensive consumers of health care services. This suggests that increased and improved community supports would not only benefit the acute care setting but also individuals with dementia and their families.

---

*“Profiling seniors with diagnosed dementia will help to examine their health system use and aid planners in providing adequate community support, improving health system navigation and organizing service delivery for seniors with dementia.”*

**EXHIBIT 2.4 Observation and follow-up windows for the cohort of community-dwelling older adults with physician-diagnosed dementia**

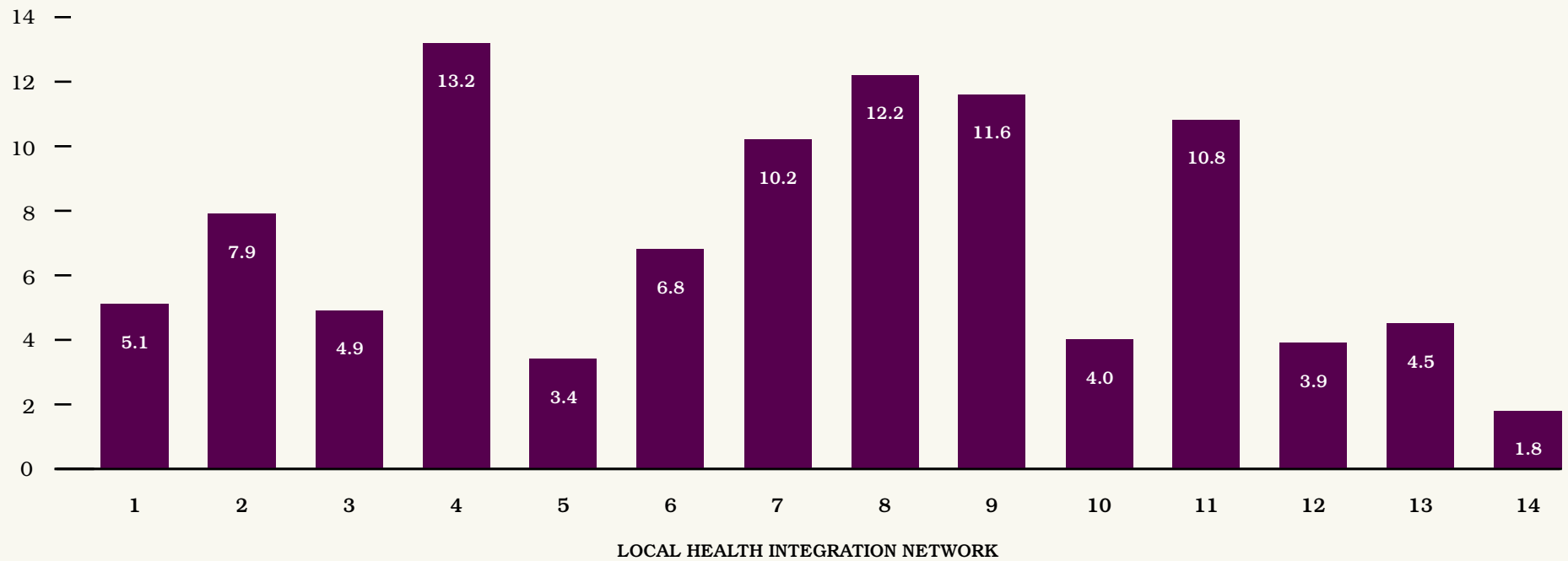


In Ontario, 101,775 seniors with dementia were identified. The distribution of this cohort across the LHINs is detailed in [Exhibit 2.5](#), and its stratification by subsequent hospitalization (with/without ALC days; no hospitalization) is shown in [Exhibit 2.6](#). Across all LHINs, the majority of seniors with dementia were not hospitalized in the year following baseline—

the proportion ranged from 67.7% in the North East LHIN to 77.5% in the South East LHIN. There was a two-fold difference across the LHINs in the proportion of older adults with dementia who were hospitalized with ALC days—from 5.4% in the Central LHIN to 12.7% in the North West LHIN.

**EXHIBIT 2.5 Contribution of each Local Health Integration Network in Ontario to the cohort of community-dwelling older adults with physician-diagnosed dementia, 2007**

PERCENT



- |                                    |                      |                         |
|------------------------------------|----------------------|-------------------------|
| 1 Erie St. Clair                   | 6 Mississauga Halton | 11 Champlain            |
| 2 South West                       | 7 Toronto Central    | 12 North Simcoe Muskoka |
| 3 Waterloo Wellington              | 8 Central            | 13 North East           |
| 4 Hamilton Niagara Haldimand Brant | 9 Central East       | 14 North West           |
| 5 Central West                     | 10 South East        |                         |

**EXHIBIT 2.6 Distribution of community-dwelling adults aged 66 and older with physician-diagnosed dementia by type of hospital use, in Ontario and by Local Health Integration Network, 2007/08**

<b>Hospitalization in Year Following Baseline (April 1, 2007–March 31, 2008)</b>				
	<b>TOTAL</b>	<b>HOSPITALIZATION WITH ALTERNATE LEVEL OF CARE</b>	<b>HOSPITALIZATION WITH NO ALTERNATE LEVEL OF CARE</b>	<b>NO HOSPITALIZATION</b>
<b>ONTARIO, N (%)</b>	101,775 (100.0)	7,039 (6.9)	18,470 (18.1)	76,266 (75.0)
<b>LOCAL HEALTH INTEGRATION NETWORK, n (%)</b>				
<b>1</b> Erie St. Clair	5,142 (100.0)	355 (6.9)	1,033 (20.1)	3,754 (73.0)
<b>2</b> South West	8,019 (100.0)	503 (6.3)	1,537 (19.2)	5,979 (74.6)
<b>3</b> Waterloo Wellington	4,938 (100.0)	348 (7.0)	868 (17.6)	3,722 (75.4)
<b>4</b> Hamilton Niagara Haldimand Brant	13,386 (100.0)	1,207 (9.0)	2,308 (17.2)	9,871 (73.7)
<b>5</b> Central West	3,465 (100.0)	216 (6.2)	594 (17.1)	2,655 (76.6)
<b>6</b> Mississauga Halton	6,911 (100.0)	438 (6.3)	1,314 (19.0)	5,159 (74.6)
<b>7</b> Toronto Central	10,342 (100.0)	709 (6.9)	1,785 (17.3)	7,848 (75.9)
<b>8</b> Central	12,435 (100.0)	669 (5.4)	2,259 (18.2)	9,507 (76.5)
<b>9</b> Central East	11,838 (100.0)	738 (6.2)	1,985 (16.8)	9,115 (77.0)
<b>10</b> South East	4,051 (100.0)	263 (6.5)	648 (16.0)	3,140 (77.5)
<b>11</b> Champlain	10,958 (100.0)	647 (5.9)	1,950 (17.8)	8,361 (76.3)
<b>12</b> North Simcoe Muskoka	3,930 (100.0)	291 (7.4)	798 (20.3)	2,841 (72.3)
<b>13</b> North East	4,535 (100.0)	423 (9.3)	1,040 (22.9)	3,072 (67.7)
<b>14</b> North West	1,784 (100.0)	227 (12.7)	343 (19.2)	1,214 (68.0)

### Medically Complex Home Care Clients

This chapter focuses on older adults with a high burden of health care needs who are at high risk for institutional care (acute and LTC admission). Specifically, this population included individuals receiving home care who were subsequently admitted to an acute care hospital with diagnoses that were either: 1) known to be associated with complex care needs, or 2) had been included in published randomized controlled trials of care transition interventions.<sup>1,2</sup> Targeting these individuals who were already well connected with parts of the health care system and having information on their: 1) medical conditions (from acute care); and 2) functional and health status (both from home care assessments) granted the opportunity to assess how their needs were met by the health care system, and to optimize care coordination through the transition from acute care to home.

Individuals were first included in the study if they were aged 66 and older and had been discharged from an acute care hospital between April 1, 2007, and March 31, 2008, with two or more ambulatory care sensitive conditions (including angina, asthma, chronic obstructive pulmonary disease, diabetes, grand mal status and other epileptic convulsions, heart

failure or pulmonary edema, and hypertension); or had one of six diagnoses that have been targeted for care transition interventions: cardiac arrhythmias, stroke, hip fracture, spinal stenosis, deep vein thrombosis or pulmonary embolism, or peripheral vascular disease.<sup>1</sup>

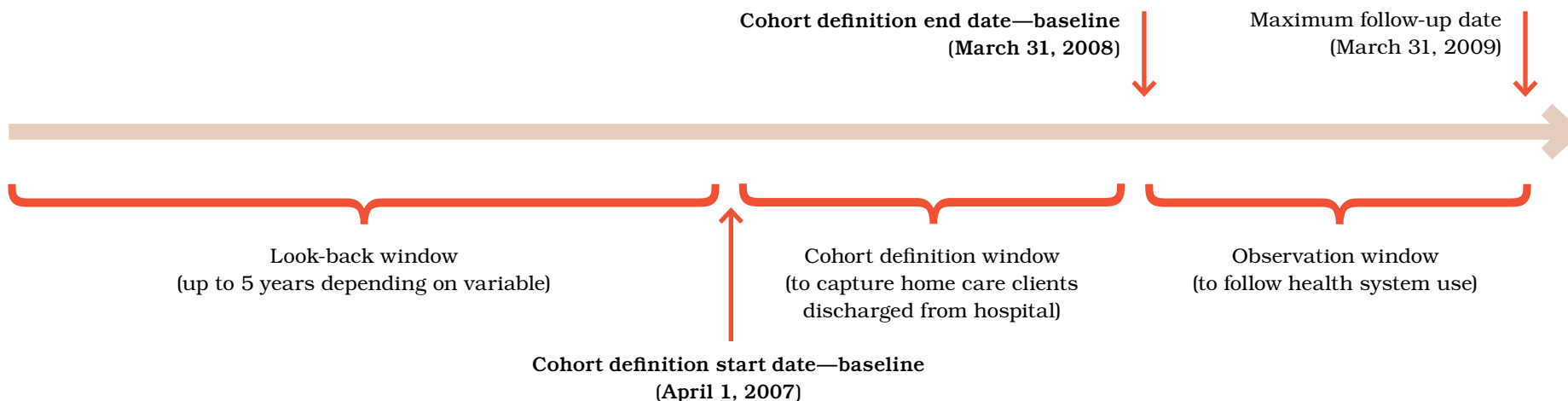
Although prior research has excluded adults aged 75 or above in defining ambulatory care sensitive conditions, we used the list of conditions to define a set of chronic conditions rather than to imply avoidability of hospitalizations with these conditions. (For specific claim codes, see [Appendix E.2](#).) The first applicable hospitalization between April 1, 2007, and March 31, 2008 was marked as the “baseline.” From this group, individuals who had a home care service visit in the 30 days prior to their baseline hospitalization were selected to make up the medically complex older adults cohort upon which subsequent analyses were based. Individuals were excluded from the study if they had been hospitalized for a psychiatric condition or palliative care in the prior year because these populations tend to experience different patterns of care.<sup>1</sup> The variables assessed in the historical observation windows are outlined in [Appendix E.1](#).

---

*“Targeting these individuals who were already well connected with parts of the health care system ... granted the opportunity to assess how their needs were met by the health care system, and to optimize care coordination through the transition from acute care to home.”*



**EXHIBIT 2.7 Observation and follow-up windows for the cohort of medically complex home care clients discharged from acute care**



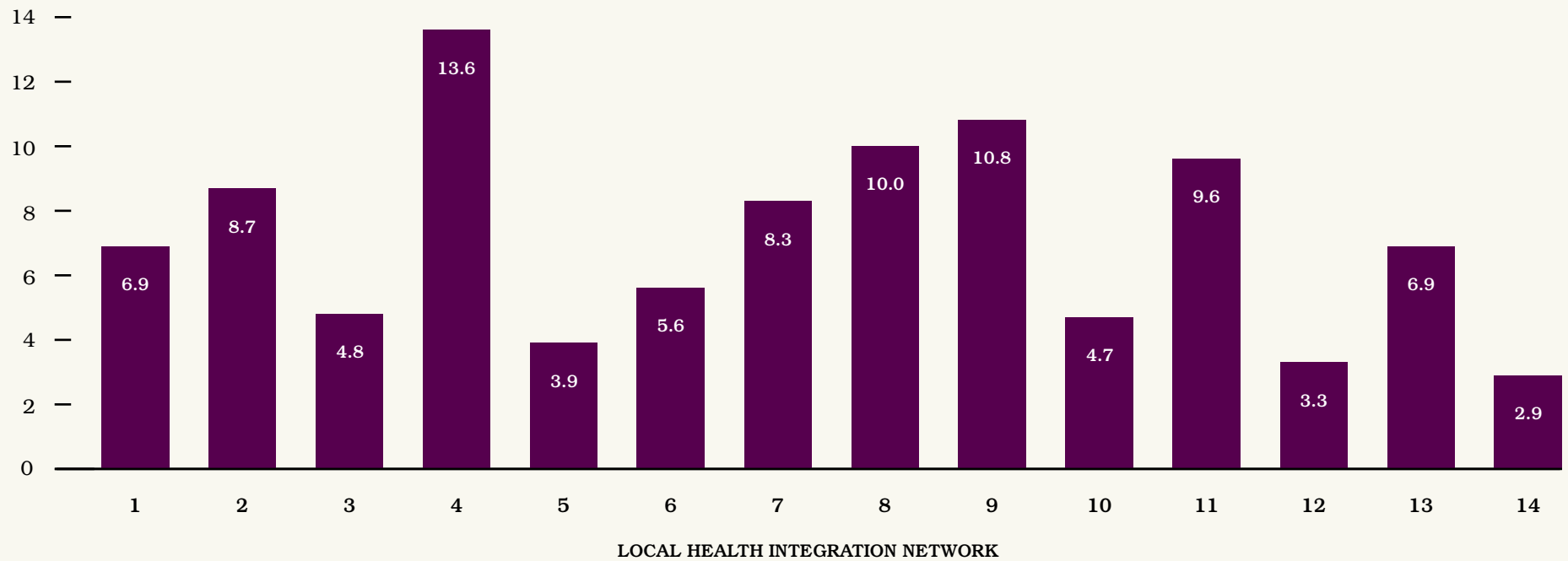
Cohort-specific measures reported on in the chapter on medically complex home care clients are: LACE index at baseline (as a predictor for unplanned readmission to acute care or death within 30 days) and Resident Assessment Instrument (RAI) aggregate risk scores, including MAPLe level (as a predictor for admission to long-term care). The LACE index incorporates Length of stay, Acuity of admission, patient Comorbidity and number of visits to the emergency department into the predictive score,<sup>3</sup> while MAPLe is a Method for Assigning Priority Levels.<sup>4</sup> Further details regarding the LACE index and RAI aggregate risk scores are documented in [Appendix E.3](#).

For this cohort, 10,644 medically complex older Ontario adults were identified. The distribution of these older adults across the LHINs is detailed in [Exhibit 2.8](#), and stratified by discharge location (rehabilitation/complex continuing care (CCC) facility, long-term care, the community with and without home care, or died in hospital) ([Exhibit 2.9](#)). The distribution of discharges to the various locations varied widely across LHINs. Factors that might influence this large variation across LHINs could be related to the health status of the senior being discharged from acute care, and the availability of community support and facility beds. The largest proportion of

discharged older adults was to the community with home care, ranging from a high of 60.5% in the North East LHIN to a low of 38.1% in the Waterloo Wellington LHIN. The second largest proportion of discharges across all LHINs (ranging from 34.3% in the Mississauga Halton LHIN to 10.9% in the North East LHIN) was to rehabilitation or CCC facilities, except in the North East LHIN where discharges to rehabilitation or CCC facilities were the third largest proportion of discharged older adults (after the group of individuals that died in hospital).

**EXHIBIT 2.8 Contribution of each Local Health Integration Network in Ontario to the cohort of medically complex home care clients discharged from acute care, 2007/08**

PERCENT



- |                                    |                      |                         |
|------------------------------------|----------------------|-------------------------|
| 1 Erie St. Clair                   | 6 Mississauga Halton | 11 Champlain            |
| 2 South West                       | 7 Toronto Central    | 12 North Simcoe Muskoka |
| 3 Waterloo Wellington              | 8 Central            | 13 North East           |
| 4 Hamilton Niagara Haldimand Brant | 9 Central East       | 14 North West           |
| 5 Central West                     | 10 South East        |                         |

**EXHIBIT 2.9 Distribution of medically complex home care clients aged 66 and older discharged from acute care by discharge location, in Ontario and by Local Health Integration Network, 2007/08**

	Discharge Location*					
	TOTAL	REHABILITATION/ COMPLEX CONTINUING CARE	LONG-TERM CARE	COMMUNITY WITH HOME CARE	COMMUNITY WITHOUT HOME CARE	DIED IN HOSPITAL
<b>ONTARIO, N (%)</b>	10,541 (100.0)	2,488 (23.6)	658 (6.2)	5,122 (48.6)	482 (4.6)	1,793 (17.0)
<b>LOCAL HEALTH INTEGRATION NETWORK, n (%)</b>						
<b>1</b> Erie St. Clair	721 (100.0)	155 (21.5)	41 (5.7)	376 (52.1)	39 (5.4)	110 (15.3)
<b>2</b> South West	928 (100.0)	194 (20.9)	65 (7.0)	489 (52.7)	36 (3.9)	144 (15.5)
<b>3</b> Waterloo Wellington	506 (100.0)	142 (28.1)	49 (9.7)	193 (38.1)	18 (3.6)	104 (20.6)
<b>4</b> Hamilton Niagara Haldimand Brant	1,435 (100.0)	395 (27.5)	70 (4.9)	679 (47.3)	45 (3.1)	246 (17.1)
<b>5</b> Central West	413 (100.0)	79 (19.1)	32 (7.7)	232 (56.2)	11 (2.7)	59 (14.3)
<b>6</b> Mississauga Halton	594 (100.0)	204 (34.3)	23 (3.9)	231 (38.9)	31 (5.2)	105 (17.7)
<b>7</b> Toronto Central	863 (100.0)	228 (26.4)	53 (6.1)	360 (41.7)	45 (5.2)	177 (20.5)
<b>8</b> Central	1,061 (100.0)	271 (25.5)	50 (4.7)	490 (46.2)	59 (5.6)	191 (18.0)
<b>9</b> Central East	1,137 (100.0)	284 (25.0)	57 (5.0)	551 (48.5)	53 (4.7)	192 (16.9)
<b>10</b> South East	494 (100.0)	88 (17.8)	44 (8.9)	267 (54.0)	17 (3.4)	78 (15.8)
<b>11</b> Champlain	1,017 (100.0)	223 (21.9)	87 (8.6)	466 (45.8)	57 (5.6)	184 (18.1)
<b>12</b> North Simcoe Muskoka	346 (100.0)	63 (18.2)	19 (5.5)	194 (56.1)	12 (3.5)	58 (16.8)
<b>13</b> North East	726 (100.0)	79 (10.9)	51 (7.0)	439 (60.5)	46 (6.3)	111 (15.3)
<b>14</b> North West	300 (100.0)	83 (27.7)	17 (5.7)	153 (51.0)	13 (4.3)	34 (11.3)

\*Includes an "Other" category that is not shown in this exhibit. However, the "Other" category contributes to the overall total (cited in Chapter 5) of 10,644 clients.

## Older Adults Newly Placed in Long-Term Care

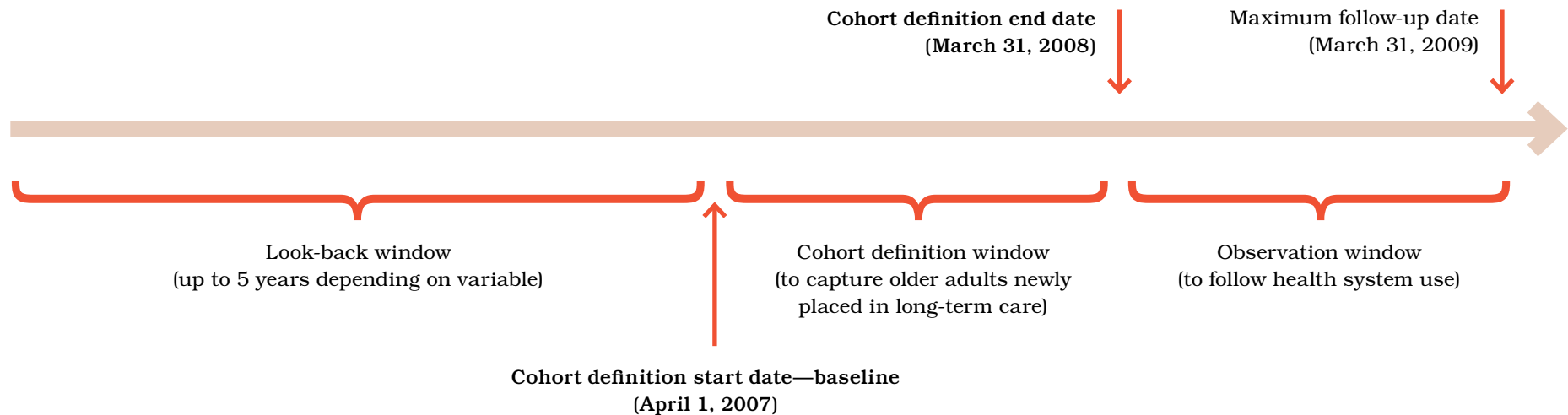
This chapter examines older adults newly placed in LTC and their contact with the health care system in the time period immediately preceding placement. Levels of clinical and functional need, and waiting time to placement are described. The time spent waiting for a LTC bed is often a difficult period for frail

older adults and their caregivers. Identifying common points of system contact during the transition to LTC will enable health system planners to optimize the quality of care during this transition period.

To create this cohort, all Ontario adults aged 66 and older who were newly placed in LTC (on an interim or permanent basis) between April 1, 2007, and March 31, 2008, were

identified. By using the placement date (and not the date of application to LTC) as a starting point, individuals that died while waiting for placement were excluded from these analyses. Data relating to the LTC placement process came from the Client Profile Database (see [Appendix A](#)). The variables assessed in the historical observation windows are outlined in [Appendix E](#).

**EXHIBIT 2.10** Observation and follow-up windows for the cohort of older adults newly placed in long-term care



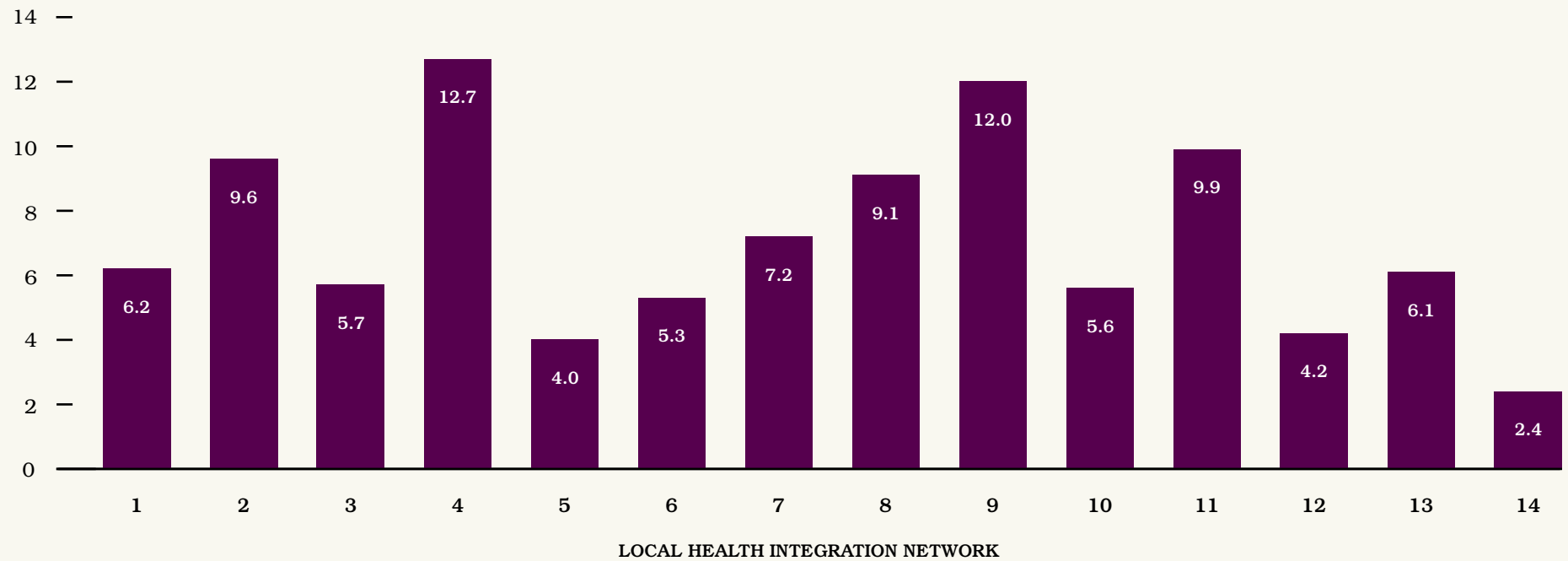
Additional cohort-specific measures examined the length of wait times between LTC application and placement and the settings where this wait occurred. Therefore, the data are stratified by the individual's location immediately preceding admission to LTC, be it an inpatient setting (acute care, chronic care, rehabilitation or psychiatric hospital) or the community. Both settings hold different resource implications and demonstrate how needs and health system use vary.

For this cohort, 19,256 older adults were identified in Ontario. The distribution of these individuals across the LHINs is detailed in [Exhibit 2.11](#), and their stratification by location at the time of LTC placement is shown in [Exhibit 2.12](#). The distribution of locations at the time of placement varied widely across

LHINs. The proportion of older adults placed from an inpatient setting ranged from 38.3% in the Central LHIN to 70.0% in the North West LHIN, whereas the proportion of older adults placed from the community ranged from 30.0% in the North West LHIN to 61.7% in the Central LHIN—approximately a two-fold difference in each case. Factors that might influence this large variation across LHINs could be related to the health status of the older adults being placed into LTC, availability of long-term care beds as well as the available support within the community. Across most LHINs, the majority of older adults were placed from the community, the exceptions being the Erie St. Clair, Toronto Central, North East and North West LHINs.

**EXHIBIT 2.11 Contribution of each Local Health Integration Network in Ontario to the cohort of older adults newly placed in long-term care, 2007/08**

PERCENT



- |                                    |                      |                         |
|------------------------------------|----------------------|-------------------------|
| 1 Erie St. Clair                   | 6 Mississauga Halton | 11 Champlain            |
| 2 South West                       | 7 Toronto Central    | 12 North Simcoe Muskoka |
| 3 Waterloo Wellington              | 8 Central            | 13 North East           |
| 4 Hamilton Niagara Haldimand Brant | 9 Central East       | 14 North West           |
| 5 Central West                     | 10 South East        |                         |

**EXHIBIT 2.12 Distribution of adults aged 66 and older newly placed in long-term care by location at time of placement, in Ontario and by Local Health Integration Network, 2007/08**

	Location At Placement		
	TOTAL	INPATIENT	COMMUNITY
<b>ONTARIO, N (%)</b>	19,256 (100.0)	8,832 (45.9)	10,424 (54.1)
<b>LOCAL HEALTH INTEGRATION NETWORK, n (%)</b>			
<b>1</b> Erie St. Clair	1,193 (100.0)	614 (51.5)	579 (48.5)
<b>2</b> South West	1,856 (100.0)	875 (47.1)	981 (52.9)
<b>3</b> Waterloo Wellington	1,101 (100.0)	542 (49.2)	559 (50.8)
<b>4</b> Hamilton Niagara Haldimand Brant	2,441 (100.0)	1,050 (43.0)	1,391 (57.0)
<b>5</b> Central West	768 (100.0)	347 (45.2)	421 (54.8)
<b>6</b> Mississauga Halton	1,027 (100.0)	454 (44.2)	573 (55.8)
<b>7</b> Toronto Central	1,391 (100.0)	823 (59.2)	568 (40.8)
<b>8</b> Central	1,748 (100.0)	670 (38.3)	1,078 (61.7)
<b>9</b> Central East	2,314 (100.0)	942 (40.7)	1,372 (59.3)
<b>10</b> South East	1,069 (100.0)	474 (44.3)	595 (55.7)
<b>11</b> Champlain	1,898 (100.0)	745 (39.3)	1,153 (60.7)
<b>12</b> North Simcoe Muskoka	815 (100.0)	316 (38.8)	499 (61.2)
<b>13</b> North East	1,166 (100.0)	651 (55.8)	515 (44.2)
<b>14</b> North West	454 (100.0)	318 (70.0)	136 (30.0)

## Relationship Between the Four Study Cohorts

The amount of overlap across the four cohorts was examined. Overall, the total number of older adults captured in the four groups comprised just under one-third of the total population aged 66 and older in Ontario. The majority of individuals captured (86.4%) were included in their own unique cohort, 12.2% were included in two cohorts, and only 0.1% (273 individuals) were included in all four cohorts. Individuals from the older women cohort were most likely to be represented in the other three cohorts, having the greatest amount of overlap with the dementia cohort. Those diagnosed with dementia also noticeably intersected with the medically complex and LTC cohorts. This illustrates that frail older adults in Ontario are not a homogeneous population. Therefore, the diversity of older adults' needs should be incorporated into the planning of service provision and delivery.

## MEASURES

In order to allow for comparisons across the four cohorts, exhibits are presented in a standardized format using the same measures. These common measures can be classified into three broad categories: demographic, health status and health services use. Additional analyses were performed to highlight chapter-specific topics of interest, and these additional measures are discussed in the subsequent chapters.

### Demographic Measures

The foundation for each cohort was the Registered Persons Database (RPDB) which contains demographic information on all residents of Ontario with a valid Ontario Health Insurance Plan (OHIP) number. Age and sex were obtained from the RPDB. Where applicable, variables were stratified by the following age groups: 66–69 years, 70–74 years, 75–79 years (76–79 years for the older women cohort), 80–84 years, 85–89 years and 90 years and older. This allowed for the observation of changing needs across age groups. Neighbourhood income quintile and residential LHIN information were obtained by linking postal codes obtained from the RPDB to Statistics Canada's Postal Code Conversion

Files. Two measures of socioeconomic status were used, the first capturing area deprivation and the second capturing individual financial need. The first measure attributed median household income of each neighbourhood (obtained from census data) to all persons living in that neighbourhood. Neighbourhoods were then ranked by quintile, from poorest (Q1) to wealthiest (Q5) within areas assigned by Statistics Canada. Caution, therefore, must be used when making income quintile comparisons across different regions (e.g., LHINs) because income ranges for each quintile may vary from region to region. In the Greater Toronto Area, however, LHINs 5, 6, 7 and 8 consist of areas where income ranges are very similar, and comparisons between these particular LHINs are valid. Finally, it is important to bear in mind that income quintiles characterize neighbourhoods, not individual households (i.e., an individual may live in a high-income household within a low-income neighborhood, or vice versa). The second measure of socioeconomic status used the qualification for reduced drug co-payments<sup>5</sup> through the Ontario Drug Benefit plan in the three months prior to the cohort definition date (April 1, 2007) as an indicator of low income level.



## Health Status Measures

Comorbidity and frailty were quantified using the Johns Hopkins Adjusted Clinical Group (ACG) algorithm. The ACG System is based on the premise that the burden of illness in a population is correlated with the level of resources necessary to provide health care to that particular population.<sup>6</sup> Its unique methodology uses administrative data (e.g., physician billing claims and hospital admissions and discharge data) that have been coded according to the International Classification of Diseases Version 10 (ICD-10) to quantify and predict health system utilization and cost by accounting for the totality of diagnoses experienced by a person within a given time period rather than for any specific disease. The ACG System is widely used by health care providers and planners, as well as by health care researchers and analysts. It provides a suite of tools to measure and predict the delivery and consumption of health care resources—one of these tools being the Aggregated Diagnosis Groups (ADGs). For this project, ADGs were used to measure the number of chronic conditions per individual within each cohort and to identify individuals with the frailty marker. ADGs, the building blocks of the ACG System and considered as a type of morbidity marker, are groupings of diagnosis codes that are similar in terms of

severity and likelihood of persistence over time. All ICD-10 codes assigned by clinicians over an extended period, such as a year, can be assigned to one of 32 ADGs. An individual may have multiple ADGs. The ACG system has been validated extensively in the US and Europe and has shown to be compatible with Canadian health administrative data.<sup>7-9</sup> The frailty marker is based on clusters of diagnosis codes that indicate the presence of frail conditions. Specifically, it indicates whether an individual has a diagnosis falling within any one of 11 clusters that represent medical problems associated with frailty. The clusters are comprised of 81 diagnostic codes that are highly associated with marked functional limitations among older individuals, and the presence of any one of these diagnoses suggests frailty. The 13 ADGs used to qualify an individual as having two or more comorbid conditions are documented in [Appendix G](#).<sup>10</sup>

Hospitalizations, emergency department visits and physician visits in the two years prior to the cohort definition date (April 1, 2007) were used as inputs to the ACG algorithm. Hospital data was obtained from the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD), which contains records on all hospitalizations in Ontario. Emergency department visits were extracted from the

National Ambulatory Care Reporting System (NACRS), which captures visits to hospital and community-based ambulatory care services. Physician visits were identified using the Ontario Health Insurance Plan claims database, which lists the physician services paid for by the Ministry of Health and Long-Term Care.

In Ontario, individuals who applied for long-term care and/or were receiving long-stay home care were assessed using the Resident Assessment Instrument–Home Care (RAI-HC). The RAI-HC is a comprehensive clinical assessment instrument with over 300 data items; it contains a number of items and embedded scales specific to geriatric concerns, including measures of daily living activities, physical and mental health decline and/or stress, and cognitive performance. After the initial assessment at the time of application to long-term care or long-stay home care, subsequent assessments should occur every six months thereafter to assess and compare possible changes in clinical status over time. The instrument was designed to highlight issues related to functioning and quality of life for these community-residing individuals. In this report, for individuals who were administered a RAI-HC, the most recent assessment prior to cohort definition date was examined to determine each senior's home care use,

living status and caregiver relationship (i.e., informal care use), and health status (functional and cognitive).<sup>11,12</sup>

The specific components of the RAI-HC used in this study are described below.

**1 / Activities of Daily Living (ADL) Hierarchy Scale.** This groups activities of daily living according to the stage of the disablement process in which they occur. Early loss ADLs (e.g., dressing) are assigned lower scores than late loss ADLs (e.g., eating). The ADL Hierarchy Scale ranges from 0 (no impairment) to 6 (total dependence).

**2 / Changes in Health, End-stage Disease, and Signs and Symptoms (CHESS) Scale.** This was designed to identify individuals at risk of serious decline. It can serve as an outcome where the objective is to minimize problems related to declines in function. CHESS, originally developed for use in the long-term care home, has been adapted for use with the RAI-HC. It uses six items in the sub-scale (plus three additional items) to create a five-point scale from 0 (not at all unstable) to 5 (highly unstable). In a long-term care home population, there is clear differentiation of all six levels of CHESS scores; higher levels are predictive of adverse outcomes like mortality, hospitalization, pain, caregiver stress and poor self-rated health.

**3 / Cognitive Performance Scale (CPS).** This combines information on memory impairment, communication and executive function, with scores ranging from 0 (intact) to 6 (very severe impairment). The CPS has been shown to be highly correlated with the Mini Mental State Examination (MMSE) in a number of validation studies.

**4 / Depression Rating Scale (DRS).** This can be used as a clinical screen for depression. Seven items are used, with scores ranging from 0 (no indicators of depression exhibited in the last 30 days) to 14 (all indicators exhibited daily or almost daily). Validation studies were based on a comparison of the DRS with the Hamilton Depression Rating Scale and the Cornell Scale for Depression. Compared to DSM-IV major or minor depression diagnoses, the DRS was 91% sensitive and 69% specific at a cut-point score of 3 out of 14.

**5 / Instrumental Activities of Daily Living (IADL) Involvement Scale.** This measures difficulty in performing instrumental activities, including meal preparation, ordinary housework and telephone use. Each item can be assigned three values (no difficulty, some difficulty, great difficulty) using a hierarchical algorithm to produce a scale that ranges from 0 (no difficulty in any of the three IADLs) to 6 (great difficulty in all three ADLs).

**6 / Method for Assigning Priority Levels (MAPLe).** This differentiates clients into five priority levels, based on their risk of adverse outcomes. The MAPLe algorithm is based on a broad range of clinical variables in the RAI-HC. Clients in the low priority level have no major functional, cognitive, behavioral or environmental problems and can be considered self-reliant. The high priority level is based on presence of ADL impairment, cognitive impairment, wandering, behaviour problems and the long-term care home risk Clinical Assessment Protocols (CAPs). Research has demonstrated that the five priority levels (low, mild, moderate, high, very high) are predictive of adverse outcomes. Clients in the high priority level are nearly nine times more likely to be admitted to a long-term care facility than are the low priority clients. MAPLe is also correlated with caregiver stress.

## Health Service Use Measures

The following health service use variables were calculated for a one-year historical and one-year follow-up period in relation to the baseline date for each cohort.

**1 / Emergency department visits.** Unplanned visits to the emergency department were extracted from the NACRS database. All non-duplicate registrations that were not results of transfers from other acute institutions were counted. Low-acuity visits were defined as those with a triage level of less urgent (semi-urgent) and non-urgent and ended with the patient leaving the ED without admission into hospital. An emergency department visit was identified as potentially preventable if any of the presenting diagnoses included the following: angina, asthma, cellulitis, chronic obstructive pulmonary disease, congestive heart failure, dehydration, diabetes, gastroenteritis, grand mal seizure disorders, hypertension, hypoglycemia, kidney/urinary tract infections, pneumonia, or severe ear, nose or throat infection. The diagnostic codes used to identify these diagnoses are listed in [Appendix G](#).<sup>13</sup>

An emergency department visit was identified as fall-related if the diagnosis met the following criteria:

- Primary diagnosis of any injury (ICD-10-CA: S or T00–T14);
- Secondary diagnosis of injury caused by fall (ICD-10-CA: W00–W19).

**2 / Acute hospitalizations.** All hospital records within the period of interest were extracted from the CIHI-DAD, and unique episodes were counted. The length of stay of a particular hospitalization was calculated as the number of days between the hospital admission and discharge dates; the total annual length of stay was calculated by summing up the length of stay for each hospitalization in that year. Same-day surgery records were extracted from the NACRS database (as same-day surgery can be considered a hospital-based outpatient service) and counted.

Three measures of ALC designation while in hospital were used. First, the total number of ALC days in a given hospital episode; second, the total annual number of ALC days; and third, the percentage of a single hospital episode that was designated as ALC. The number of days that a patient was designated ALC during a hospitalization, as indicated on his/her discharge abstraction record, denotes the ALC length of stay. The total annual ALC length of stay was calculated by summing up

all non-zero ALC lengths of stay from every hospitalization in that year. The percentage of days that a patient was designated ALC in a particular hospitalization episode was calculated in a two-step process. The total number of ALC days in that episode was calculated by summing up the ALC days for all hospital stays belonging to the episode; similarly, the episode length of stay was calculated by counting the number of days between the episode admission and discharge dates. The episode ALC length of stay was then divided by the hospital episode length of stay.

**3 / Physician visits.** All OHIP fee codes billed by a general practitioner or family practitioner (GP/FP) in the one-year period were counted. Claims by GP/FPs were identified using the OHIP specialty code for health professionals.

All scheduled emergency department visits were extracted from the NACRS database and counted in order to account for certain regions where individuals would be seen in the ED by their physicians.

All OHIP fee codes billed by a medical practitioner other than a GP/FP, determined using the OHIP specialty code for health professionals, were considered to be visits to a specialist and counted as such.

Home visits were defined as having two OHIP claims by the same physician on the same day, with one fee code beginning with 'B99' and the other fee code beginning with 'A.' All home visits in the one-year observation period were counted.

After-hours visits were defined as OHIP claims with a fee code of 'Q012' and counted.

Mental health visits were defined as an OHIP claim with a diagnosis code of 290, 295, 296, 297, 298, 299, 300, 301, 302, 306, 307, 311, 313 or 314.

**4 / Home care services.** Long-stay home care service visits (vs. short-stay home care visits, which do not require a RAI assessment) are typically necessitated by functional decline and are expected to be required on an ongoing basis (no anticipated discharge date). They are made available by private home care providers contracted by the Community Care Access Centres (CCACs). These visits are recorded in the Home Care Database. Home care records where the service provided was any of a nursing visit or shift, nutrition/dietetic service, physiotherapy, occupational therapy, speech language therapy, social work, psychology, personal service, homemaking or combined personal service and homemaking were counted

over the year to obtain the total number of home care visits.

Records for each particular type of service were then counted to get the total number of visits by service type. The average number of home care visits was calculated by dividing the total number of visits in a year by the number of months in which home care services were provided.

**5 / Long-term care use (applications and placements).** Wait lists for long-term care homes in Ontario are centrally managed by the Ontario CCACs and are captured in the CPRO database. Long-term care applications that were opened over the course of the one-year observation period were counted. Similarly, placements in long-term care homes, excluding transfers between homes, were counted over the one-year period.

**6 / Drug use.** Medications for Ontario adults over the age of 65 are paid for by the Ministry of Health and Long-Term Care and captured in the Ontario Drug Benefit database. Prescriptions that were filled at an outpatient pharmacy during the one-year observation period were extracted from the database and examined to determine the number of unique drugs claimed for each individual. The number of distinct

medications used for an individual has been shown to be a simple measure of comorbidity,<sup>14</sup> and we counted medications used in the year prior to index. Use of cholinesterase inhibitors, a class of medications commonly used in the treatment of dementia, was further identified from these records (see [Appendix D.2](#)).

## REFERENCES

- 1 Coleman EA, Parry C, Chalmers S, Min SJ. The care transitions intervention: results of a randomized controlled trial. *Arch Intern Med* 2006; 166(17):1822-8.
- 2 Naylor MD, Brooten DA, Campbell RL, Maislin G, McCauley KM, Schwartz JS. Transitional care of older adults hospitalized with heart failure: a randomized, controlled trial. *J Am Geriatr Soc* 2004; 52(5):675-84.
- 3 van Walraven C, Dhalla IA, Bell C, Etchells E, et al. Derivation and validation of an index to predict early death or unplanned readmission after discharge from hospital to the community. *CMAJ* 2010; 182(6):551-7.
- 4 Hirdes JP, Poss JW, Curtin-Telegdi N. The Method for Assigning Priority Levels (MAPLe): a new decision-support system for allocating home care resources. *BMC Med* 2008; 6:9.
- 5 Ontario Ministry of Health and Long-Term Care. Co-Payment Application for Seniors. Accessed on October 18, 2011 at [http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/GetFileAttach/014-3233-87~1/\\$File/3233-87E.pdf](http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/GetFileAttach/014-3233-87~1/$File/3233-87E.pdf).
- 6 Weiner J. *The Johns Hopkins ACG System Reference Manual. Version 7.0*. Baltimore, MD: Health Services Research and Development Center, Johns Hopkins University Bloomberg School of Public Health; 2005.
- 7 The Johns Hopkins University ACG Case-Mix System. Describing Morbidity Burden. Accessed October 18, 2011 at [http://www.acg.jhsph.org/index.php?option=com\\_content&view=article&id=55&Itemid=149](http://www.acg.jhsph.org/index.php?option=com_content&view=article&id=55&Itemid=149).
- 8 The Johns Hopkins University ACG Case-Mix System. Canada. Accessed October 18, 2011 at [http://www.acg.jhsph.org/index.php?option=com\\_content&view=article&id=61:canada&catid=89:international-experience&Itemid=132](http://www.acg.jhsph.org/index.php?option=com_content&view=article&id=61:canada&catid=89:international-experience&Itemid=132)
- 9 Reid R, MacWilliam L, Roos NP, Bogdanovic B, Black C. *Measuring Morbidity in Populations: Performance of the Johns Hopkins Adjusted Clinical Group (ACG) Case-Mix Adjustment System in Manitoba*. Winnipeg, MB: Manitoba Centre for Health Policy and Evaluation; 1999. Accessed April 20, 2011 at <http://mchp-appserv.cpe.umanitoba.ca/reference/acg.pdf>.
- 10 Doupe M, Brownell M, Kozyrskyj A, Dik N, et al. *Using Administrative Data to Develop Indicators of Quality Care in Personal Care Homes*. Winnipeg, MB: Manitoba Centre for Health Policy; 2007. Accessed April 20, 2011 at <http://mchp-appserv.cpe.umanitoba.ca/reference/pch.qi.pdf>.
- 11 InterRAI. InterRAI HC – Home Care. Accessed April 20, 2011 at <http://www.interrai.org/section/view/?fnode=15>.
- 12 InterRAI. Status and Outcome Scales. Accessed April 20, 2011 at <http://www.interrai.org/section/view/?fnode=28>.
- 13 Gruneir A, Bell CM, Bronskill S, Schull M, Anderson GM, Rochon PA. Frequency and pattern of emergency department visits by long-term care residents – a population-based study. *J Am Geriatr Soc* 2010; 58(3):510-7.
- 14 Schneeweiss S, Seeger JD, Maclure M, Wang PS, Avorn J, Glynn RJ. Performance of comorbidity scores to control for confounding in epidemiologic studies using claims data. *Am J Epidemiol* 2001; 154(9):854-64.

# Older Women

## *A look at gender differences in health system use*

**Lead Author**  
**Andrea Gruneir**

**Contributors**  
**Susan E. Bronskill**  
**Jeffrey W. Poss**

## INTRODUCTION

On average, Canadian women have outlived their male counterparts for more than a century.<sup>1</sup> Yet despite their longer life expectancy, women tend to experience a greater burden of chronic conditions with disabling consequences, such as arthritis, osteoporosis and depression. Worsening matters is the frequency with which these chronic conditions co-occur leading to a high prevalence of multi-morbidity. Older women are also at higher risk for fall-related injuries, such as hip fracture, that can have devastating consequences on their ability to perform self-care activities. Given the combination of their greater longevity and morbidity, women constitute the majority of older persons with disabilities living in the community.<sup>2</sup>

The health differences between older women and older men are compounded by social trends that have resulted in a greater number of older women living alone, with fewer financial resources, and less access to an informal caregiver. In their younger years, women tend to marry men who are older, making them more likely to be widowed in later years; widowed older women are also less likely to remarry than are widowed older men.<sup>3</sup> This means that older women are more likely to live alone and, consequently, less likely to

have access to a regular informal care provider. For older women who live alone, access to financial resources may also be a problem. The current generation of older women were less likely to have participated in the workforce; among those who did, they often earned less than their male counterparts and had fewer working years due to time-off for childrearing. Older women with a spouse often maintain the role of primary caregiver, even in the face of their own health needs. Conventional notions of caregiving as women's work have also meant that women with disabilities, but relatively healthier husbands, are unlikely to receive the same support as older couples with opposite dynamics. Combined, these trends have a significant effect on the ability of older women to have their health needs met in the community.<sup>4</sup>

This interplay between health and social forces means that older women are more likely to enter long-term care facilities than are older men. It also means that older women who do enter long-term care are likely to enter at earlier stages than older men and therefore to have longer stays. They are also less likely to return to their homes.<sup>5</sup> Enabling older women to remain in the community as long as possible not only suits their preferences but can also be a cost-effective alternative to

long-term institutional care. To these ends, this chapter considers the factors relevant to maintaining older women's health and independence in the community and the disparities between women and men on key measures of healthy aging in the community.

## METHODS

### Population Definition

This chapter focuses on Ontario women over the age of 75 who live in the community. We chose to focus on this older age group to better identify individuals who experience health conditions that put them at increased risk of becoming frail and requiring admission to long-term care. To create the cohort, we identified all adults in Ontario who were 76 years of age or older and who were not residents of a long-term care facility on April 1, 2007 (considered baseline). We chose to restrict inclusion to those 76 years of age or older because several of our measures of health services use required looking in the year before baseline; this restriction ensured that all measures captured use among those at least 75 years of age.

The cohort of older adults in Ontario presented in this chapter includes both women and men over the age of 76. Although our primary focus is on describing the needs of older women as

they relate to the risk of admission to long-term care, we believe it is important to show this data alongside data about older men. By presenting the data on men, we highlight some important disparities between older women and men in their levels of disability, access to informal support, and use of health services.

The majority of health and health services use indicators are stratified by the following age groups: 76–79 years, 80–84 years, 85–89 years, and 90 years and older. This stratification allows us to observe how needs differ for those in the oldest age groups and to compare this difference between women and men.

### Measures

In addition to the demographic, health services, and broad health status measures presented in the other chapters, additional measures on the prevalence of health conditions with the potential to limit functioning are presented here. Specific diagnoses of interest were divided into three categories: *general medical* (asthma; chronic obstructive pulmonary disease; cardiovascular conditions including acute myocardial infarction, congestive heart failure and stroke; cancer; and diabetes); *physical functioning* (arthritis, osteoporosis and urinary incontinence); and *mental health* (dementia, depression and other mental health conditions). These diagnoses were

chosen because they are known to have the potential to adversely affect an individual's independent functioning either by limiting physical or cognitive abilities. The specific diagnosis codes examined are listed in [Appendix C.2](#).

We also created a measure of multi-morbidity in order to estimate the proportion of older women and men who are affected by more than one of these conditions. By including a measure of multi-morbidity, we are better able to describe the total burden of these conditions in our cohort. To create this measure, we summed the number of these specific conditions experienced by each member of the cohort. This is presented as the proportion of our cohort who had none of these conditions, only one, two, three and greater than three of these conditions.

Finally, we also added a measure of the occurrence of fractures in the five years prior to entering the cohort. Fractures are the most significant consequence of falls in older adults, and they have potentially devastating consequences on an individual's ability to perform self-care activities and remain in the community. The specific fractures of interest were: wrist/forearm, shoulder/upper arm, thoracic spine, lumbar spine and pelvis, hip/femur and lower leg/ankle.

## RESULTS

### Characterizing Older Women in Ontario

[Exhibit 3.1](#) presents key demographic and broad health status measures of older women in Ontario, along with some specific measures

that were only available for women who had undergone a RAI-HC assessment. [Exhibits 3.2–3.5](#) provide complementary information that illustrates important differences between older women and men that may affect their risk of admission to long-term care.

**EXHIBIT 3.1 Demographic and broad health status measures of Ontario women aged 76 and older, overall and by age group, 2007**

	Women				
	ONTARIO	AGED 76–79	AGED 80–84	AGED 85–89	AGED ≥90
Older women, N	656,836	144,721	140,505	74,668	32,976
<b>DEMOGRAPHIC MEASURES, n (%)</b>					
Low income level	165,201 (25.2)	38,867 (26.9)	40,861 (29.1)	25,029 (33.5)	12,959 (39.3)
<b>HEALTH STATUS MEASURES, n (%)</b>					
Number of ADG comorbidity categories					
0	26,271 (4.0)	5,486 (3.8)	5,045 (3.6)	3,001 (4.0)	2,134 (6.5)
1–5	184,035 (28.0)	44,041 (30.4)	39,368 (28.0)	19,951 (26.7)	9,186 (27.9)
6–9	250,493 (38.1)	55,611 (38.4)	54,134 (38.5)	28,119 (37.7)	11,599 (35.2)
≥10	196,037 (29.8)	39,583 (27.4)	41,958 (29.9)	23,597 (31.6)	10,057 (30.5)
≥1 Diagnoses associated with frailty	60,381 (9.2)	11,025 (7.6)	14,055 (10.0)	10,064 (13.5)	5,393 (16.4)
≥2 Coexisting chronic conditions	514,377 (78.3)	108,974 (75.3)	110,321 (78.5)	59,423 (79.6)	24,825 (75.3)

continued on next page...



EXHIBIT 3.1 CONTINUED...

	Women				
	ONTARIO	AGED 76-79	AGED 80-84	AGED 85-89	AGED ≥90
<b>Number of different drugs</b>					
0	45,946 (7.0)	9,630 (6.7)	8,279 (5.9)	4,460 (6.0)	2,921 (8.9)
1-5	194,711 (29.6)	45,373 (31.4)	39,187 (27.9)	19,491 (26.1)	8,626 (26.2)
6-9	196,881 (30.0)	43,086 (29.8)	42,891 (30.5)	23,033 (30.8)	9,939 (30.1)
10-19	197,916 (30.1)	41,774 (28.9)	45,082 (32.1)	25,063 (33.6)	10,469 (31.7)
≥20	21,382 (3.3)	4,858 (3.4)	5,066 (3.6)	2,621 (3.5)	1,021 (3.1)
<b>RAI-HC ASSESSMENTS, n (%)</b>					
Assessed in year prior to baseline*	73,809 (11.2)	9,787 (6.8)	16,984 (12.1)	15,552 (20.8)	10,600 (32.1)
Had home care contact in prior year	125,067 (19.0)	19,421 (13.4)	28,385 (20.2)	22,642 (30.3)	13,746 (41.7)
Had home care contact and RAI-HC assessment	71,303 (10.9)	9,523 (6.6)	16,447 (11.7)	15,036 (20.1)	10,195 (30.9)
<b>Living Status</b>					
Reported living alone	10,537 (14.3)	1,625 (16.6)	2,779 (16.4)	2,567 (16.5)	1,343 (12.7)
Reported a primary caregiver relationship					
Child/child-in-law	43,646 (59.1)	5,713 (58.4)	11,136 (65.6)	11,066 (71.2)	7,748 (73.1)
Spouse	17,677 (23.9)	2,507 (25.6)	3,017 (17.8)	1,642 (10.6)	418 (3.9)
Other relative	6,337 (8.6)	741 (7.6)	1,408 (8.3)	1,507 (9.7)	1,452 (13.7)
Friend/neighbour	4,940 (6.7)	631 (6.4)	1,140 (6.7)	1,112 (7.2)	842 (7.9)
Not reported	1,209 (1.6)	195 (2.0)	283 (1.7)	225 (1.4)	140 (1.3)
Reported co-residing with primary caregiver	33,108 (44.9)	4,556 (46.6)	6,808 (40.1)	5,343 (34.4)	3,429 (32.3)
Type of primary caregiver					
Child/child-in-law	13,821 (41.7)	1,841 (40.4)	3,442 (50.6)	3,323 (62.2)	2,627 (76.6)

\*All proportions calculated on only those who received a RAI-HC assessment.

continued on next page...

EXHIBIT 3.1 CONTINUED...

	Women				
	ONTARIO	AGED 76–79	AGED 80–84	AGED 85–89	AGED ≥90
Spouse	17,258 (52.1)	2,453 (53.8)	2,939 (43.2)	1,583 (29.6)	388 (11.3)
Other relative	1,370 (4.1)	187 (4.1)	291 (4.3)	307 (5.7)	309 (9.0)
Friend/neighbour	659 (2.0)	75 (1.6)	136 (2.0)	130 (2.4)	105 (3.1)
Reported a caregiver experiencing distress	9,066 (12.3)	1,032 (10.5)	1,776 (10.5)	1,452 (9.3)	1,006 (9.5)
<b>Functional Status</b>					
MAPLe level					
Low/mild/moderate	49,454 (67.0)	7,170 (73.3)	12,018 (70.8)	10,758 (69.2)	6,938 (65.5)
High	18,186 (24.6)	2,014 (20.6)	3,778 (22.2)	3,598 (23.1)	2,730 (25.8)
Very high	6,169 (8.4)	603 (6.2)	1,188 (7.0)	1,196 (7.7)	932 (8.8)
ADL Hierarchy Scale					
0	52,503 (71.1)	7,452 (76.1)	12,808 (75.4)	11,636 (74.8)	7,059 (66.6)
1+	21,281 (28.8)	2,332 (23.8)	4,168 (24.5)	3,912 (25.2)	3,537 (33.4)
CHESS Scale					
0–1	53,060 (71.9)	6,986 (71.4)	12,277 (72.3)	11,372 (73.1)	7,788 (73.5)
2+	20,724 (28.1)	2,798 (28.6)	4,699 (27.7)	4,176 (26.9)	2,808 (26.5)
Cognitive Performance Scale					
0–2	59,766 (81.0)	8,385 (85.7)	14,177 (83.5)	12,812 (82.4)	8,332 (78.6)
3+	14,018 (19.0)	1,399 (14.3)	2,799 (16.5)	2,736 (17.6)	2,264 (21.4)
Depression Rating Scale					
0–2	65,670 (89.0)	8,322 (85.0)	14,853 (87.5)	13,959 (89.8)	9,729 (91.8)
3+	8,114 (11.0)	1,462 (14.9)	2,123 (12.5)	1,589 (10.2)	867 (8.2)
IADL Involvement Scale					
0–3	39,603 (53.7)	6,278 (64.1)	10,434 (61.4)	9,082 (58.4)	4,976 (46.9)
4+	33,963 (46.0)	3,480 (35.6)	6,479 (38.1)	6,424 (41.3)	5,596 (52.8)

ADG = Aggregated Diagnosis Groups  
RAI-HC = Resident Assessment Instrument—Home Care

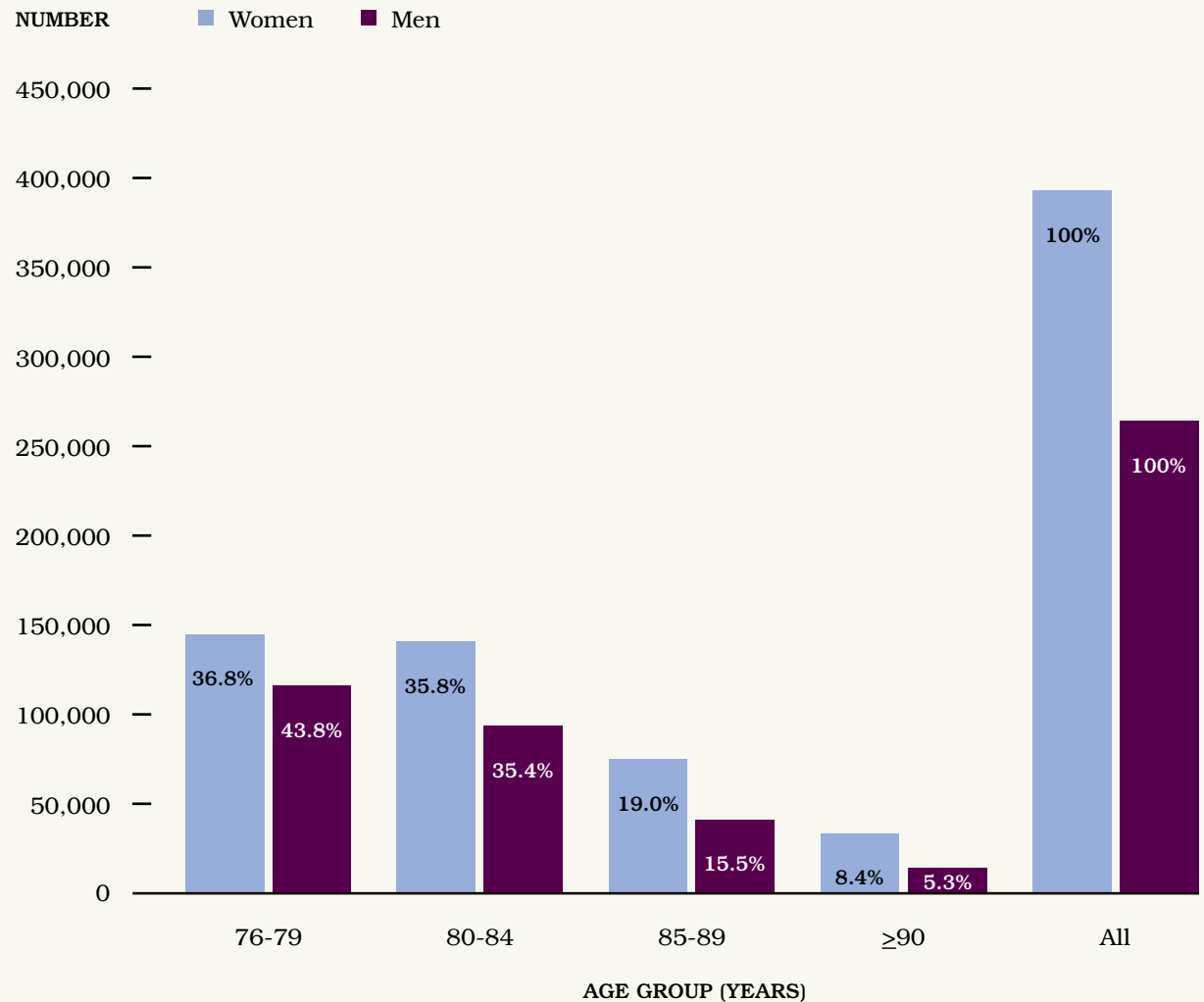
MAPLe = Method for Assigning Priority Levels  
ADL = Activities of Daily Living

CHESS = Changes in Health, End-stage Disease, and Signs and Symptoms  
IADL = Instrumental Activities of Daily Living

### Demographic Measures

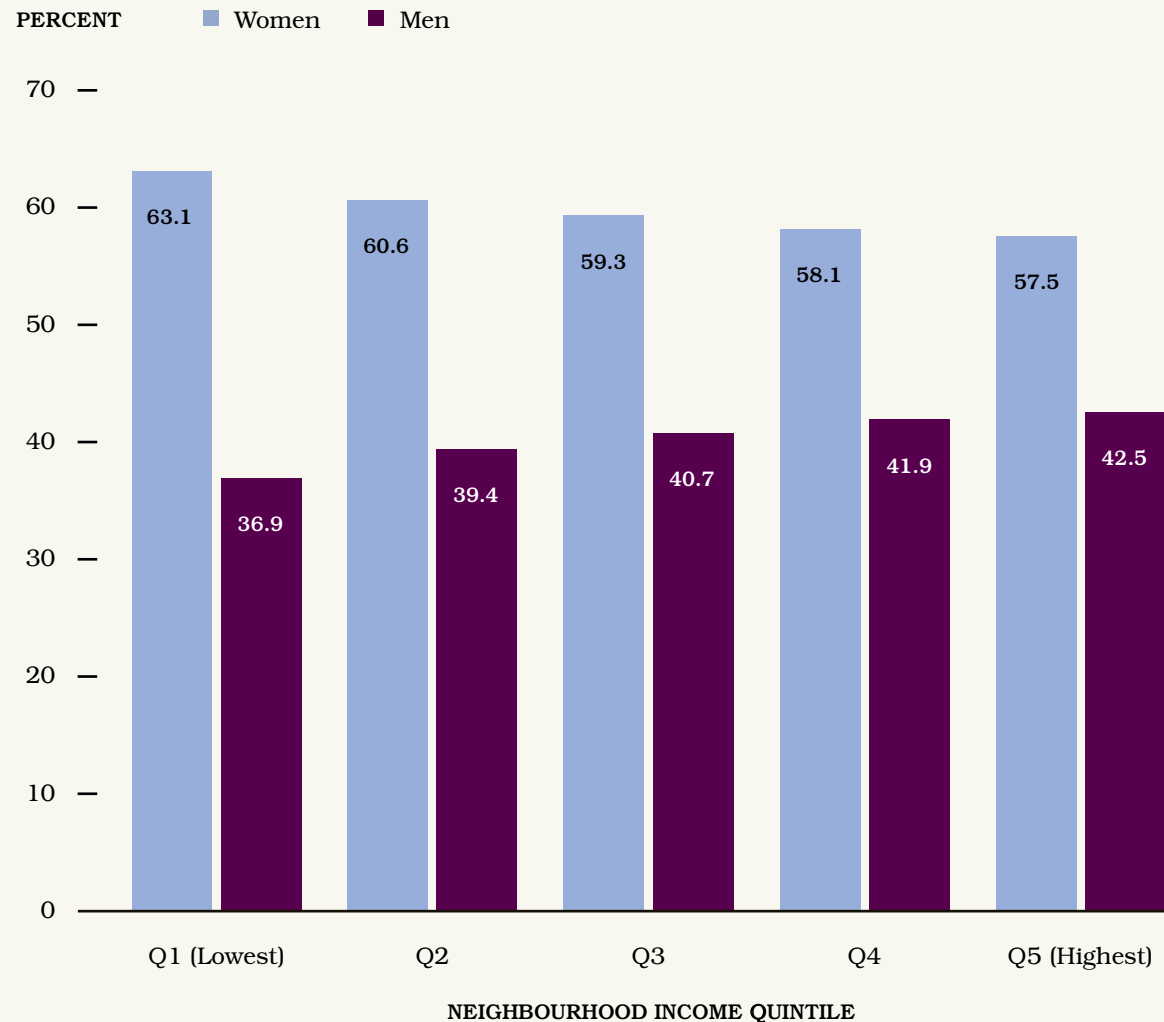
We identified 392,870 women and 263,966 men over the age of 76 in Ontario. [Exhibit 3.2](#) illustrates the number of women and men by age group. In each group, there were more women than men, and the gap widened among the oldest old. For example, women accounted for 55.6% of people in the 76–79 age group whereas they accounted for 70.4% of those aged 90 and older. Not surprisingly, the women in our cohort were, on average, older than the men. Among women, 36.8% were in the 76–79 age range, but 19.0% were aged 85–89 and 8.4% were aged 90 and older. Comparatively, among men, 43.8% were in the 76–79 age range, but 15.5% were aged 85–89 and only 5.3% were aged 90 and older. It is clear that women comprise a large majority of the oldest old in Ontario. In fact, there are over 100,000 women over the age of 85 compared to approximately 50,000 men over age 85 in Ontario. This means that the absolute number of older Ontarians who require services are disproportionately women; and, as the remainder of this chapter will demonstrate, differences in opportunities to obtain informal support and the prevalence of potentially disabling conditions may have important implications for the types of services that need to be made available to enable older adults to stay in the community.

**EXHIBIT 3.2** Number and relative percent of Ontario adults aged 76 and older, by age group and sex, 2007



Approximately 30% of women over 76 years of age were identified as low income based on their need for reduced co-payments for prescription medication. We identified a clear relationship between age and low income status (as previously defined), such that as age increased so did the proportion of older adults with low income status. The trend increased from 26.9% among those aged 76–79 to 39.3% among those aged 90 and older. Among men, a similar age pattern was observed but with overall lower percentages in each age group (16.7% in those aged 76–79 and 24.4% in those aged 90 and older; not shown here). [Exhibit 3.3](#) illustrates the income disparity between older women and men using a different measure: neighbourhood income quintile. [Exhibit 3.3](#) shows that within each neighbourhood income quintile there was a higher percentage of women than men but that this gap was widest among the lowest income neighbourhoods. These data show that compared to older men, older women were disproportionately represented in the lowest income groups.

**EXHIBIT 3.3 Percentage of Ontario adults aged 76 and older, by neighbourhood income quintile and sex, 2007**



### Health Measures (Broad)

Older women, regardless of age, have a high burden of chronic disease. Fewer than 7% are reported to have no chronic conditions, and 75% have two or more comorbid conditions. Markers of frailty are also common in older women but do increase with age from 7.6% among those aged 76–79 to 16.4% among those aged 90 and older. Over 90% of older women took at least one medication, with approximately 30% taking 6–9 medications and another 30% taking 10–19 medications over the course of one year. Similar patterns on broad measures of health status were observed among older men, with the exception of markers of frailty which were less common (not shown).

### Home Care Use and RAI-HC Indicators

Contact with the home care system in the year prior to baseline varies dramatically across age groups, from 13.4% in women aged 76–79 to 41.7% among women aged 90 and older ([Exhibit 3.1](#)). A subset of the women who accessed home care also had a completed RAI-HC assessment during this time indicating that they received long-term home care services to maintain their independence in the community. The percentage of Ontario women who had this assessment also varied by age—from 6.8% in those aged 76–79 to 32.1% in those aged 90 and older. The percentage of women

who used these services was consistently higher than the percentage of men, especially in the oldest age groups (for men, 13.7% in those aged 85–89 and 22.9% in those aged 90 and older, not shown). Among those who had a completed RAI-HC assessment, we have access to much more detailed information on their access to support as well as functional status. In the following sub-sections (Living Status, The Primary Caregiver and Functional Status), data is presented only on those members of our cohort who had a completed RAI-HC assessment, i.e., the long-stay home care users.

### Living Status

Approximately 16% of older women who received a RAI-HC assessment in the cohort live alone (this was slightly lower in the oldest age group at 12.7%). Among the men who received a RAI-HC assessment, approximately 10% lived alone, and this did not vary across age groups (not shown).

### The Primary Caregiver

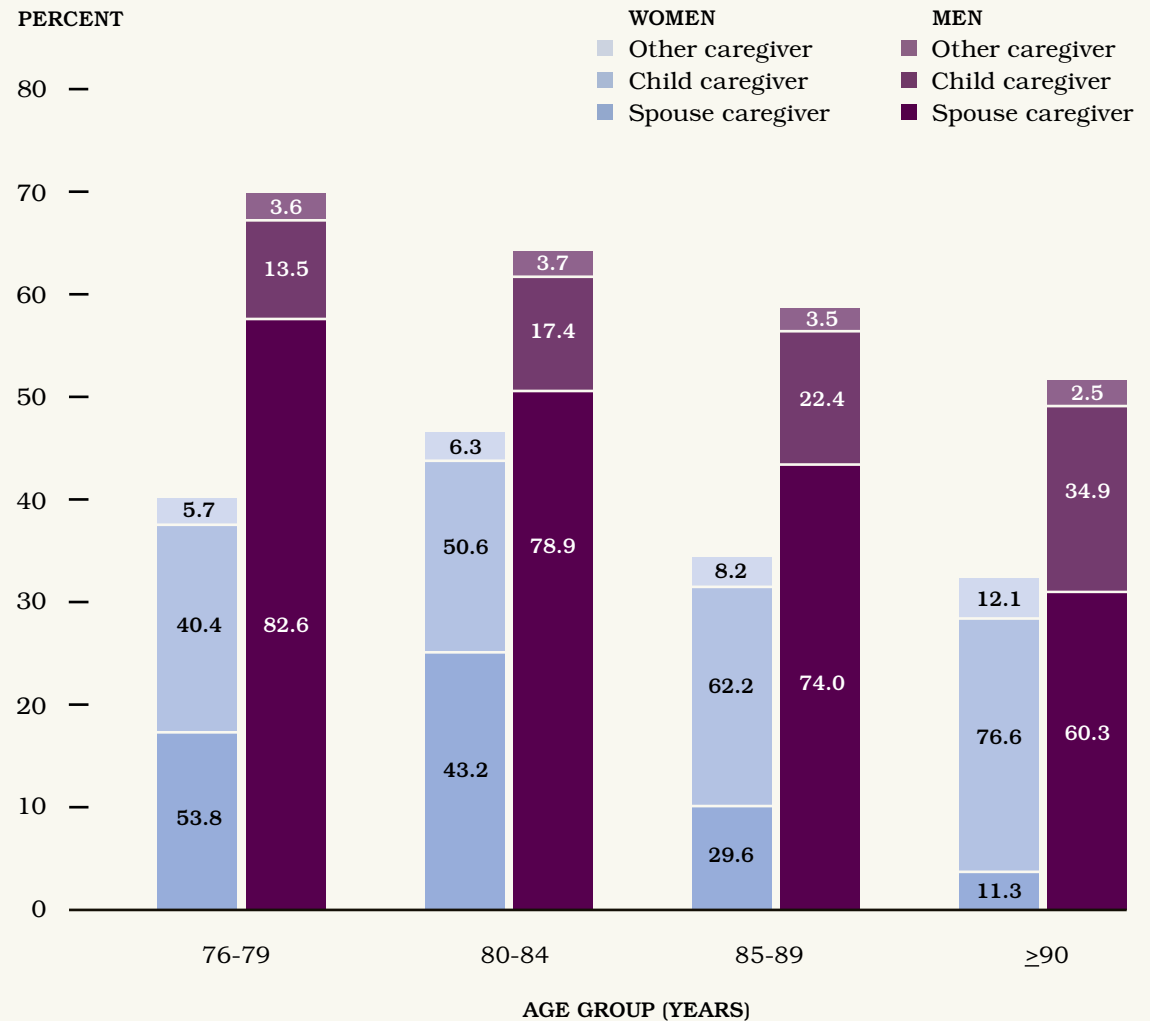
The majority of women who had a completed RAI-HC reported a primary caregiver. In all age groups, the most common primary caregiver relationship was a child (son or daughter) or child-in-law, but the proportion who reported this caregiver type increased with age (from 58.4% among those aged 76–79

to 73.1% among those aged 90 and older). Spouses were reported as the second most common type of primary caregiver but with much less frequency than child or child-in-law and with the opposite pattern across age groups (25.6% among those aged 76–79 compared to 3.9% among those aged 90 and older). Regardless of age group, approximately 10% of these women’s caregivers experienced distress (see [Exhibit 3.1](#)). Patterns of caregiving were very different for men who had a RAI-HC (not shown). Among the men, spouses were the most common type of primary caregiver in all age groups except among the oldest old (58.8%, 51.5%, 44.4% and 31.9%, respectively, from youngest to oldest). Child or child-in-law were the second most commonly reported primary caregiver types in all age groups except among the oldest old, where they were the most common (27.3%, 34.9%, 42.8% and 54.4%, respectively). Among men with a RAI-HC, approximately 18% of their caregivers were reported to have experienced distress, with little variation across age groups.

Given the differences between older women and men in the proportion who live alone, we also looked at the caregiver relationships among those who live with their primary caregiver. This is illustrated in [Exhibit 3.4](#). The bars represent the proportion of older

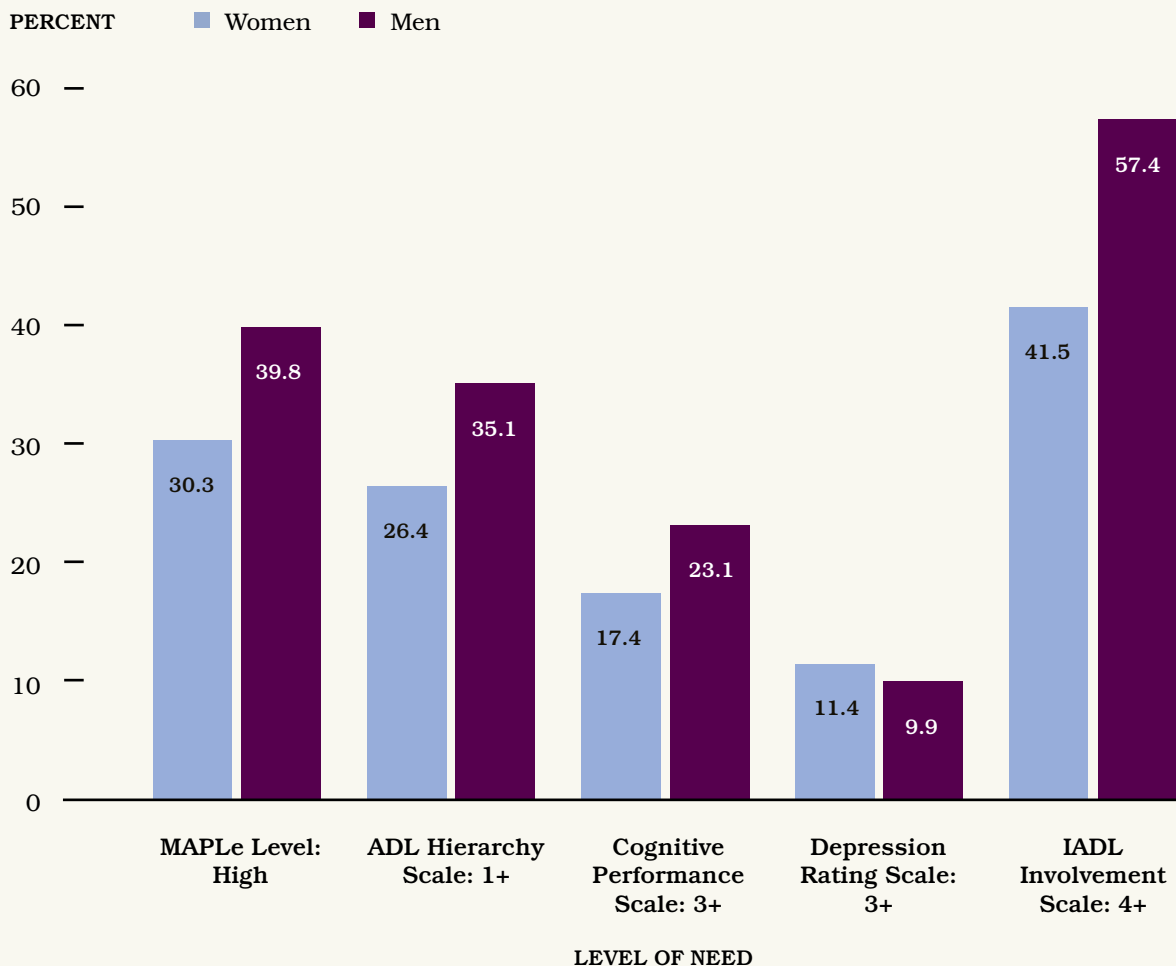
adults who live with a primary caregiver and the breakdown of different types of caregivers is shown inside the bars. A large proportion of both older women and men who had a RAI-HC assessment lived with their primary caregiver, but this declined with age for both sexes and was consistently lower for women than for men (in women, this declined from 46.6% among those aged 76–79 to 32.3% among those aged 90 and older; among men, this declined from 69.8% among those aged 76–79 to 51.6% among those aged 90 and older). Even among those who lived with a primary caregiver, women were much more likely to rely on a child or child-in-law than a spouse. In all age groups except the youngest, child or child-in-law was the most common type of live-in caregiver for women, whereas spouse was the most common type among men in all age groups.

**EXHIBIT 3.4 Percentage of Ontario adults aged 76 and older receiving home care services and co-residing with a primary caregiver, by age group, sex and caregiver relationship, 2007**



**EXHIBIT 3.5 Percentage of Ontario adults aged 76 and older with a RAI-HC assessment\* and exhibiting high levels of need, by sex and level of need, 2007**

\*Either long-stay home care client or long-term care applicant.



MAPLe = Method of Assigning Priority Levels

ADL = Activities of Daily Living

IADL = Instrumental Activities of Daily Living

### Functional Status

[Exhibit 3.5](#) illustrates the proportion of women and men who were assessed as having a high level of need in different areas of functional status using the RAI-HC. On all measures except the Depression Rating Scale, a greater proportion of older men were identified as having a high level of need than were older women. This difference was consistent on measures of cognition, physical functioning and overall functioning. This suggests that women were more likely to access long-term home care services at lower levels of need because they were less likely to have access to adequate informal support.

### Health Services Use

[Exhibit 3.6](#) presents data on how older women used health care services in the year prior to entering the cohort. We focused on use of hospitals, physician services and applications to long-term care. [Exhibits 3.7](#) and [3.8](#) highlight important differences between older women and men on important features of hospital stays and use of long-term care services.

**EXHIBIT 3.6 Health service use by Ontario women in the year prior to April 1, 2007 (baseline), by age group**

	<b>Women</b>				
	<b>TOTAL</b>	<b>AGED 76–79</b>	<b>AGED 80–84</b>	<b>AGED 85–89</b>	<b>AGED ≥90</b>
Older adults, N	656,836	144,721	140,505	74,668	32,976
<b>ACUTE CARE HOSPITAL USE, n (%)</b>					
<b>Emergency Department Visits</b>					
No visits	452,088 (68.8)	105,124 (72.6)	96,614 (68.8)	48,067 (64.4)	20,571 (62.4)
Any visits	204,748 (31.2)	39,597 (27.4)	43,891 (31.2)	26,601 (35.6)	12,405 (37.6)
Any low-acuity visits	68,659 (10.5)	14,766 (10.2)	14,819 (10.5)	8,147 (10.9)	3,202 (9.7)
Any visits for potentially preventable conditions	49,422 (7.5)	9,057 (6.3)	10,330 (7.4)	6,729 (9.0)	3,328 (10.1)
Any visits for fall-related injuries	32,329 (4.9)	6,081 (4.2)	7,743 (5.5)	5,596 (7.5)	3,162 (9.6)
<b>Acute Care Hospital Admissions</b>					
No admissions	560,925 (85.4)	127,513 (88.1)	121,289 (86.3)	62,698 (84.0)	27,264 (82.7)
Any admissions	95,911 (14.6)	17,208 (11.9)	19,216 (13.7)	11,970 (16.0)	5,712 (17.3)
Average acute care length of stay, mean ± SD	10.42 ± 13.58	9.65 ± 13.90	10.36 ± 13.07	11.56 ± 13.79	11.59 ± 13.40
Any admissions with ALC	8,782 (1.3)	1,240 (0.9)	1,875 (1.3)	1,598 (2.1)	913 (2.8)
Average ALC length of stay for those with ALC days, mean ± SD	10.78 ± 16.78	9.77 ± 22.39	10.51 ± 16.33	11.09 ± 14.47	10.53 ± 14.37

continued on next page...



EXHIBIT 3.6 CONTINUED...

	Women				
	TOTAL	AGED 76–79	AGED 80–84	AGED 85–89	AGED ≥90
<b>PHYSICIAN VISITS, n (%)</b>					
Any days with primary care visits	610,298 (92.9)	134,934 (93.2)	131,309 (93.5)	69,380 (92.9)	29,583 (89.7)
Any days with specialist visits	550,163 (83.8)	122,193 (84.4)	118,365 (84.2)	61,536 (82.4)	24,731 (75.0)
Any days with mental health visits	137,725 (21.0)	30,460 (21.0)	32,212 (22.9)	18,170 (24.3)	8,012 (24.3)
<b>HOME CARE SERVICE VISITS, n (%)</b>					
No visits	545,032 (83.0)	127,145 (87.9)	115,103 (81.9)	54,414 (72.9)	20,627 (62.6)
Any visits	111,804 (17.0)	17,576 (12.1)	25,402 (18.1)	20,254 (27.1)	12,349 (37.4)
Average monthly visits, mean ± SD	10.04 ± 11.24	9.15 ± 9.92	9.62 ± 10.70	10.62 ± 11.72	13.15 ± 14.10
<b>LONG-TERM CARE USE, n (%)</b>					
Any long-term care applications	13,621 (2.1)	1,258 (0.9)	2,695 (1.9)	2,919 (3.9)	2,283 (6.9)
Any long-term care placements	289 (0.0)	35 (0.0)	46 (0.0)	61 (0.1)	47 (0.1)

SD = Standard Deviation

ALC = Alternate Level of Care

### Hospital Use

Within one year, over one-quarter of older women in Ontario visited an emergency department at least once. This varied across age groups and increased from 27.4% among those aged 76–79 to 37.6% among those aged 90 and older. Low-acuity visits were defined as those that were triaged as non-urgent at registration in the emergency department and ended with the patient returning home. Approximately 10% of older women, regardless of age, made at least one low-acuity visit to the emergency department. Potentially preventable visits are defined as visits for specific health conditions that are known to be responsive to primary care and that may have been avoided if the condition was better managed earlier in its course. We found that between 6.3% and 10.1% of older women, depending on age group, made at least one visit for a potentially preventable visit. We also looked at the percentage of older women who visited the emergency department for an injury that was caused by a fall. This increased sharply from 4.2% of women aged 76–79 to 9.6% of women aged 90 and older. In total, there were over 22,500 emergency department visits by older women in Ontario for fall-related injuries in one year. Overall, men showed a similar pattern in their emergency department visits

except that they made fewer visits for fall-related injuries (not shown).

Hospital stays were also fairly common among older women and the frequency appears to increase with age (from 11.9% among those aged 76–79 to 17.3% among those 90 and older). The median length of stay in hospital was approximately 6–7 days with most stays between 3 and 14 days. [Exhibit 3.7](#) shows that a slightly higher percentage of men experienced a hospital stay in the year before cohort entry, and, that like the women, the frequency of hospitalization increased incrementally with age. Despite the greater likelihood of hospitalization among men, women at all age groups were more likely to have part of their hospital stay designated as alternate level of care. An ALC designation means that the patient no longer requires hospital-level services but cannot be discharged because appropriate care is not available elsewhere. For both women and men, the average length of time during hospital stay designated as ALC was approximately 10 days; this was consistent across age groups for both sexes. The higher frequency of ALC designation among older women, even with overall similar use of the hospital system between sexes, may reflect their differential access to appropriate support in the community.

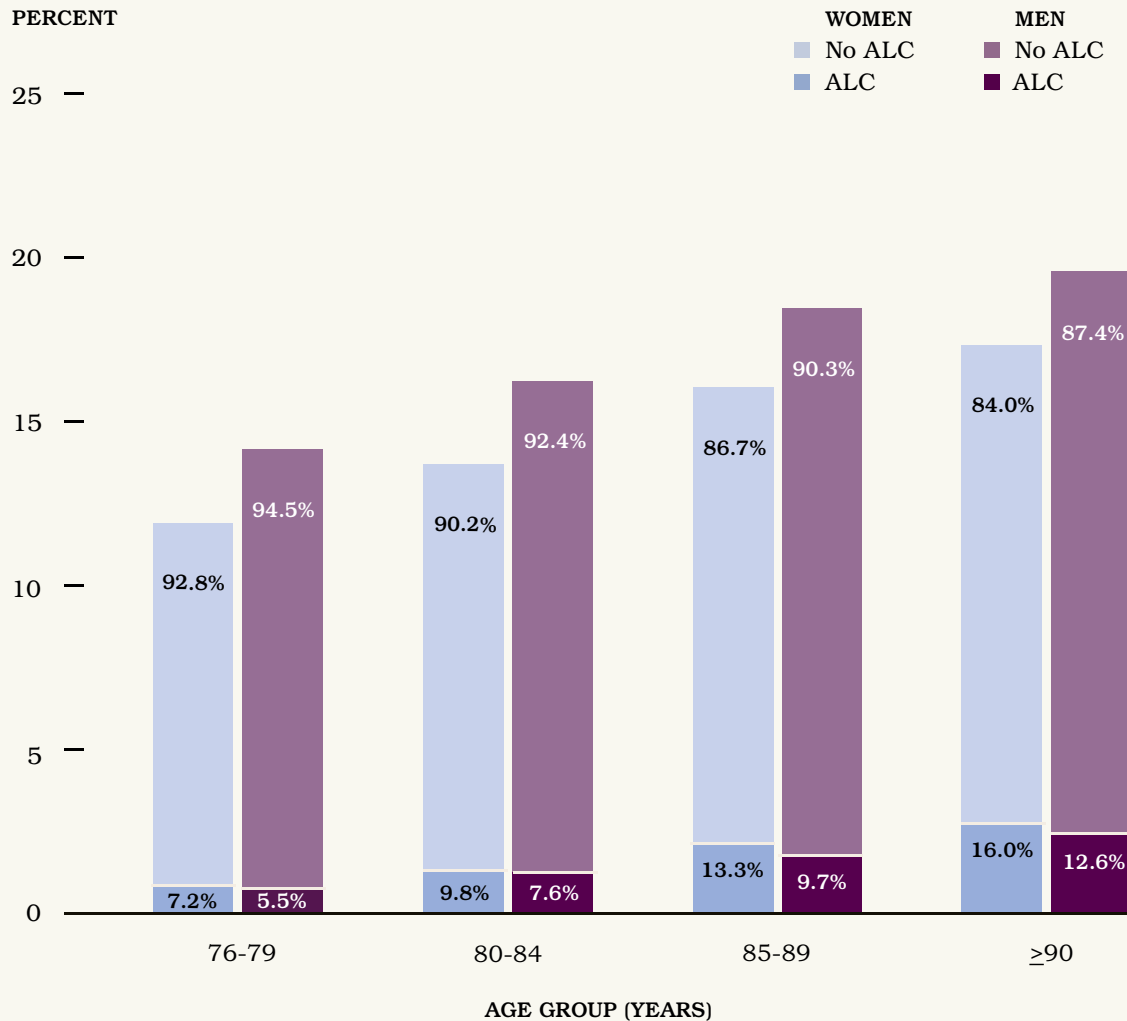
### Physician Services

The vast majority of older women visited a general practitioner at least once in the year prior to entering our cohort. As well, over 80% made at least one visit to a specialist physician in this time. Surprisingly, both types of physician visits were slightly less common among the oldest old, but it is not clear why this is the case. Over one-fifth of older women in Ontario had at least one mental health visit, with a slight increase from 21.0% among those aged 76–79 to 24.3% among those aged 90 and older. Very similar patterns were observed for older men in the same period but with somewhat fewer mental health visits (16.8% among those aged 76–79 to 21.7% among those aged 90 and older; not shown).

### Long-Term Care

The proportion of older women who had applied for admission to long-term care in the year prior to entering the cohort rose sharply with age. Among women aged 76–79, only 0.9% had applied for long-term care admission, but among women aged 90 and older, 6.9% had applied. Men had a similar pattern of applications for admission to long-term care across age groups but a lower frequency overall (0.7% among those aged 76–79 to 5.8% among those aged 90 and older; not shown). In absolute terms, there were over 9,000

**EXHIBIT 3.7 Percentage of Ontario adults aged 76 and older with an acute care admission in the year prior to April 1, 2007 (baseline), by age group, sex and presence of Alternate Level of Care (ALC) days**

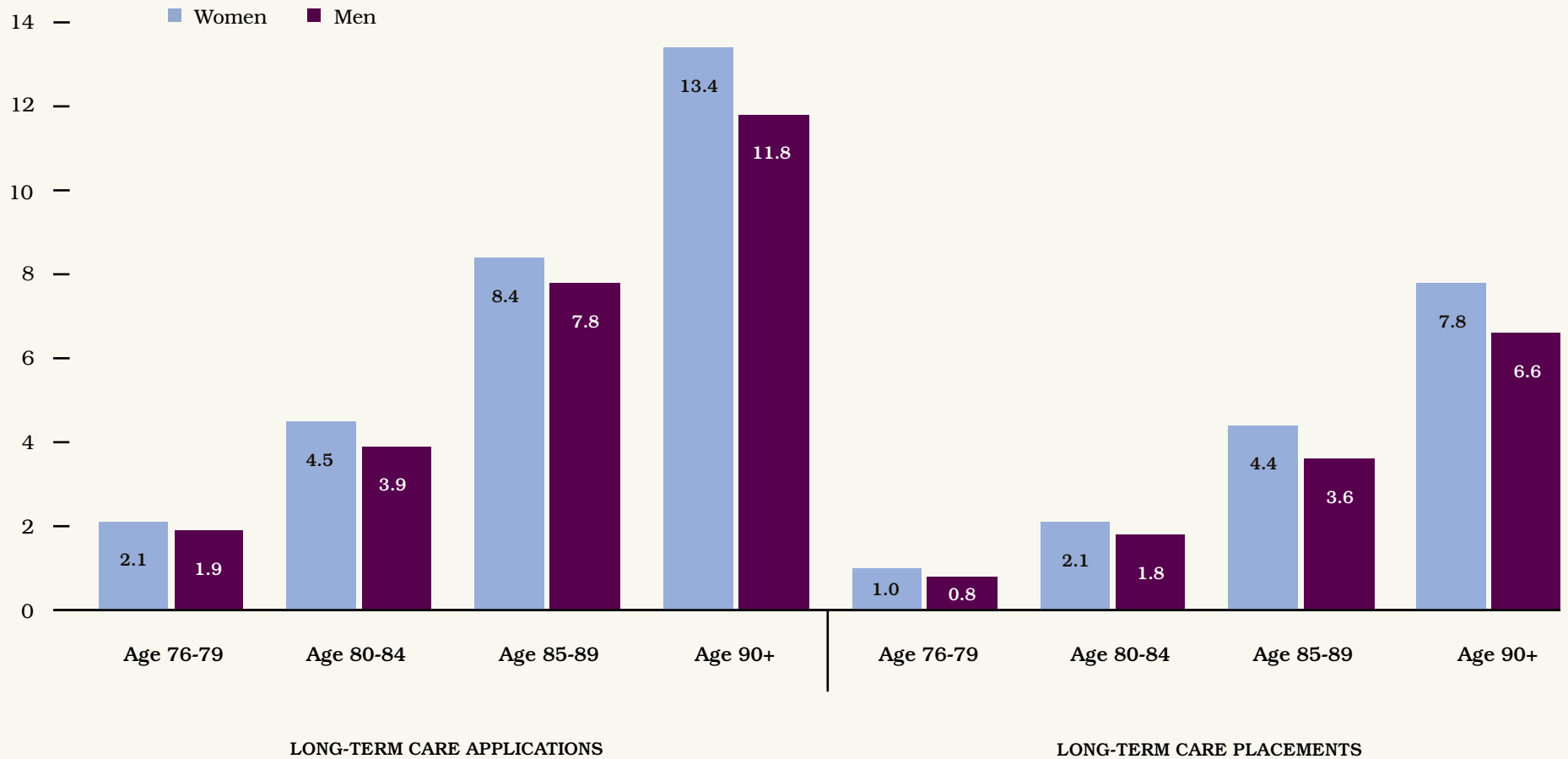


women who had applied for long-term care compared to approximately 4,500 men in the same period.

In [Exhibit 3.8](#), we illustrate the proportion of women and men who submitted a new application for admission to long-term care and the proportion who were admitted to long-term care in the year following cohort entry. On both measures, frequency increased dramatically with age for women and men; application for admission and admission to long-term care was over five times higher among those aged 90 and older than among those aged 76–79. However, women were also more likely than men to either start a new application for long-term care or to be admitted to long-term care in the follow-up year. While this pattern was apparent for each age group, the disparity increased among the oldest old. In absolute numbers, there were approximately twice as many women admitted to long-term care than men (10,325 women vs. 5,019 men).

**EXHIBIT 3.8 Percentage of Ontario adults aged 76 and older with long-term care use in the year following April 1, 2007 (baseline), by age group, sex and type of contact**

PERCENT



### Conditions with the Potential to Limit Functioning

Exhibit 3.9 shows the prevalence of health conditions with the potential to limit functioning in older women and men. It identifies the proportion who experienced each of the specific health conditions, the proportion who experienced more than one condition (known as multi-morbidity) and the proportion who had a fracture. We included fractures because they are the most important consequence of falls in older adults and have significant potential to limit everyday functioning.

#### EXHIBIT 3.9 Prevalence\* of health conditions with the potential to limit functioning in Ontario adults aged 76 and older, by sex, 2007

\*Within five years prior to April 1, 2007 (baseline)

	TOTAL	WOMEN	MEN
Older adults, N	656,836	392,870	263,966
<b>Conditions, n (%)</b>			
Cardiovascular			
Acute myocardial infarction	22,212 (3.4)	10,822 (2.8)	11,390 (4.3)
Congestive heart failure	26,131 (4.0)	14,483 (3.7)	11,648 (4.4)
Stroke	18,432 (2.8)	9,889 (2.5)	8,543 (3.2)
Chronic obstructive pulmonary disease	116,766 (17.8)	61,310 (15.6)	55,456 (21.0)
Asthma	73,850 (11.2)	45,328 (11.5)	28,522 (10.8)
Cancer	35,578 (5.4)	17,621 (4.5)	17,957 (6.8)
Diabetes	158,209 (24.1)	85,809 (21.8)	72,400 (27.4)
Arthritis	404,831 (61.6)	253,278 (64.5)	151,553 (57.4)
Osteoporosis	118,668 (18.1)	101,990 (26.0)	16,678 (6.3)
Urinary incontinence	3,933 (0.6)	3,010 (0.8)	923 (0.3)
Dementia	75,604 (11.5)	47,892 (12.2)	27,712 (10.5)
Depression	9,051 (1.4)	6,242 (1.6)	2,809 (1.1)
Other mental health conditions	32,847 (5.0)	19,553 (5.0)	13,294 (5.0)
Multiple conditions			
0	105,918 (16.1)	56,361 (14.3)	49,557 (18.8)
1	210,417 (32.0)	120,861 (30.8)	89,556 (33.9)
≥2	340,501 (51.8)	215,648 (54.9)	124,853 (47.3)
Fractures			
Wrist/forearm	17,200 (2.6)	14,070 (3.6)	3,130 (1.2)
Shoulder/upper arm	7,728 (1.2)	6,278 (1.6)	1,450 (0.5)
Thoracic spine	1,856 (0.3)	1,422 (0.4)	434 (0.2)
Lumbar spine and pelvis	6,467 (1.0)	5,056 (1.3)	1,411 (0.5)
Hip/femur	15,445 (2.4)	12,038 (3.1)	3,407 (1.3)
Lower leg/ankle	8,070 (1.2)	5,849 (1.5)	2,221 (0.8)

Men had a higher prevalence of nearly all of the general medical conditions shown here. This includes congestive heart failure (3.7% in women vs. 4.4% in men), stroke (2.5% in women vs. 3.2% in men), chronic obstructive pulmonary disease (15.6% in women vs. 21.0% in men), cancer (4.5% in women vs. 6.8% in men) and diabetes (21.8% in women vs. 27.4% in men). Despite this, because there were so many more older women than men, the absolute number of women affected by nearly every condition was either approximately equal to or higher than the number of men. Women were found to have a higher prevalence of arthritis (64.5% vs. 57.4% for men) and osteoporosis (26.0% vs. 6.3% for men), two conditions that are common in older age and can have a direct effect on physical functioning. A very small proportion of both women and men were found to experience urinary incontinence, but we anticipate that this was vastly underreported in our data. Among mental health conditions, we found an overall similar prevalence between women and men, but an overall greater number of women affected. For example, there were over 47,000 older women with dementia in Ontario compared to approximately 27,000 older men.

Multi-morbidity was highly prevalent in both older women and men. Approximately 54.9% of women and 47.3% of men experienced two or more conditions that had the potential to limit functioning. Surprisingly, there was a large difference in the proportion of women and men who had none of these conditions (14.3% in women vs. 18.8% in men).

Overall, 10.1% of older women and 4.2% of older men experienced a fracture in the five years before entering our cohort (not shown). At each site, fractures were similarly two to three times more common among women than men.

## CONCLUSION

The data presented in this chapter provide a detailed overview of the older women living in Ontario and illustrates how they differ from older men on important risk factors for admission to long-term care. Overall, we found that older women and men had fairly similar use of hospital and physician services, but women were more likely to use long-stay home care services and to access these services at earlier stages of disability. Of those older adults who received long-stay

home care services, a higher proportion of women lived alone and relied on their children for support whereas men more frequently relied on their spouse. This difference in caregiver dynamics was also observed among those older adults who lived with their primary caregiver. This differential access to adequate support at home may explain, at least partially, why older women were more likely than men to be in hospital when no longer necessary (Alternate Level of Care days). Finally, we observed a higher prevalence of conditions such as arthritis and dementia as well as a higher prevalence of multi-morbidity among older women. Despite all of these issues, the most striking difference is the absolute number of older women compared to men, especially in the oldest age groups, living in Ontario. Their greater numbers combined with their higher burden of risk factors for long-term care admission mean that addressing the specific needs of women will be critical to the success of any efforts to maintain older Ontarians' health and independence in the community.

## REFERENCES

- 1 DesMeules M, Manuel D, Cho R. Mortality: life and health expectancy of Canadian women. *BMC Womens Health* 2004; 4 (Suppl 1):S9.
- 2 Statistics Canada. Participation and Activity Limitation Survey 2006: Tables (Part VI). Accessed October 19, 2011 at <http://www.statcan.gc.ca/pub/89-628-x/89-628-x2010015-eng.pdf>.
- 3 Spillman BC, Lubitz J. New estimates of lifetime nursing home use: have patterns of use changed? *Med Care* 2002; 40(10):965-75.
- 4 Katz SJ, Kabeto M, Langa KM. Gender disparities in the receipt of home care for elderly people with disability in the United States. *JAMA* 2000; 284(23):3022-7.
- 5 Martikainen P, Moustgaard H, Murphy M, Einio EK, et al. Gender, living arrangements, and social circumstances as determinants of entry into and exit from long-term institutional care at older ages: a 6-year follow-up study of older Finns. *Gerontologist* 2009; 49(1):34-45.

# Community-Dwelling Older Adults with Dementia

## *Tracking encounters with the health system*

### Lead Authors

**Sudeep S. Gill**

**Ximena Camacho**

**Jeffrey W. Poss**

### Contributors

**Susan E. Bronskill**

**Walter P. Wodchis**

## INTRODUCTION

Alzheimer's disease and related dementias are progressively debilitating diseases that erode cognitive and functional abilities and are often associated with difficult-to-manage changes in behaviour.<sup>1</sup> Alzheimer's disease is the most common dementia in Canada.<sup>2,3</sup> In addition to its direct impact on affected individuals, dementia also has a profound effect on the health of caregivers, who are often spouses, daughters or daughters-in-law. Currently there are 181,000 Ontarians with dementia; within a decade, this number is expected to increase by 50%.<sup>4</sup> A tally of the direct, indirect and opportunity costs of dementia reveals that its total annual economic burden in Ontario is projected to grow by more than \$770 million each year over the next 10 years.<sup>4</sup>

When the cognitive and functional impairments of dementia become too prohibitive, institutional care is often required. This transition to long-term care can be influenced by many variables, including the patient's functional dependence and the presence of behavioural issues.<sup>5</sup> Entry into long-term care can occur directly from the community or indirectly following admission to an acute care hospital, usually with a waiting period in hospital that is called 'alternate level of care' (ALC). An ALC designation indicates that the patient no longer

requires acute care but still requires a level of care such that he/she cannot be safely discharged back home to community. Current literature shows that hospitalization occurs at least three times more often for older adults with Alzheimer's disease than for age-matched older adults without the disease,<sup>6,7</sup> with the clinical outcomes of hospitalization being worse for patients with Alzheimer's disease.<sup>8,9</sup> Dementia is the primary cause of long-term care institutionalization among elderly Canadians.<sup>10</sup>

The costs associated with long-term care institutionalization and acute care hospitalization are borne by the individual in terms of lost independence and by society in terms of health system expenditures. Moreover, the interests of the individual and the health care system intersect around institutionalization. On the one hand, older adults with dementia are keen to live in the community for as long as possible. On the other, increasing pressures on long-term care facilities means that system planners must work to ensure that the necessary community supports are in place to allow older adults with dementia to remain in their community. Policy makers and service providers are focused on improving system navigation for patients and on organizing service delivery around patients' needs



across the system. These supports should emphasize service delivery and system navigation, both for individuals who remain in the community and for those who, when the need arises, require the transition into long-term care.

With an eye to these policy and planning priorities, this chapter follows community-dwelling older adults with dementia and examines their encounters with their local home care and hospital sectors, focusing in particular on home care utilization, emergency department visits, acute care hospital admission, ALC designation within acute care, and long-term care placement.

## METHODS

### Population Definition

The study population described in this chapter is community-dwelling older adults with physician-diagnosed dementia. We included all older adults who were living in a community setting in Ontario and aged between 66 and 105 years on April 1, 2007 (baseline). We chose this age range because we were interested in various health measures and service use among this population in the year prior to baseline; by restricting the cohort to older adults over 66 years of age, we ensured that

all of the individuals examined were at least 65 during the study period. We excluded older adults who had not had any contact with the health care system in the previous five years, as they were assumed to have either died or left the province.

In order to classify older adults as having physician-diagnosed dementia, we required individuals to have at least one physician claim or hospitalization record with a diagnosis of dementia in the five years prior to baseline. We also looked for dispensation of cholinesterase inhibitors in the year prior to baseline, as these medications are specifically indicated for dementia.

We compared older adults diagnosed with dementia to older Ontario adults who were not diagnosed with dementia in order to observe any differences in health status or health service use between the two groups. We also stratified several of the health and historical service measures by sex and by the following age groups: 66–74 years, 75–84 years, and 85 years and older. This breakdown allowed us to conduct a more in-depth examination of seniors with dementia; we could detect whether needs varied between women and men and observe any age-related trends.

Hospital use is reportedly higher in seniors with dementia, and we were therefore also interested in acute care use among this population. We stratified several measures of service use in the year following baseline according to whether a hospitalization had occurred and whether it involved an ALC designation.

### Measures

Individual measures of health status, medical conditions and demographic characteristics common to all chapters were assessed for this study population. Methodologies used for these measures are described in [Chapter 2](#).

For additional analyses specific to this cohort, we examined the amount of support provided to older adults by informal caregivers (that is, individuals who help and support older adults but who are not paid care providers). Caregiver information was obtained for all older adults who had been administered a Resident Assessment Instrument – Home Care (RAI-HC) in the year prior to baseline. For those individuals who reported receiving any informal support, the number of hours of care provided in the five weekdays and two weekend days preceding the assessment date were summed to get the total number of hours of informal care over a one-week period.

## RESULTS

### Characterizing Community-Dwelling Older Adults with Dementia

[Exhibit 4.1](#) presents key demographic information, along with several measures of health, for older Ontario adults with physician-

diagnosed dementia. We also present specific measures of cognitive and functional ability that were available only to those who had been administered a RAI-HC assessment (see description in [Chapter 2](#)). [Exhibits 4.2-4.6](#) are complementary to this information and highlight comparisons in more detail.

**EXHIBIT 4.1 Demographic and broad health status measures of Ontario adults aged 66 and older living in the community, by sex and presence of physician-diagnosed dementia, 2007**

	Physician-Diagnosed Dementia			No Physician-Diagnosed Dementia		
	TOTAL	WOMEN	MEN	TOTAL	WOMEN	MEN
Community-dwelling older adults, N	101,775	62,122	39,653	1,404,702	778,895	625,807
<b>DEMOGRAPHIC MEASURES, n (%)</b>						
Low income level	25,463 (25.0)	18,299 (29.5)	7,164 (18.1)	252,163 (18.0)	171,973 (22.1)	80,190 (12.8)
Age group (years)						
66-69	6,968 (6.8)	3,696 (5.9)	3,272 (8.3)	372,942 (26.5)	194,618 (25.0)	178,324 (28.5)
70-74	13,891 (13.6)	7,445 (12.0)	6,446 (16.3)	388,290 (27.6)	205,864 (26.4)	182,426 (29.2)
75-79	22,326 (21.9)	12,608 (20.3)	9,718 (24.5)	309,980 (22.1)	171,078 (22.0)	138,902 (22.2)
80-84	27,112 (26.6)	16,801 (27.0)	10,311 (26.0)	204,659 (14.6)	122,638 (15.7)	82,021 (13.1)
85-89	20,226 (19.9)	13,398 (21.6)	6,828 (17.2)	94,047 (6.7)	60,441 (7.8)	33,606 (5.4)
≥90	11,252 (11.1)	8,174 (13.2)	3,078 (7.8)	34,784 (2.5)	24,256 (3.1)	10,528 (1.7)

continued on next page...

EXHIBIT 4.1 CONTINUED...

	Physician-Diagnosed Dementia			No Physician-Diagnosed Dementia		
	TOTAL	WOMEN	MEN	TOTAL	WOMEN	MEN
<b>HEALTH STATUS MEASURES, n (%)</b>						
Number of ADG comorbidity categories						
0-5	19,237 (18.9)	12,478 (20.1)	6,759 (17.0)	551,939 (39.3)	296,498 (38.1)	255,441 (40.8)
6-9	35,192 (34.6)	21,551 (34.7)	13,641 (34.4)	535,243 (38.1)	300,277 (38.6)	234,966 (37.5)
≥10	47,346 (46.5)	28,093 (45.2)	19,253 (48.6)	317,520 (22.6)	182,120 (23.4)	135,400 (21.6)
≥1 Diagnoses associated with frailty	21,596 (21.2)	13,749 (22.1)	7,847 (19.8)	72,767 (5.2)	48,227 (6.2)	24,540 (3.9)
≥2 Coexisting chronic conditions	92,437 (90.8)	55,841 (89.9)	36,596 (92.3)	982,202 (69.9)	543,237 (69.7)	438,965 (70.1)
<b>RAI-HC ASSESSMENTS, n (%)</b>						
Assessed in year prior to baseline*	29,239 (28.7)	19,545 (31.5)	9,694 (24.4)	62,691 (4.5)	44,954 (5.8)	17,737 (2.8)
<b>Living Status</b>						
Reported living alone	3,319 (28.9)	2,528 (34.6)	791 (18.9)	9,640 (39.7)	7,601 (47.3)	2,039 (24.9)
Reported a primary caregiver relationship						
Child/child-in-law	15,798 (54.0)	12,595 (64.4)	3,203 (33.0)	34,125 (54.4)	28,182 (62.7)	5,943 (33.5)
Spouse	9,232 (31.6)	3,893 (19.9)	5,339 (55.1)	16,816 (26.8)	7,958 (17.7)	8,858 (49.9)
Other relative	2,264 (7.7)	1,725 (8.8)	539 (5.6)	5,504 (8.8)	4,296 (9.6)	1,208 (6.8)
Friend/neighbour	1,567 (5.4)	1,086 (5.6)	481 (5.0)	4,858 (7.7)	3,596 (8.0)	1,262 (7.1)
Not reported	378 (1.3)	246 (1.3)	132 (1.4)	1,388 (2.2)	922 (2.1)	466 (2.6)
Reported co-residing with primary caregiver	15,449 (52.8)	8,893 (45.5)	6,556 (67.6)	28,905 (46.1)	17,738 (39.5)	11,167 (63.0)
Reported a caregiver experiencing distress	5,501 (18.8)	3,115 (15.9)	2,386 (24.6)	5,685 (9.1)	3,256 (7.2)	2,429 (13.7)

\*All proportions calculated on only those who received a RAI-HC assessment.

continued on next page...

EXHIBIT 4.1 CONTINUED...

	Physician-Diagnosed Dementia			No Physician-Diagnosed Dementia		
	TOTAL	WOMEN	MEN	TOTAL	WOMEN	MEN
<b>Functional Status</b>						
MAPLe level						
Low/mild/moderate	11,284 (38.6)	7,933 (40.6)	3,351 (34.6)	51,934 (82.8)	38,205 (85.0)	13,729 (77.4)
High	12,545 (42.9)	8,227 (42.1)	4,318 (44.5)	9,113 (14.5)	5,766 (12.8)	3,347 (18.9)
Very high	5,410 (18.5)	3,385 (17.3)	2,025 (20.9)	1,644 (2.6)	983 (2.2)	661 (3.7)
ADL Hierarchy Scale						
0	17,082 (58.4)	11,932 (61.0)	5,150 (53.1)	48,747 (77.8)	35,862 (79.8)	12,885 (72.6)
1+	12,153 (41.6)	7,610 (38.9)	4,543 (46.9)	13,920 (22.2)	9,072 (20.2)	4,848 (27.3)
CHESS Scale						
0–1	20,679 (70.7)	13,933 (71.3)	6,746 (69.6)	45,943 (73.3)	33,063 (73.5)	12,880 (72.6)
2+	8,556 (29.3)	5,609 (28.7)	2,947 (30.4)	16,724 (26.7)	11,871 (26.4)	4,853 (27.4)
Cognitive Performance Scale						
0–2	16,914 (57.8)	11,610 (59.4)	5,304 (54.7)	58,775 (93.8)	42,583 (94.7)	16,192 (91.3)
3+	12,321 (42.1)	7,932 (40.6)	4,389 (45.3)	3,892 (6.2)	2,351 (5.2)	1,541 (8.7)
Depression Rating Scale						
0–2	24,957 (85.4)	16,514 (84.5)	8,443 (87.1)	56,108 (89.5)	39,983 (88.9)	16,125 (90.9)
3+	4,278 (14.6)	3,028 (15.5)	1,250 (12.9)	6,559 (10.5)	4,951 (11.0)	1,608 (9.1)
IADL Involvement Scale						
0–3	10,824 (37.0)	8,071 (41.3)	2,753 (28.4)	39,733 (63.4)	30,283 (67.4)	9,450 (53.3)
4+	18,309 (62.6)	11,405 (58.4)	6,904 (71.2)	22,727 (36.3)	14,505 (32.3)	8,222 (46.4)
<b>PRESCRIBED DRUG THERAPY</b>						
Number of distinct drugs prescribed in year prior, mean ± SD	9.82 ± 5.71	9.95 ± 5.74	9.61 ± 5.65	7.48 ± 4.95	7.70 ± 5.02	7.19 ± 4.83
Number of active drugs at baseline, mean ± SD	5.81 ± 3.37	5.89 ± 3.37	5.69 ± 3.36	4.46 ± 2.91	4.51 ± 2.93	4.39 ± 2.87

ADG = Aggregated Diagnosis Groups

RAI-HC = Resident Assessment Instrument—Home Care

MAPLe = Method for Assigning Priority Levels

ADL = Activities of Daily Living

CHESS = Changes in Health, End-stage Disease, and Signs and Symptoms

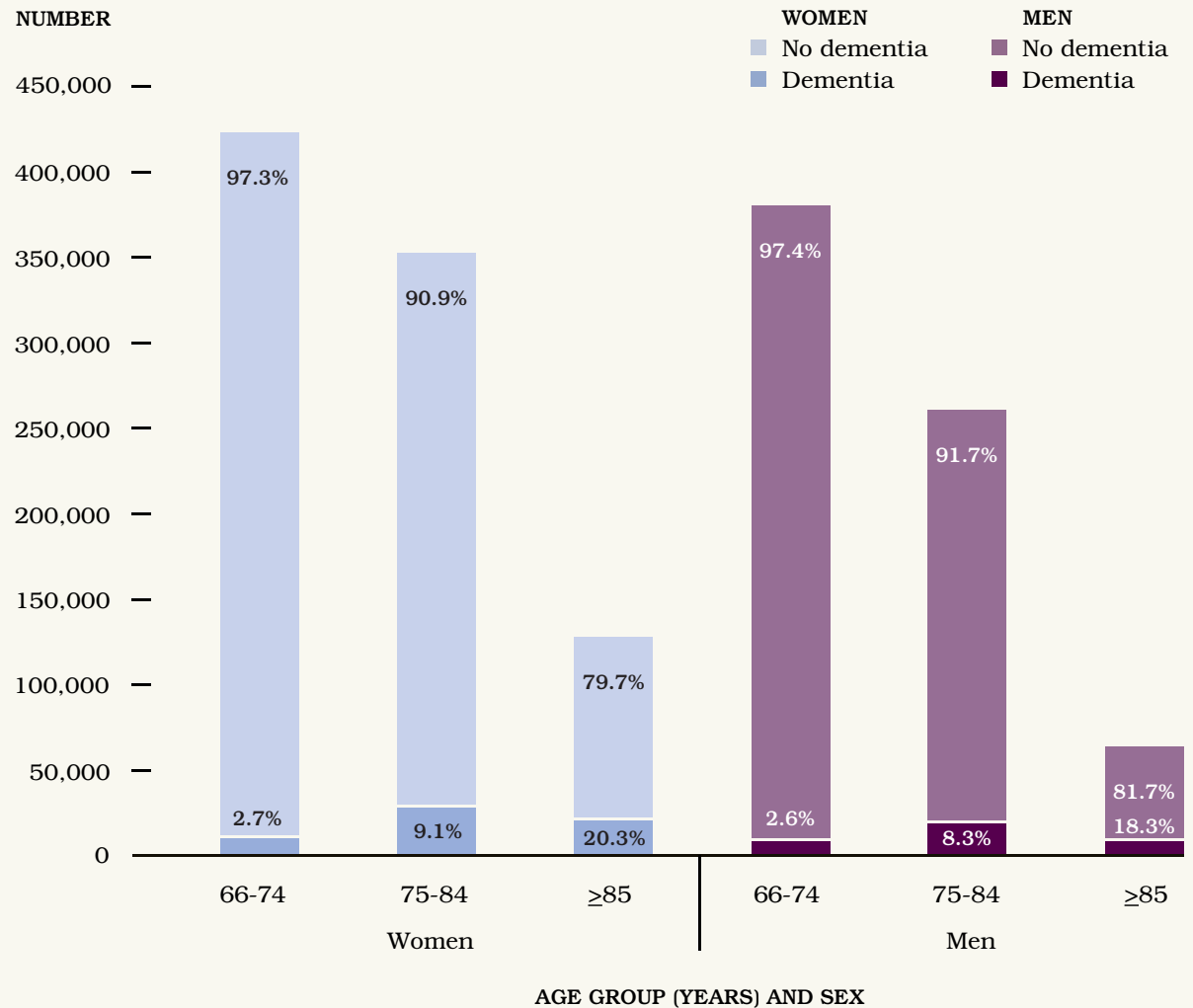
IADL = Instrumental Activities of Daily Living

SD = Standard Deviation

**Demographic Measures**

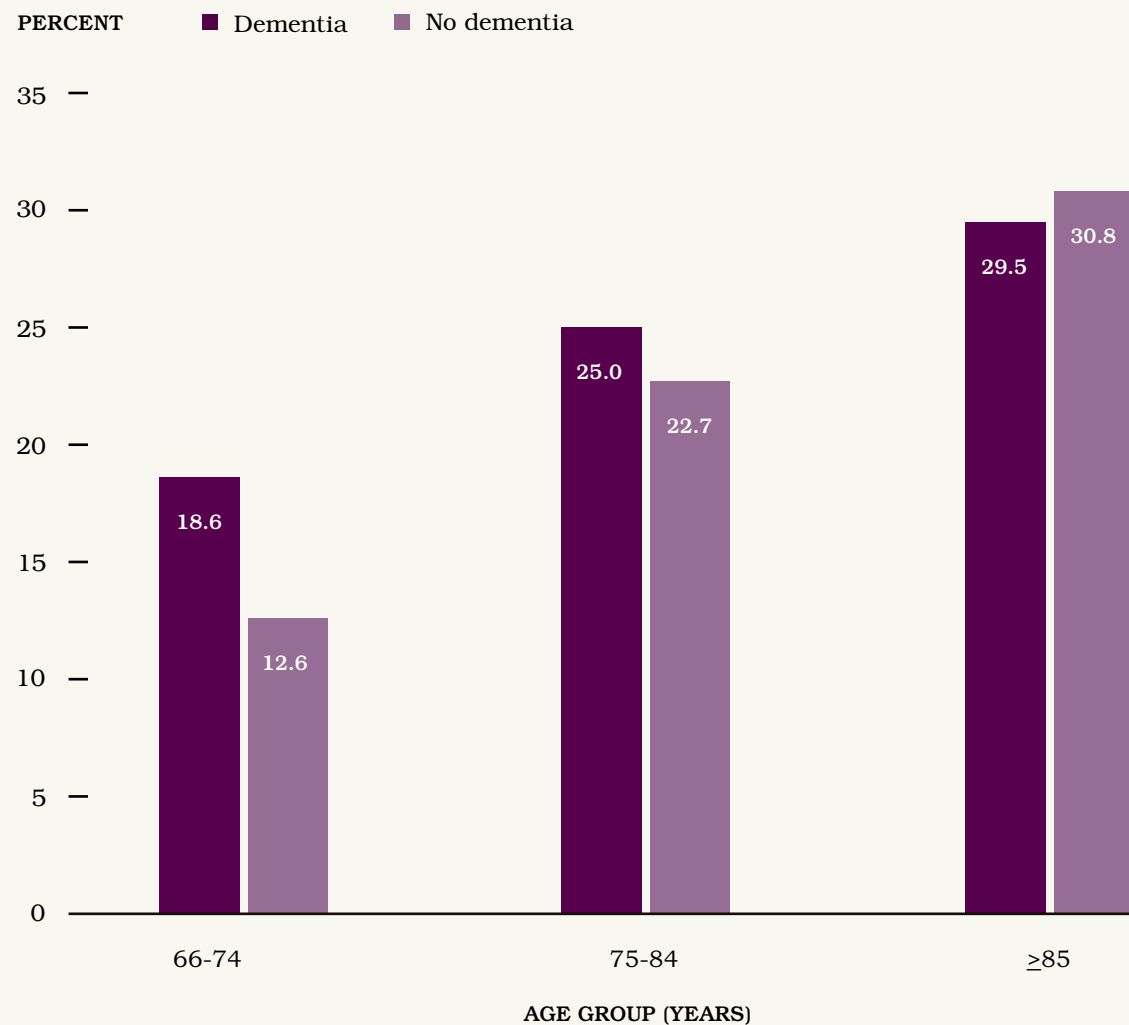
We identified 101,775 older adults with a physician diagnosis of dementia and 1,404,702 older adults without a diagnosis of dementia. Those diagnosed with dementia were slightly older (an average age of 80.7 years vs. 74.8 years for those without dementia) and more likely to be female (61.0% vs. 55.4%). [Exhibit 4.2](#) displays the proportion of individuals with physician-diagnosed dementia in each age group by sex and illustrates that while there were more women with dementia in absolute terms, the proportion of older adults affected was similar across the sexes and increased with age (rising from 2.7% of women aged 66–74 to 20.3% of women aged 85 and older).

**EXHIBIT 4.2** Number and relative percent of Ontario adults aged 66 and older living in the community, by age group, sex and presence of physician-diagnosed dementia, 2007



A quarter of older adults with dementia qualified for reduced co-payments for medications and were identified as low-income, compared to 18.0% of older Ontario adults without dementia. Among those with dementia, there was a strong gradient in low-income status associated with an increase in age, as depicted in [Exhibit 4.3](#). For example, 18.6% of individuals aged 66–74 qualified for low-income status, whereas almost 30% of individuals aged 85 and older required financial assistance for drug payments. A similar increase in need was also observed among older Ontario adults without dementia. In addition, women predominantly qualified for low-income status over men; almost a third of women with dementia required assistance compared to 18.1% of their male counterparts—a pattern likely driven by differences in the age distributions. When census data were examined to obtain estimated neighbourhood income levels for these older adults, there was no marked difference between men and women.

**EXHIBIT 4.3 Percentage of Ontario adults aged 66 and older living in the community and qualifying for low-income status, by age group and presence of physician-diagnosed dementia, 2007**

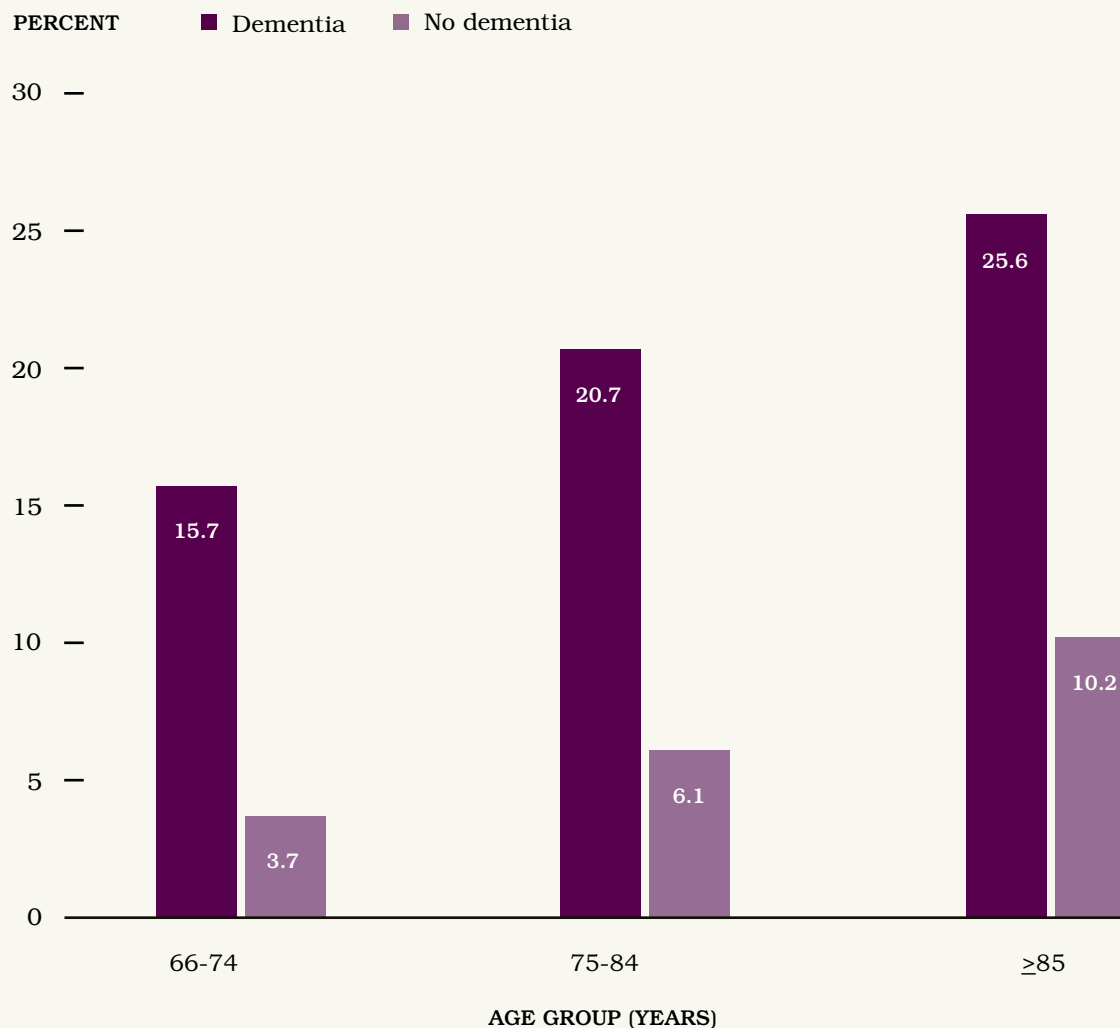


### Health Measures (Broad)

The burden of chronic disease was generally higher in older adults with dementia. Almost all of the adults in the dementia group (90.8%) had been diagnosed with two or more comorbid conditions, compared to 69.9% in the group without a dementia diagnosis. In addition, approximately twice as many older adults with dementia had 10 or more Aggregated Diagnosis Group comorbidities compared to those without (46.5% vs. 22.6%, respectively). Diagnoses associated with frailty were much more common in the dementia group, with 21.2% exhibiting diagnoses related to frailty compared to only 5.2% of older Ontario adults without dementia. [Exhibit 4.4](#) depicts an increase in frailty associated with an increase in age in older adults with dementia; the incidence of frailty markers increased from 15.7% in the youngest age group to 25.6% in the oldest group. A similar but smaller trend was also observed in older adults without dementia.

**EXHIBIT 4.4 Percentage of Ontario adults aged 66 and older living in the community with incidence\* of frailty markers, by age group and presence of physician-diagnosed dementia, 2007**

\*Within two years prior to April 1, 2007 (baseline)



The complexity of disease in these older adults was also reflected in their medication use in the year prior to baseline. Older adults diagnosed with dementia were prescribed, on average, two more drugs than their counterparts without dementia over the course of the prior year, with an average of 9.8 medications in the dementia group compared to 7.5 medications in those without dementia. In addition, 12.5% of older adults with dementia were on 10 or more medications at baseline, whereas that level of medication use was observed in only 4.9% of the remaining population (not shown).

### RAI-HC Assessments

RAI-HC assessments are administered to older adults who are long-stay home care clients or who are awaiting placement in a long-term care facility. Almost a third of older adults with dementia (28.7%, N = 29,239) were administered a RAI-HC in the year prior to baseline, compared to less than 5% of the remaining older adults (N = 62,691). Differences in assessment rates were observed between men and women; in the dementia group, 31.5%

of women had been assessed compared to 24.4% of men. An increase in age was also associated with an increase in the assessment rate of older adults with dementia; while 16.7% of those aged 66–74 had a completed assessment, the rate rose to 39.1% in the oldest age group (not shown). Similar patterns were also observed in the group of older adults without dementia.

RAI-HC assessments provide more detailed information on functional status and informal care. The following sub-sections present data only on those individuals who had completed an assessment.

**1 / Living status.** Of those administered a RAI-HC assessment, approximately 28.9% of the older adults with dementia reported living alone. In the group without dementia, 39.7% reported living alone. In both groups, more women lived alone than men; for example, 34.6% of women with dementia reported living alone compared to 18.9% of men, and 47.3% of women without dementia lived alone compared to 24.9% of men.

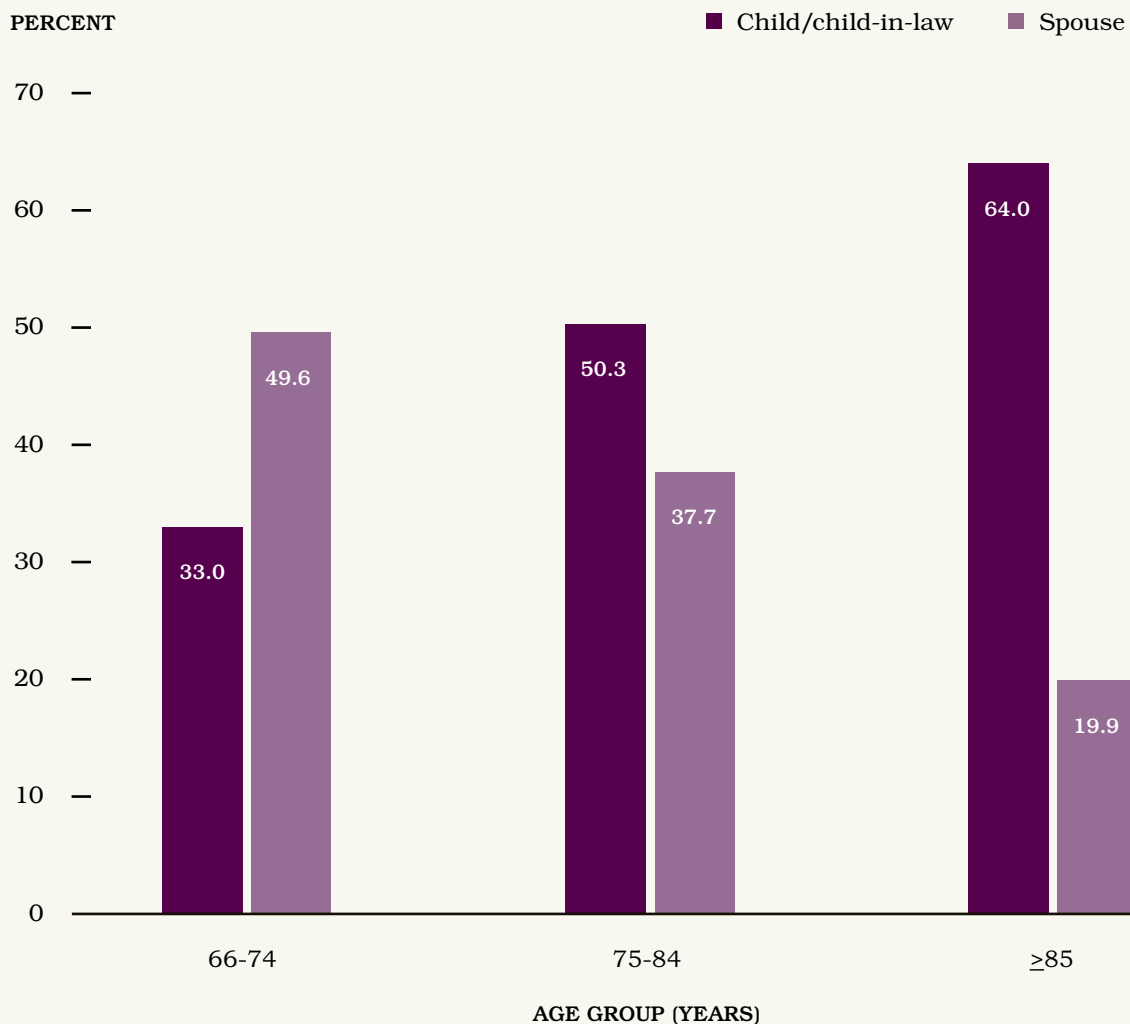
Just over half (52.8%) of older adults with dementia reported having a primary caregiver who lived with them vs. 46.1% of older adults without dementia. Men were more likely than women to live with an informal caregiver. Of those with dementia, 67.6% of men and 45.5% of women lived with their informal caregiver, compared to 63.0% of men and 39.5% of women without dementia.

The majority of assessed older adults reported being cared for by a child or child-in-law, with spouses being the second most common type of caregiver. However, this differed by sex; among older adults both with and without dementia, more females were cared for by a child or child-in-law, whereas more males were cared for by their spouse. [Exhibit 4.5](#) shows that over time an increasing proportion of caregivers were a child or child-in-law (rising from 33.3% in those aged 66–74 to 64.0% in those aged 85 and older, for those with dementia).



**EXHIBIT 4.5 Percentage of Ontario adults aged 66 and older with physician-diagnosed dementia and living in the community with a RAI-HC assessment\*, by age group and primary caregiver relationship, 2007**

\*Either long-stay home care client or long-term care applicant.



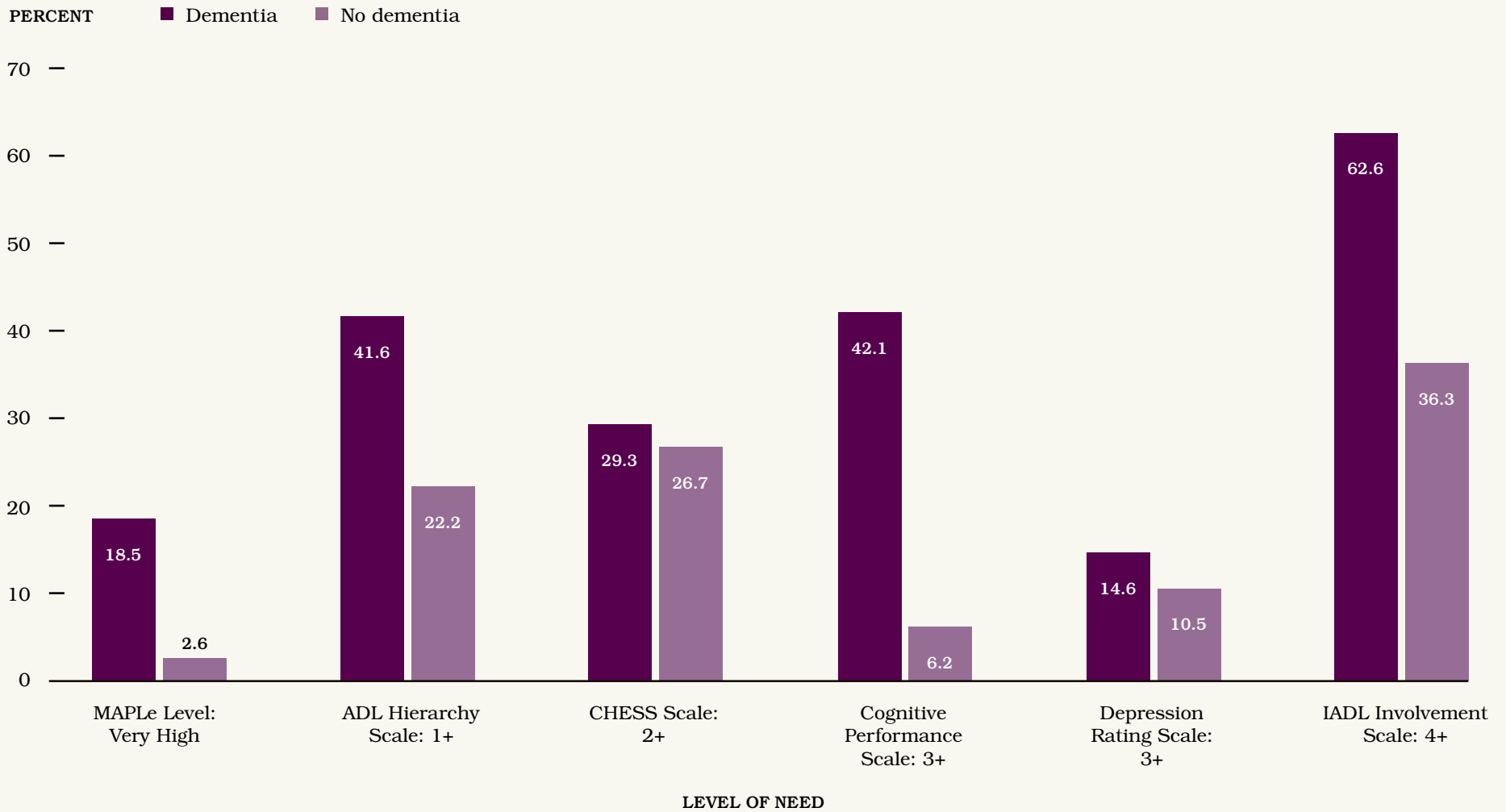
**2 / Functional status.** We examined various measures of functional and cognitive ability using RAI-HC assessment data for those older adults in Ontario who had been administered an assessment. [Exhibit 4.6](#) depicts the proportion of older adults with the highest levels of need across several measures among individuals with and without dementia—41.6% of individuals with dementia required some assistance with activities of daily living (e.g., getting out of bed, dressing, toileting, eating) and 62.6% had greater difficulty performing instrumental activities of daily living (e.g., preparing meals, doing housework, using the phone). Furthermore, the proportion of older adults with dementia who had moderate to very severe cognitive impairment was seven times that of older adults without dementia (42.1% vs. 6.2%, respectively). Among all of the RAI health measures, with the exception of the Depression Rating Scale, higher levels of need were observed among males with dementia as compared to their female counterparts.

**Historical Health Service Use**

[Exhibit 4.7](#) presents broad measures of health system use in the year prior to baseline by sex. Our goal was to describe when and how older adults with dementia made contact with the health care system.

**EXHIBIT 4.6 Percentage of Ontario adults aged 66 and older with a RAI-HC assessment\* living in the community and exhibiting high levels of need, by presence of physician-diagnosed dementia and level of need, 2007**

\*Either long-stay home care client or long-term care applicant.



MAPLe = Method of Assigning Priority Levels  
ADL = Activities of Daily Living

CHES = Changes in Health, End-stage Disease, and Signs and Symptoms  
IADL = Instrumental Activities of Daily Living

**EXHIBIT 4.7 Health service use by Ontario adults aged 66 and older living in the community in the year prior to April 1, 2007, by presence of physician-diagnosed dementia and sex**

	Physician-Diagnosed Dementia			No Physician-Diagnosed Dementia		
	TOTAL	WOMEN	MEN	TOTAL	WOMEN	MEN
Older adults living in the community, N	101,775	62,122	39,653	1,404,702	778,895	625,807
<b>ACUTE CARE HOSPITAL USE, n (%)</b>						
<b>Emergency Department Visits</b>						
Any visits	43,783 (43.0)	26,665 (42.9)	17,118 (43.2)	345,630 (24.6)	192,763 (24.7)	152,867 (24.4)
Number of visits, mean ± SD	2.11 ± 2.01	2.06 ± 1.90	2.17 ± 2.16	1.74 ± 1.51	1.71 ± 1.44	1.76 ± 1.58
Any low-acuity visits	12,506 (12.3)	7,540 (12.1)	4,966 (12.5)	133,614 (9.5)	75,091 (9.6)	58,523 (9.4)
Any potentially preventable visits	11,351 (11.2)	6,954 (11.2)	4,397 (11.1)	73,590 (5.2)	41,962 (5.4)	31,628 (5.1)
Any fall-related visits	8,670 (8.5)	6,025 (9.7)	2,645 (6.7)	43,079 (3.1)	28,791 (3.7)	14,288 (2.3)
<b>Acute Care Hospital Admissions</b>						
Any admissions	22,711 (22.3)	13,103 (21.1)	9,608 (24.2)	149,862 (10.7)	77,649 (10.0)	72,213 (11.5)
Acute care admission length of stay, mean ± SD	14.24 ± 18.35	14.16 ± 17.64	14.36 ± 19.26	8.63 ± 11.62	8.73 ± 11.53	8.53 ± 11.71
Any acute care admission with Alternate Level of Care	3,821 (3.8)	2,323 (3.7)	1,498 (3.8)	7,858 (0.6)	4,938 (0.6)	2,920 (0.5)
<b>PHYSICIAN VISITS, n (%)</b>						
Any days with primary care visits	97,547 (95.8)	59,414 (95.6)	38,133 (96.2)	1,284,076 (91.4)	716,806 (92.0)	567,270 (90.6)
Number of days with primary care visits, mean ± SD	13.02 ± 11.82	12.87 ± 11.80	13.24 ± 11.85	8.71 ± 7.69	8.78 ± 7.68	8.62 ± 7.70
Any days with specialist visits	88,801 (87.3)	53,319 (85.8)	35,482 (89.5)	1,141,975 (81.3)	639,648 (82.1)	502,327 (80.3)
Number of days with specialist visits, mean ± SD	10.16 ± 12.07	9.49 ± 11.38	11.18 ± 12.99	7.49 ± 8.58	7.25 ± 8.09	7.80 ± 9.17

EXHIBIT 4.7 CONTINUED...

	Physician-Diagnosed Dementia			No Physician-Diagnosed Dementia		
	TOTAL	WOMEN	MEN	TOTAL	WOMEN	MEN
<b>HOME CARE SERVICE VISITS, n (%)</b>						
Any home care services visits	34,979 (34.4)	22,841 (36.8)	12,138 (30.6)	126,717 (9.0)	80,769 (10.4)	45,948 (7.3)
Any nursing visits	13,959 (13.7)	8,263 (13.3)	5,696 (14.4)	69,674 (5.0)	38,479 (4.9)	31,195 (5.0)
Any physiotherapy visits	9,852 (9.7)	6,230 (10.0)	3,622 (9.1)	39,524 (2.8)	26,111 (3.4)	13,413 (2.1)
Any occupational therapy visits	12,295 (12.1)	7,762 (12.5)	4,533 (11.4)	29,652 (2.1)	19,491 (2.5)	10,161 (1.6)
Any personal service/homemaking visits	24,234 (23.8)	16,641 (26.8)	7,593 (19.1)	59,816 (4.3)	45,470 (5.8)	14,346 (2.3)
<b>LONG -TERM CARE USE, n (%)</b>						
Any long-term care applications	8,112 (8.0)	5,335 (8.6)	2,777 (7.0)	6,899 (0.5)	4,654 (0.6)	2,245 (0.4)
Any long-term care placements	423 (0.4)	246 (0.4)	177 (0.4)	184 (0.0)	114 (0.0)	70 (0.0)

## Hospital Use

Just under half (43.0%) of older adults with dementia visited the emergency department (ED) during the year prior to baseline compared to 24.6% of older adults without dementia. The proportion of older adults who made potentially preventable visits to the ED was also larger in older adults with dementia than in the remaining individuals. Potentially preventable conditions are diseases that are sensitive to ambulatory care and can often be managed effectively in outpatient settings, such as diabetes or asthma. Among older adults with dementia, 11.2% visited the ED at least once for a potentially preventable condition, whereas the rate was only 5.2% in older adults without dementia. Although still higher in older adults with dementia, there was a slight difference in the rates of low-acuity ED visits between the groups (12.3% vs. 9.5% for those without a dementia diagnosis). Almost 10% of older adults with dementia visited the ED as a result of a fall, compared to only 3.1% of those without dementia. ED visit rates in the dementia group seemed to increase with age; 5.6% of those aged 66–74, 8.0% of those aged 75–84, and 11.3% of those aged 85 and older made a fall-related ED visit over the course of the year. A similar trend was observed in the group without a dementia diagnosis (not shown). Falls were

also more common in females with dementia, where 9.7% of women visited the ED compared to 6.7% of men with dementia.

Roughly one in five older adults with dementia was hospitalized over the course of the year prior to baseline—a rate double that of older adults without dementia. Not only were more individuals hospitalized, those in the dementia group also had longer lengths of stay in comparison to those without dementia (an average length of stay of 14.2 days in the dementia group vs. 8.6 days in the remaining group). Alternate level of care (ALC) designations among hospitalized patients were more common in those with dementia, as well; 16.8% of hospitalized older adults with dementia had ALC days, whereas this was the case in only 5.2% of the remaining group (not shown). Among all hospitalized older adults, the rate of ALC designations seemed to increase with age; for example, 12.9% of those aged 66–74, 16.0% of those aged 75–84, and 20.2% of those aged 85 and older with dementia were designated ALC during their hospital stays (not shown). It should be noted, however, that although not all of the hospitalizations examined in the one-year historical lookback period were related to dementia, some hospitalizations would also represent an

individual's entry into the dementia cohort and might therefore inflate the hospitalization rate among this group.

## Physician Services

Almost all older adults visited a family physician at least once during the year prior to baseline (95.8% of the dementia group, 91.4% of the group without dementia). Although individuals in both groups saw a doctor, those with dementia made more visits on average than those without, seeing a physician on 13 separate days (vs. nine in the group without dementia) over the course of the year. A quarter of older adults with dementia visited a family physician on more than 17 different days (data not shown).

Contact with specialists was also common in both groups, with 87.3% of those with dementia and 81.3% of those without dementia visiting a specialist at least once during the year. On average, older adults with dementia visited specialists on 10 different occasions, whereas the remaining seniors saw specialists only eight different times. Specialist use seemed to decrease slightly by age in older adults with dementia, from 90.6% in those aged 66–74 to 82.3% in those aged 85 and older (data not shown); it is not clear why this is the case.

### Home Care

In the year prior to baseline, roughly one-third of older adults with dementia (34.4%) used at least one home care service, whereas 9.0% of older adults without dementia received home care services. In both groups, approximately two-thirds of home care clients were women. Home care visits were most commonly made to provide nursing, physiotherapy, occupational therapy and personal support/homemaking services. The proportion of older adults receiving nursing services was approximately three times higher in the dementia group than in the group without dementia (13.7% vs. 5.0%). A similar difference was observed with physiotherapy services, where 9.7% of those with dementia received services compared to 2.8% of those without dementia. Personal support/homemaking was the most commonly provided service and was received by approximately one-quarter of older adults with dementia.

### Follow-Up Health Service Use

[Exhibit 4.8](#) presents the same measures of system use as [Exhibit 4.7](#), but here we look at patterns of health service use in the year following baseline. As we noted in examining historical health system use, older adults with dementia have greater contact with the health care system than those without, particularly in the hospital and home care sectors. We classified individuals based on any inpatient hospitalizations and further divided those hospitalized by the presence or absence of ALC designations in order to observe any systematic differences in need or severity among older adults with dementia. [Exhibit 4.9](#) presents data that are complementary and describe patterns in more detail.

---

*“Home care visits were most commonly made to provide nursing, physiotherapy, occupational therapy and personal support/homemaking services. The proportion of older adults receiving nursing services was approximately three times higher in the dementia group than in the group without dementia.”*

**EXHIBIT 4.8 Health service use by Ontario adults aged 66 and older living in the community in the year following April 1, 2007 (baseline), by presence of physician-diagnosed dementia and type of hospital use**

	Physician-Diagnosed Dementia				No Physician-Diagnosed Dementia			
	TOTAL	HOSPITALIZATION WITH ALC	HOSPITALIZATION WITH NO ALC	NO HOSPITALIZATION	TOTAL	HOSPITALIZATION WITH ALC	HOSPITALIZATION WITH NO ALC	NO HOSPITALIZATION
Older adults living in the community, N	101,775	7,039	18,470	76,266	1,404,702	21,849	162,742	1,220,111
<b>ACUTE CARE HOSPITAL USE, n (%)</b>								
<b>Emergency Department Visits</b>								
Any visits	46,726 (45.9)	6,843 (97.2)	17,057 (92.3)	22,826 (29.9)	388,006 (27.6)	20,714 (94.8)	129,497 (79.6)	237,795 (19.5)
Number of visits, mean ± SD	2.06 ± 1.86	2.47 ± 1.95	2.44 ± 2.17	1.65 ± 1.45	1.82 ± 1.62	2.54 ± 2.18	2.26 ± 2.00	1.52 ± 1.20
Any low-acuity visits	11,052 (10.9)	652 (9.3)	2,684 (14.5)	7,716 (10.1)	133,358 (9.5)	2,491 (11.4)	24,594 (15.1)	106,273 (8.7)
Any visits for potentially preventable conditions	12,431 (12.2)	2,201 (31.3)	6,186 (33.5)	4,044 (5.3)	86,707 (6.2)	6,905 (31.6)	40,501 (24.9)	39,301 (3.2)
Any visits for fall-related injuries	10,120 (9.9)	1,944 (27.6)	3,201 (17.3)	4,975 (6.5)	53,209 (3.8)	5,154 (23.6)	14,660 (9.0)	33,395 (2.7)
<b>Acute Care Hospital Admissions</b>								
Any acute care admissions	25,509 (25.1)	7,039 (100.0)	18,470 (100.0)	0 (0.0)	184,591 (13.1)	21,849 (100.0)	162,742 (100.0)	0 (0.0)
Acute care length of stay, mean ± SD	18.64 ± 25.02	39.95 ± 34.77	10.51 ± 12.83	–	12.24 ± 17.80	36.10 ± 31.75	9.04 ± 11.73	–
Any admission with Alternate Level of Care	7,039 (6.9)	7,039 (100.0)	0 (0.0)	0 (0.0)	21,849 (1.6)	21,849 (100.0)	0 (0.0)	0 (0.0)

continued on next page...

EXHIBIT 4.8 CONTINUED...

	Physician-Diagnosed Dementia				No Physician-Diagnosed Dementia			
	TOTAL	HOSPITALIZATION WITH ALC	HOSPITALIZATION WITH NO ALC	NO HOSPITALIZATION	TOTAL	HOSPITALIZATION WITH ALC	HOSPITALIZATION WITH NO ALC	NO HOSPITALIZATION
<b>PHYSICIAN VISITS, n (%)</b>								
Any days with primary care visits	96,539 (94.9)	7,026 (99.8)	18,367 (99.4)	71,146 (93.3)	1,288,275 (91.7)	21,812 (99.8)	161,894 (99.5)	1,104,569 (90.5)
Number of days with primary care visits, mean ± SD	13.60 ± 13.65	34.37 ± 23.74	18.65 ± 14.69	10.24 ± 8.99	9.14 ± 8.99	33.60 ± 23.81	15.78 ± 12.38	7.68 ± 6.34
Any days with specialist visits	87,444 (85.9)	7,018 (99.7)	18,410 (99.7)	62,016 (81.3)	1,156,127 (82.3)	21,810 (99.8)	162,424 (99.8)	971,893 (79.7)
Number of days with specialist visits, mean ± SD	10.31 ± 12.76	24.26 ± 21.69	16.91 ± 15.09	6.77 ± 7.82	8.19 ± 10.05	29.39 ± 24.44	18.47 ± 14.50	6.00 ± 6.26
<b>HOME CARE SERVICE VISITS, n (%)</b>								
Any home care services visits	39,143 (38.5)	5,076 (72.1)	11,574 (62.7)	22,493 (29.5)	161,932 (11.5)	15,279 (69.9)	73,221 (45.0)	73,432 (6.0)
Any nursing visits	14,648 (14.4)	2,165 (30.8)	5,914 (32.0)	6,569 (8.6)	90,378 (6.4)	8,527 (39.0)	49,489 (30.4)	32,362 (2.7)
Any physiotherapy visits	8,828 (8.7)	1,527 (21.7)	3,566 (19.3)	3,735 (4.9)	48,365 (3.4)	6,387 (29.2)	27,014 (16.6)	14,964 (1.2)
Any occupational therapy visits	12,322 (12.1)	2,104 (29.9)	4,174 (22.6)	6,044 (7.9)	45,266 (3.2)	6,988 (32.0)	21,359 (13.1)	16,919 (1.4)
Any personal service/ homemaking visits	29,658 (29.1)	4,031 (57.3)	8,209 (44.4)	17,418 (22.8)	84,707 (6.0)	10,298 (47.1)	32,468 (20.0)	41,941 (3.4)
<b>LONG-TERM CARE USE, n (%)</b>								
Any long-term care applications	13,969 (13.7)	3,901 (55.4)	3,021 (16.4)	7,047 (9.2)	21,128 (1.5)	7,636 (34.9)	5,995 (3.7)	7,497 (0.6)
Any long-term care placements	8,019 (7.9)	2,630 (37.4)	1,592 (8.6)	3,797 (5.0)	8,337 (0.6)	3,981 (18.2)	1,903 (1.2)	2,453 (0.2)

ALC = Alternate Level of Care

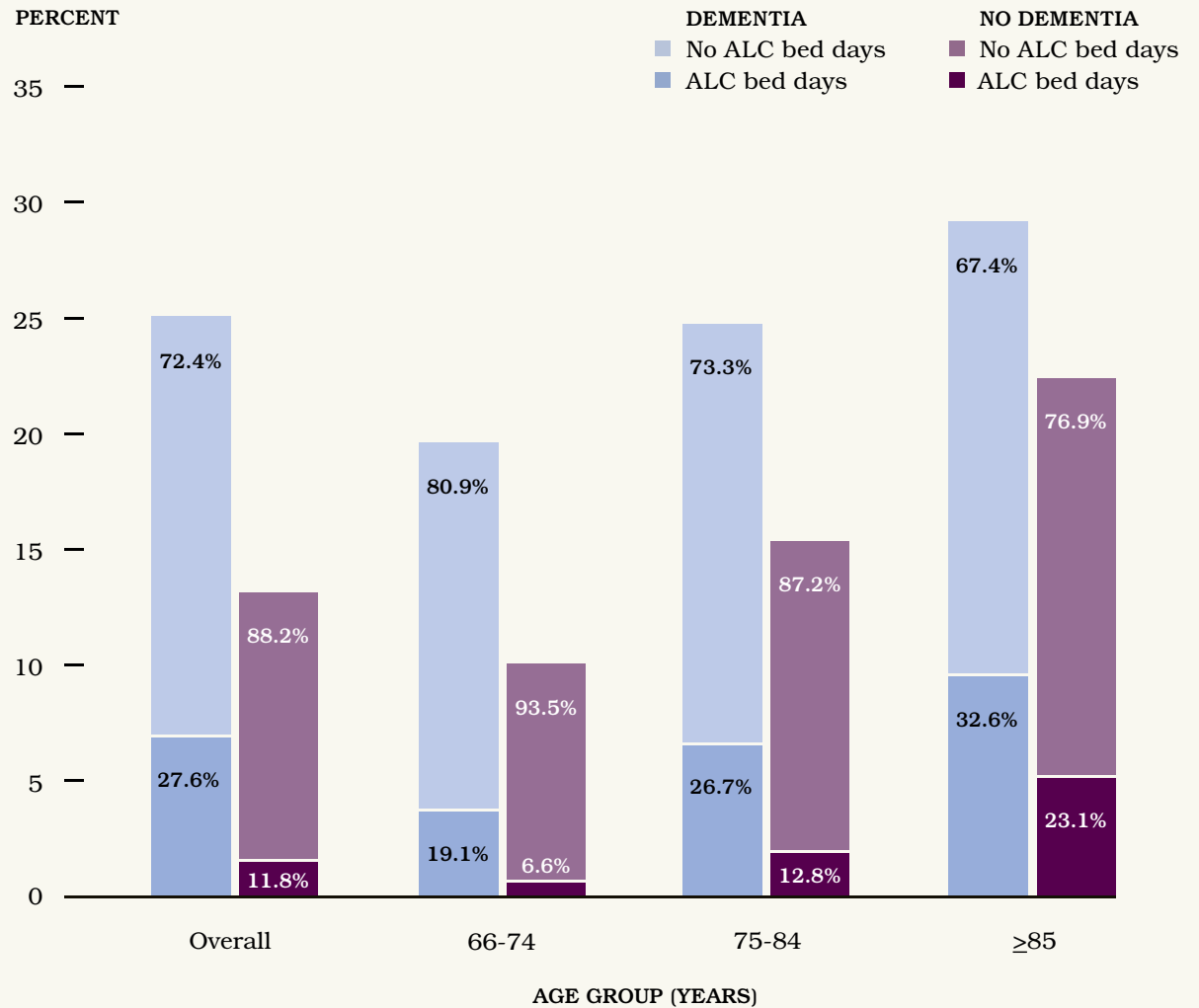
SD = Standard Deviation



### Hospital Use

A quarter of older adults with dementia were hospitalized in the year following baseline, and almost a third (27.6%) of those hospitalized were designated ALC during their stay. Although the overall hospital admission rate increased only slightly from 22.3% in the previous year to 25.1% in the following year, the rate of ALC designations increased from 16.8% to 27.6%. The average length of stay was 18.6 days for all hospitalized individuals with dementia, an increase of four days over the previous year. Similar trends were observed in older adults without dementia; although their hospitalization rate increased only slightly (from 10.7% to 13.1%), the proportion with ALC designations rose from 5.2% in the prior year to 11.8% in the year following baseline. Their average length of stay also increased to 12.2 days from 8.6. [Exhibit 4.9](#) depicts the distribution of ALC designations among hospitalized older adults, and we can clearly see an increasing trend associated with age.

**EXHIBIT 4.9 Percentage of Ontario adults aged 66 and older living in the community with an acute care hospitalization in the year following April 1, 2007 (baseline), by age group, presence of physician-diagnosed dementia and relative use of Alternate Level of Care (ALC) beds**



In the year following baseline, patterns of ED use were similar to those preceding baseline, and 45.9% of individuals with physician-diagnosed dementia visited an ED. Individuals with dementia who ended up being hospitalized in the follow-up year were much more likely to have ED use than those who were not hospitalized (over 90% compared to 29.9%), likely reflecting the ED as the route to hospitalization.

One-third of adults with dementia who were hospitalized in the follow-up year, regardless of ALC designation, visited the ED for a potentially preventable condition in the year following baseline; this was the case in only 5.3% of those who were not hospitalized. ED visits for fall-related injuries were associated with the complex needs of dementia patients: 27.6% of those hospitalized with an ALC designation in the follow-up year also had a fall-related ED visit, compared to 17.3% who were hospitalized with no ALC designation and only 6.5% of those who were not hospitalized at all. There was no marked difference in low-acuity ED visits among those who were hospitalized and those who were not. Although the overall ED visit rate was lower in older adults without dementia (27.6% vs. 45.9%), similar trends were observed in low-acuity, potentially preventable, and fall-related visits.

### Physician Services

The vast majority of older adults continued to visit a family physician in the year following baseline. Among older adults with dementia, the average number of days when visits were made to a family physician in that year increased only slightly from the previous year, from 13.0 days to 13.6 days. There is a clear difference in the number of visit days among the hospitalized and non-hospitalized groups of older adults with dementia, however. Those who were not hospitalized visited a primary care physician an average of 10.2 separate occasions, whereas those who were hospitalized without an ALC designation saw a family physician an average of 18.7 different occasions. Those who were hospitalized and designated ALC during their stay visited a family physician an average of 34.4 occasions. The same patterns were echoed among older adults without dementia, although this group visited slightly less frequently.

Visits to specialist physicians (that is, any physician other than a family practitioner or general practitioner) were also frequent in the year following baseline; 85.9% of older adults with dementia and 82.3% of other older Ontario adults made at least one visit to a specialist physician. While patterns differed according to whether an individual was

hospitalized in the year following baseline, there was little difference between those with and without a dementia diagnosis.

### Home Care

The proportion of older adults receiving home care services rose slightly in the year following baseline, from 34.4% to 38.5% in those with dementia and from 9.0% to 11.5% in those without dementia. We can clearly see that use of home care services is higher among individuals who have been hospitalized (although in these analyses we did not account for whether home care preceded or followed hospitalization). In the dementia group, home care use is highest (72.1%) among those who have ALC designations during their hospital stays and those who are hospitalized without ALC (62.7%), and lowest among those who are not hospitalized at all (29.5%). A similar pattern can be seen among the group of older adults without dementia, although the rates are lower; 69.9% of those hospitalized with ALC, 45.0% of those hospitalized without ALC, and 6.0% of those who were not hospitalized received home care services. Home care rates in the year prior to baseline are similar to those in the subsequent year. There is a clear increase in home care usage rates among older adults who were hospitalized in the year following baseline; there were, however, no

changes or slight decreases in the rates among the non-hospitalized groups. Nursing, physiotherapy, occupational therapy and personal support/homemaking services were most commonly used in the year following baseline. There was little to no change in usage rates for these services among older adults with dementia in the year following baseline, with the exception of personal support/homemaking services, which increased from 23.8% to 29.1%.

### Impact of Dementia on Caregivers

As described earlier, we found that older adults with physician-diagnosed dementia had high levels of need across the various sectors of the health care system. We therefore became interested in the impact on caregivers of managing these needs and caring for these individuals, along with the impact on the long-term care sector. [Exhibit 4.10](#) is complementary to these findings and describes caregiver impact in more detail.

### Caregiver Burden

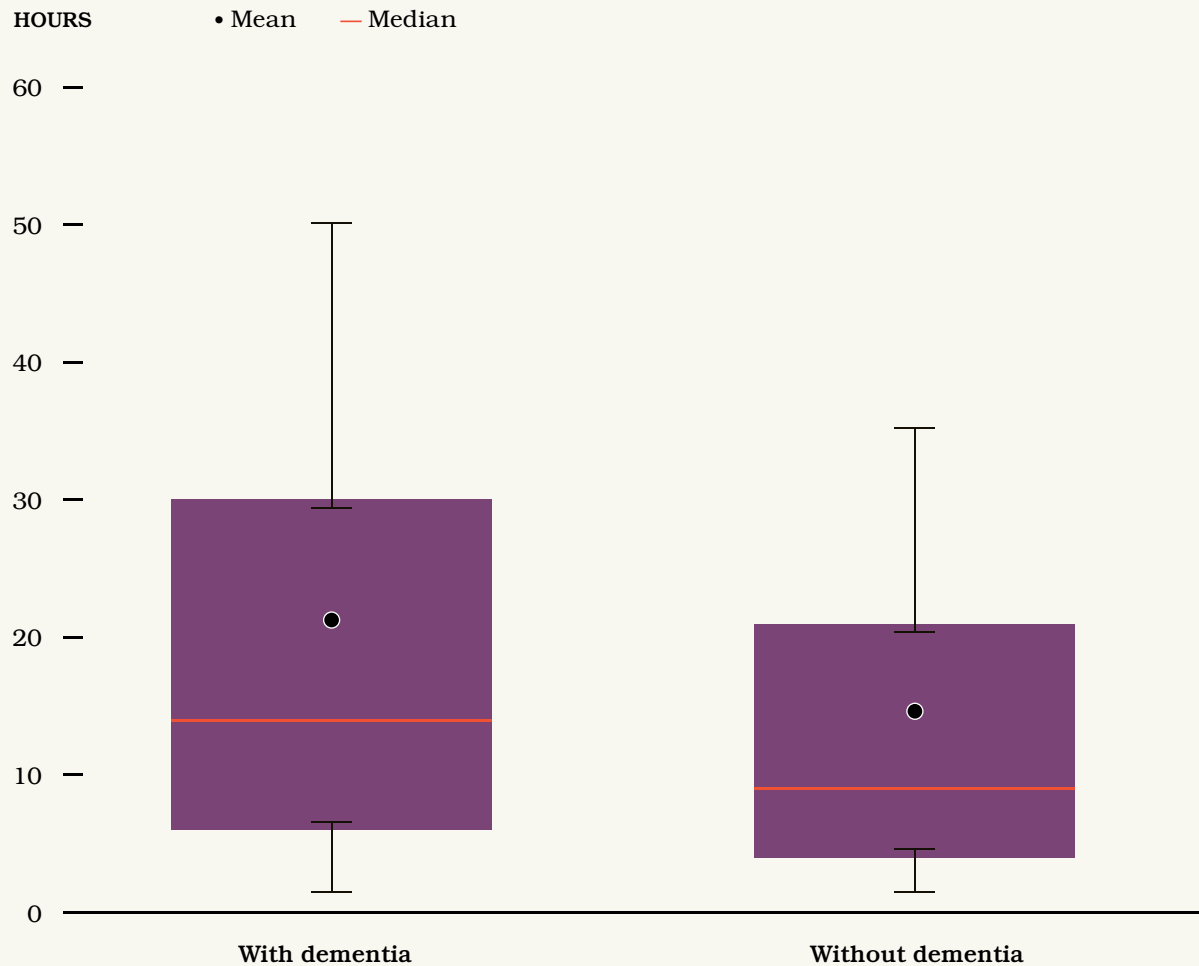
The vast majority (98.7%) of community-dwelling older adults with dementia and who were administered a RAI-HC reported having an informal caregiver (that is, an individual who helped and supported the dementia patient but who was not a paid care provider). Most of these caregivers were family members, predominantly a child (or child-in-law) or a spouse. Caring for an individual with dementia seemed to have quite a large impact on caregivers; almost one in five reported feelings of distress, anger or depression, or an inability to continue care. This was even more marked among caregivers who lived with an individual with dementia, where the distress rate was 26.7% (not shown). In contrast, only 9.1% of informal caregivers for other older adults reported distress (14.3% among those who lived with the individual [not shown]). [Exhibit 4.10](#) depicts the number of hours of informal care provided by caregivers over a one-week period. It is clear that older adults with dementia required more resources and support; caregivers spent an average of 21 hours a week caring for individuals with dementia, six hours longer than those who cared for older adults without dementia.

---

*“The vast majority of older adults with dementia continued to visit a family physician in the year following baseline.”*

**EXHIBIT 4.10 Number of informal care hours provided in the week prior to RAI-HC assessment\* for Ontario adults aged 66 and older living in the community, by presence of physician-diagnosed dementia, 2007**

\*Either long-stay home care clients or long-term care home applicants.



### Long-Term Care

The cognitive and functional limitations of older adults with dementia, combined with the burden on caregivers, make this an at-risk population for entry into a long-term care (LTC) facility. Although the rate of application to LTC facilities almost doubled during the course of our study, from 8.0% who applied in the year prior to baseline to 13.7% in the year following, only one in five older adults with physician-diagnosed dementia ever applied to LTC over the two-year period examined (not shown). Of those who did apply, 36.7% were placed in a LTC facility during the two years (not shown). The application rate was much lower among other older adults without a diagnosis of dementia, where only 1.9% applied to LTC and one-third of those applicants were placed (data not shown).

## CONCLUSION

The data presented in this chapter provide a detailed profile of older adults diagnosed with dementia living in the community, and contrast their characteristics to those of older adults without a diagnosis of dementia. Overall, older adults with dementia had a higher prevalence of comorbid conditions, were dispensed a greater number of prescription medications, and were more likely to be frail than individuals without a dementia diagnosis. Those who were long-stay home care clients or who were awaiting placement in a long-term care facility also showed more severe cognitive impairment and required higher levels of assistance with everyday activities than long-stay clients without a diagnosis of dementia. In general, older adults with dementia were more intensive users of health care services across the spectrum (e.g., higher rates of emergency department visits, hospitalizations, physician visits, and home care services) than older adults without dementia. Although we cannot conclude that the emergency department and hospital visits among the dementia group are

a result of dementia itself, it is still worth noting that the visit rates are higher in this population than in the group with no diagnosis of dementia. The majority of older adults with dementia did have regular contact with a physician, indicating that they were being cared for in community settings.

Although some older adults with dementia were able to function independently in community settings, many received informal assistance with their daily activities. Family members were most often the providers of informal care; many felt the strain of caring for an individual with dementia, and the amount of support provided by unpaid caregivers is only expected to increase as the population ages.<sup>11</sup> Despite this, only a small proportion of individuals with dementia were placed in a long-term care facility in the year following baseline. This may indicate that community-based services provide sufficient care and support for many older adults with dementia and, if implemented appropriately, may be able to delay or perhaps even entirely prevent institutionalization among this group.

---

*“Although some older adults with dementia were able to function independently in community settings, many received informal assistance with their daily activities.”*

## REFERENCES

- 1 Blennow K, de Leon MJ, Zetterberg H. Alzheimer's disease. *Lancet* 2006; 368(9533):387-403.
- 2 Canadian Study of Health and Aging Working Group. Canadian study of health and aging: study methods and prevalence of dementia. *CMAJ* 1994; 150(6):899-913.
- 3 Ebly EM, Parhad IM, Hogan DB, Fung TS. Prevalence and types of dementia in the very old: results from the Canadian Study of Health and Aging. *Neurology* 1994; 44(9):1593-600.
- 4 Alzheimer Society of Ontario. *10 by 20: Ontario Action Plan for Dementia*. Accessed October 6, 2011 at [http://www.marep.uwaterloo.ca/PDF/ASO\\_10by20\\_printable\\_03\\_10.pdf](http://www.marep.uwaterloo.ca/PDF/ASO_10by20_printable_03_10.pdf).
- 5 Gaugler JE, Yu F, Krichbaum K, Wyman JF. Predictors of nursing home admission for persons with dementia. *Med Care* 2009; 47(2):191-8.
- 6 Fick DM, Kolanowski AM, Waller JL, Inouye SK. Delirium superimposed on dementia in a community-dwelling managed care population: a 3-year retrospective study of occurrence, costs, and utilization. *J Gerontol A Biol Sci Med Sci* 2005; 60(6):748-53.
- 7 Rudolph JL, Zanin NM, Jones RN, Marcantonio ER, Fong TG, Yang FM, Yap L, Inouye SK. Hospitalization in community-dwelling persons with Alzheimer's disease: frequency and causes. *J Am Geriatr Soc* 2010; 58(8):1542-8.
- 8 Pedone C, Ercolani S, Catani M, Maggio D, Ruggiero C, Quartesan R, Senin U, Mecocci P, Cherubini A. Elderly patients with cognitive impairment have a high risk for functional decline during hospitalization: The GIFA Study. *J Gerontol A Biol Sci Med Sci* 2005; 60(12):1576-80.
- 9 Zilkens RR, Spilsbury K, Bruce DG, Semmens JB. Clinical epidemiology and in-patient hospital use in the last year of life (1990-2005) of 29,884 Western Australians with dementia. *J Alzheimers Dis* 2009; 17(2):399-407.
- 10 Canadian Institute for Health Information. *Caring for Seniors with Alzheimer's Disease and Other Forms of Dementia*. Accessed October 6, 2011 at [http://secure.cihi.ca/cihiweb/products/Dementia\\_AIB\\_2010\\_EN.pdf](http://secure.cihi.ca/cihiweb/products/Dementia_AIB_2010_EN.pdf).
- 11 Alzheimer Society of Canada. *Rising Tide: The Impact of Dementia on Canadian Society*. Toronto, ON: The Society; 2010. Accessed October 6, 2011 at [http://www.alzheimer.ca/docs/RisingTide/Rising%20Tide\\_Full%20Report\\_Eng\\_FINAL\\_Secured%20version.pdf](http://www.alzheimer.ca/docs/RisingTide/Rising%20Tide_Full%20Report_Eng_FINAL_Secured%20version.pdf).

# Medically Complex Home Care Clients

## *Profiling risk following acute care hospitalization*

---

**Lead Authors**

**Walter P. Wodchis**  
**Ximena Camacho**

**Contributors**

**Susan E. Bronskill**  
**Andrea Gruneir**

## INTRODUCTION

Advancing age is often associated with an increase in chronic conditions and sometimes a decline in cognitive functioning (as shown throughout this report). In turn, both developments are met with more trips to the doctor, more visits to the emergency department, more prescribed medications and more hospital admissions.<sup>1</sup> Among Canadians identified with chronic conditions, nearly half of those aged 65–79 and almost 60% of those 80 and older reported having at least two high-prevalence or high-impact health conditions.<sup>2</sup> Treating multiple chronic conditions often means that older people must seek the services of different health care providers, with treatment itself often challenged by inadequate service coordination and continuity of care. Appropriately targeting services to reach those with complex, continuous and considerable care needs may play an important role in optimizing their health trajectory and in easing the total care burden on and costs to the health system.

As the population ages, older people are increasingly being admitted to and discharged from hospital ‘quicker and sicker.’ When transitioning from hospital to home, older people typically require community-based follow-up care from primary care, pharmacy

and home care services to help stabilize their medical condition and ensure that the resources are in place that will enable them to remain in the community. Yet gaps in care and poor communication between service providers during transitions remain a concern. Uncoordinated transitions are associated with preventable complications, medication errors and inappropriate or insufficient follow-up care.<sup>3</sup> Common and costly consequences of poor care transitions include the needless duplication of tests and services, re-hospitalization, admission to long-term care (LTC) and even death—outcomes which studies suggest can be improved by designating a specific health care provider to be responsible for individuals during care transitions and by providing individuals with comprehensive outpatient or community care.<sup>4</sup>

Efforts to improve care transitions and contain the associated system costs require an understanding of the complexity and frequency of these transitions, allowing those who are at heightened risk of adverse outcomes to experience transitions that are client-centred, comprehensive and evidence-informed.<sup>5</sup> There are many examples of the types of interventions and care that individuals need as they transition from acute hospitalization to home care. However, new care models are

disruptive and implementation costs can be considerable.<sup>6</sup> Moreover, not everyone needs enhanced or 'integrated' care. Rather, the appropriate targeting of enhanced care and coordination to prevent acute readmission and LTC institutionalization should be emphasized to ensure an adequate and cost-effective allocation of scarce health care resources. To that end, this chapter examines the patterns and prevalence of care transitions for individuals discharged from acute care hospitals in Ontario after treatment for complex medical conditions. The chapter also considers how widely available and easily implemented screening tools can be used to appropriately target care interventions that aim to reduce acute readmission and LTC institutionalization in the province.

## METHODS

### Population Definition

The study population described in this chapter was formed to focus on individuals with extensive health care needs who were at high risk for institutional care (acute care and LTC admission). These individuals represent an important target group that could benefit from care transition interventions. Individuals were included in the population if they were admitted to an acute care hospital and met the inclusion

criteria in published randomized controlled trials of care transition interventions (see [Chapter 2](#) for details). The population was restricted to those who were receiving home care immediately prior to their acute admission. We focused on this population because we know there is an opportunity for care coordination through the transition from acute care to home (based on published trials), and these individuals were already connected to home care providers. The focus is therefore on how the needs of these individuals were met by the health care system. With this population, we also have data on medical conditions from acute hospital care and on functional and health status from assessments collected by home care.

Individuals were included in the study if they were aged 66 and older and had been discharged from an acute care hospital between April 1, 2007, and March 31, 2008, with two or more ambulatory care sensitive conditions (angina, asthma, chronic obstructive pulmonary disease, diabetes, grand mal status and other epileptic convulsions, heart failure or pulmonary edema, and hypertension) or had one of six diagnoses that had been targeted for care transition interventions (cardiac arrhythmias, stroke, hip fracture, spinal stenosis, deep vein or pulmonary embolism, or peripheral vascular disease).<sup>9</sup> The first

applicable hospitalization during the study period was identified as the 'baseline' hospitalization. We selected from this population individuals who had received a home care service visit in the 30 days prior to the baseline acute admission. Individuals were excluded from the study if they had been hospitalized for a psychiatric condition or palliative care in the prior year because these populations are likely suitable for more specialized care plans. For the detailed analyses of acute care readmission and LTC admission, only residents discharged to home directly from hospital were included.

### Measures

In addition to the demographic, health services, and broad health status measures presented in the other chapters (see [Chapter 2](#)), we examined additional characteristics unique to this cohort.

### Discharge Destination

We used a multi-step, hierarchical process to assign discharge destination. A destination of LTC was first assigned by identifying the individuals who had been newly placed in LTC homes in the two weeks following hospitalization. We identified deaths, discharges to inpatient rehabilitation or complex continuing care, and discharges to the community using discharge



disposition categorization on the hospital records of the remaining group. Among individuals discharged to the community, we differentiated between those who did and did not receive home care services in the two weeks following discharge.

### **LACE Baseline**

The LACE baseline is a recently published, 19-point clinical tool for predicting the risk of death and unplanned readmission within 30 days of hospital discharge.<sup>7</sup> It is comprised of four main components: length of stay ('L'; up to 7 points), acuity of admission ('A'; 3 points), patient comorbidity as measured by the Charlson comorbidity score ('C'; up to 5 points), and emergency department visits within the previous six months ('E'; up to 4 points). Each incremental point on the scale is associated with a higher risk of readmission or death.<sup>7</sup> Each of the four components contributes to the final baseline score as outlined in [Appendix E.3](#). The final LACE score is calculated by summing up the contributions of each component.

### **RAI MAPLe**

The RAI MAPLe is a summary score that provides six levels representing risk for LTC admission ranging from Low (0) to Very High (6).<sup>8</sup> It uses several measures of functional dependency to arrive at the risk score.

### **RAI Aggregate Risk Score**

The RAI Aggregate Risk Score is a five-point baseline that uses functional status and caregiver distress information provided on the RAI Home Care assessment to provide a measure of risk of admission to LTC. The RAI risk score, also referred to as the Aggregate Risk Score or the Needs Risk Indicator, was developed and is used by several Community Care Access Centres in Ontario to determine home care service levels. To calculate the RAI score, several RAI scales (MAPLe, Activities of Daily Living Hierarchy, Cognitive Performance, IADL Involvement and CHESS) are summed to obtain a risk score ranging from 0 to 28. These scales are described in more detail in [Chapter 2](#). The calculated sum is then integrated with a measure of caregiver distress and categorized into risk levels assigned as Low (0-7), Moderate-Low (8-10 with no caregiver distress), Moderate-High (8-10 with caregiver distress), High (11-15) or Very High (16+). See [Appendix E.3](#) for details.

---

*“Efforts to improve care transitions and contain the associated system costs require an understanding of the complexity and frequency of these transitions, allowing those who are at heightened risk of adverse outcomes to experience transitions that are client-centred, comprehensive and evidence-informed.”*

## RESULTS

### Characterizing Medically Complex Home Care Clients

[Exhibit 5.1](#) provides an overview of the demographic and clinical characteristics of the study population. Data are based on information at the time of the baseline hospitalization, as well as on clinical conditions recorded in administrative data in the year prior to the baseline hospitalization. We report data for the overall population as well as data stratified by the discharge destination after baseline hospitalization, because each discharge location is associated

with its own care transition planning and needs. There were 10,644 individuals in Ontario who fit the population definition. Just under half of the population was discharged directly back to home care after their acute hospitalization (n = 5,122), 23.4% were discharged to rehabilitation or complex continuing care hospitals, 6.2% were admitted to LTC, and 16.9% of the cohort died during their initial hospitalization. Although not a large number, it is surprising that 4.5% (482) of individuals discharged home did not receive any home care in the two weeks following their acute care discharge.

**EXHIBIT 5.1 Demographic and broad health status measures of medically complex home care clients aged 66 and older in Ontario, by discharge location, 2007/08**

	Discharge Location					
	TOTAL	REHABILITATION/ COMPLEX CONTINUING CARE	LONG-TERM CARE	COMMUNITY WITH HOME CARE	COMMUNITY WITHOUT HOME CARE	DIED IN HOSPITAL
Medically complex home care clients, N	10,644	2,488	658	5,122	482	1,793
<b>DEMOGRAPHIC MEASURES, n (%)</b>						
Low income level	3,596 (33.8)	804 (32.3)	173 (26.3)	1,821 (35.6)	147 (30.5)	611 (34.1)
Age group (years)						
66–69	688 (6.5)	122 (4.9)	18 (2.7)	430 (8.4)	36 (7.5)	69 (3.8)
70–74	1,298 (12.2)	248 (10.0)	31 (4.7)	754 (14.7)	86 (17.8)	163 (9.1)
75–79	2,034 (19.1)	450 (18.1)	95 (14.4)	1,060 (20.7)	102 (21.2)	304 (17.0)
80–84	2,741 (25.8)	654 (26.3)	175 (26.6)	1,298 (25.3)	135 (28.0)	458 (25.5)
85–89	2,309 (21.7)	602 (24.2)	173 (26.3)	1,016 (19.8)	79 (16.4)	418 (23.3)
≥90	1,574 (14.8)	412 (16.6)	166 (25.2)	564 (11.0)	44 (9.1)	381 (21.2)
Sex						
Male	3,977 (37.4)	810 (32.6)	201 (30.5)	1,942 (37.9)	217 (45.0)	763 (42.6)
Female	6,667 (62.6)	1,678 (67.4)	457 (69.5)	3,180 (62.1)	265 (55.0)	1,030 (57.4)
<b>HEALTH STATUS MEASURES, n (%)</b>						
Number of ADG comorbidity categories						
0–5	957 (9.0)	278 (11.2)	106 (16.1)	332 (6.5)	40 (8.3)	188 (10.5)
6–9	2,904 (27.3)	725 (29.1)	192 (29.2)	1,337 (26.1)	117 (24.3)	510 (28.4)
≥10	6,783 (63.7)	1,485 (59.7)	360 (54.7)	3,453 (67.4)	325 (67.4)	1,095 (61.1)
≥1 Diagnoses associated with frailty	3,232 (30.4)	855 (34.4)	237 (36.0)	1,392 (27.2)	131 (27.2)	584 (32.6)
≥2 Coexisting chronic conditions	9,942 (93.4)	2,281 (91.7)	593 (90.1)	4,864 (95.0)	450 (93.4)	1,661 (92.6)

continued on next page...

EXHIBIT 5.1 CONTINUED...

	Discharge Location					
	TOTAL	REHABILITATION/ COMPLEX CONTINUING CARE	LONG-TERM CARE	COMMUNITY WITH HOME CARE	COMMUNITY WITHOUT HOME CARE	DIED IN HOSPITAL
<b>RAI-HC ASSESSMENT, n (%)</b>						
Assessed in year prior to baseline*	8,000 (75.2)	1,948 (78.3)	656 (99.7)	3,670 (71.7)	231 (47.9)	1,423 (79.4)
Any home care contact in prior year	10,644 (100.0)	2,488 (100.0)	658 (100.0)	5,122 (100.0)	482 (100.0)	1,793 (100.0)
Home care contact and assessment	8,000 (75.2)	1,948 (78.3)	656 (99.7)	3,670 (71.7)	231 (47.9)	1,423 (79.4)
<b>Living Status</b>						
Reported living alone	907 (11.3)	240 (12.3)	80 (12.2)	387 (10.5)	39 (16.9)	154 (10.8)
Reported a primary caregiver relationship						
Child/child-in-law	4,341 (54.3)	1,092 (56.1)	376 (57.3)	1,976 (53.8)	129 (55.8)	736 (51.7)
Spouse	2,317 (29.0)	520 (26.7)	154 (23.5)	1,097 (29.9)	56 (24.2)	463 (32.5)
Other relative	679 (8.5)	189 (9.7)	71 (10.8)	282 (7.7)	21 (9.1)	112 (7.9)
Friend/neighbour	559 (7.0)	126 (6.5)	46 (7.0)	264 (7.2)	22 (9.5)	97 (6.8)
Not reported	104 (1.3)	21 (1.1)	9 (1.4)	51 (1.4)	3 (1.3)	15 (1.1)
Reported co-residing with primary caregiver	3,966 (49.6)	909 (46.7)	277 (42.2)	1,869 (50.9)	100 (43.3)	776 (54.5)
Reported caregiver experiencing distress	1,284 (16.1)	281 (14.4)	216 (32.9)	462 (12.6)	23 (10.0)	282 (19.8)
<b>Functional Status</b>						
MAPLe level						
Low/mild/moderate	5,015 (62.7)	1,237 (63.5)	188 (28.7)	2,619 (71.4)	162 (70.1)	770 (54.1)
High	2,137 (26.7)	519 (26.6)	281 (42.8)	837 (22.8)	52 (22.5)	427 (30.0)
Very high	848 (10.6)	192 (9.9)	187 (28.5)	214 (5.8)	17 (7.4)	226 (15.9)

\*All proportions calculated on only those who received a RAI-HC assessment.

continued on next page...

EXHIBIT 5.1 CONTINUED...

	Discharge Location					
	TOTAL	REHABILITATION/ COMPLEX CONTINUING CARE	LONG-TERM CARE	COMMUNITY WITH HOME CARE	COMMUNITY WITHOUT HOME CARE	DIED IN HOSPITAL
<b>ADL Hierarchy Scale</b>						
0	4,665 (58.3)	1,177 (60.4)	88 (13.4)	2,493 (67.9)	151 (65.4)	715 (50.2)
1+	3,333 (41.7)	771 (39.6)	568 (86.6)	1,175 (32.0)	80 (34.6)	708 (49.8)
<b>CHESS Scale</b>						
0-1	4,654 (58.2)	1,248 (64.1)	181 (27.6)	2,269 (61.8)	131 (56.7)	781 (54.9)
2+	3,344 (41.8)	700 (35.9)	475 (72.4)	1,399 (38.1)	100 (43.3)	642 (45.1)
<b>Cognitive Performance Scale</b>						
0-2	6,280 (78.5)	1,572 (80.7)	292 (44.5)	3,161 (86.1)	202 (87.4)	1,001 (70.3)
3+	1,718 (21.5)	376 (19.3)	364 (55.5)	507 (13.8)	29 (12.6)	422 (29.7)
<b>Depression Rating Scale</b>						
0-2	6,996 (87.5)	1,734 (89.0)	546 (83.2)	3,223 (87.8)	207 (89.6)	1,225 (86.1)
3+	1,002 (12.5)	214 (11.0)	110 (16.8)	445 (12.1)	24 (10.4)	198 (13.9)
<b>IADL Involvement Scale</b>						
0-3	3,432 (42.9)	825 (42.4)	47 (7.2)	1,947 (53.1)	123 (53.2)	460 (32.3)
4+	4,564 (57.1)	1,122 (57.6)	609 (92.8)	1,720 (46.9)	108 (46.8)	963 (67.7)

\*Includes an "Other" category that is not shown but does contribute to the overall total of 10,644 clients.

ADG = Aggregated Diagnosis Groups

RAI-HC = Resident Assessment Instrument—Home Care

MAPLe = Method for Assigning Priority Levels

ADL = Activities of Daily Living

CHESS = Changes in Health, End-stage Disease, and Signs and Symptoms

IADL = Instrumental Activities of Daily Living

Most of the cohort was made up of women, approximately 62% were over 80 years of age and just over one-third received a provincial low-income subsidy for their medication costs. Medical comorbidity was quite high in this group; 93.4% had at least five different ADG conditions and 63.7% had 10 or more ADG conditions.

RAI-HC based measures are reported only for the population with RAI-HC assessments. While all individuals in the study population received home care services prior to the baseline hospitalization, only three-quarters had recent RAI-HC assessments (n = 8,000). Of those without RAI-HC assessments, 59.9% were post-acute short stay and rehabilitation home care clients where RAI-HC assessments are not required (data not shown). Whereas 16.1% of clients with RAI-HC assessments had caregivers who showed signs of distress, the prevalence was 32.9% among those discharged from acute to LTC. Most clients were at low to moderate risk of LTC admission according to their MAPLe scores, including 28.7% of the individuals discharged from acute to LTC. One fifth of the population (21.5%) had moderate or greater cognitive impairment associated with CPS scores of 3 or more, although the proportion was much higher (55.5%) among individuals discharged to LTC.

### Hospitalizations

[Exhibit 5.2](#) highlights health system utilization in the year prior to acute care hospitalization, and [Exhibit 5.3](#) provides full detail of the care reported in the one year post-hospitalization. Note that the population examined in [Exhibit 5.3](#) does not include those who died in hospital. Just over half (51.0%) of the population had been admitted to acute care in the prior year (not including the index hospitalization), while 20.9% had not even visited an emergency department. In the year after discharge, 68.9% visited an emergency department, about half of which (32.7%) were potentially preventable. In total, 56.5% of individuals were readmitted to acute care within one year of the 'baseline' hospitalization discharge. Preventing acute care readmissions among older adults is an important focus to improve their quality of life and to reduce the burden on the health care system. Identifying those at highest risk for acute care readmission is necessary to ensure effective and efficient targeting for intervention.

**EXHIBIT 5.2 Health service use by medically complex home care clients aged 66 and older in Ontario in the year prior to April 1, 2007–March 31, 2008 (baseline), by discharge location**

	Discharge Location					
	TOTAL	REHABILITATION/ COMPLEX CONTINUING CARE	LONG-TERM CARE	COMMUNITY WITH HOME CARE	COMMUNITY WITHOUT HOME CARE	DIED IN HOSPITAL
Medically complex home care clients, N	10,644	2,488	658	5,122	482	1,793
<b>ACUTE CARE HOSPITAL USE, n (%)</b>						
<b>Emergency Department Visits</b>						
Any visits	8,417 (79.1)	1,860 (74.8)	519 (78.9)	4,184 (81.7)	378 (78.4)	1,394 (77.7)
Any low-acuity visits	1,912 (18.0)	381 (15.3)	110 (16.7)	1,025 (20.0)	91 (18.9)	284 (15.8)
Any visits for potentially preventable conditions	3,754 (35.3)	653 (26.2)	183 (27.8)	2,105 (41.1)	168 (34.9)	618 (34.5)
Any visits for fall-related injuries	1,707 (16.0)	546 (21.9)	135 (20.5)	635 (12.4)	69 (14.3)	299 (16.7)
<b>Acute Care Hospital Admissions</b>						
Any acute care admissions	5,425 (51.0)	1,055 (42.4)	262 (39.8)	2,875 (56.1)	286 (59.3)	901 (50.3)
Number of acute admissions, mean ± SD	1.8 ± 1.2	1.7 ± 1.2	1.7 ± 1.1	1.9 ± 1.3	1.7 ± 1.3	1.7 ± 1.1
Average acute care length of stay, mean ± SD	18.1 ± 20.0	17.4 ± 18.7	19.6 ± 21.7	17.9 ± 19.2	17.9 ± 28.8	19.2 ± 20.1
Any ALC days 1 year prior to index	842 (7.9)	214 (8.6)	64 (9.7)	371 (7.2)	28 (5.8)	158 (8.8)
Average ALC length of stay 1 year prior to index for all hospitalized, mean ± SD	1.8 ± 7.3	2.1 ± 6.9	2.82 ± 7.46	1.5 ± 7.2	1.0 ± 4.8	2.2 ± 8.4
Average ALC length of stay 1 year prior to index for only those with ALC days, mean ± SD	11.3 ± 15.2	10.3 ± 12.4	11.6 ± 11.3	11.4 ± 16.9	9.7 ± 12.4	12.7 ± 16.4

continued on next page...

EXHIBIT 5.2 CONTINUED...

	Discharge Location					
	TOTAL	REHABILITATION/ COMPLEX CONTINUING CARE	LONG-TERM CARE	COMMUNITY WITH HOME CARE	COMMUNITY WITHOUT HOME CARE	DIED IN HOSPITAL
<b>PHYSICIAN VISITS, n (%)</b>						
Any days with primary care visits	10,510 (98.7)	2,447 (98.4)	647 (98.3)	5,075 (99.1)	479 (99.4)	1,763 (98.3)
Days with primary care visits, mean ± SD	19.0 ± 16.1	17.8 ± 16.1	17.1 ± 15.5	19.8 ± 15.8	19.1 ± 16.6	18.7 ± 16.6
Scheduled ED visits, mean ± SD	1.8 ± 2.3	1.7 ± 1.9	1.5 ± 1.4	2.0 ± 2.7	1.8 ± 2.7	1.5 ± 1.1
Any days with specialist visits	10,167 (95.5)	2,357 (94.7)	617 (93.8)	4,959 (96.8)	467 (96.9)	1,672 (93.3)
Days with specialist visits, mean ± SD	17.6 ± 18.8	15.9 ± 17.4	12.4 ± 15.9	19.0 ± 19.1	19.8 ± 21.6	17.2 ± 19.4
Any days with home visits	571 (5.4)	143 (5.7)	56 (8.5)	221 (4.3)	15 (3.1)	133 (7.4)
Days with home visits, mean ± SD	3.9 ± 8.7	3.9 ± 8.8	4.0 ± 5.1	3.6 ± 6.4	2.9 ± 3.2	4.4 ± 12.9
<b>HOME CARE SERVICE VISITS, n (%)</b>						
Any visits	10,644 (100.0)	2,488 (100.0)	658 (100.0)	5,122 (100.0)	482 (100.0)	1,793 (100.0)
Average monthly visits, mean ± SD	12.3 ± 12.3	12.6 ± 12.7	14.8 ± 14.3	11.9 ± 11.8	7.2 ± 7.4	13.5 ± 12.7
Any nursing visits	5,715 (53.7)	1,134 (45.6)	285 (43.3)	2,976 (58.1)	295 (61.2)	974 (54.3)
Average monthly nursing visits, mean ± SD	6.9 ± 6.7	7.5 ± 7.8	6.6 ± 5.5	6.8 ± 6.7	5.7 ± 5.2	6.6 ± 6.0
Any occupational therapy visits	3,467 (32.6)	838 (33.7)	245 (37.2)	1,552 (30.3)	147 (30.5)	645 (36.0)
Any personal service/homemaking visits	7,965 (74.8)	1,945 (78.2)	583 (88.6)	3,721 (72.6)	211 (43.8)	1,426 (79.5)
Average monthly personal service/ homemaking visits, mean ± SD	12.1 ± 12.0	12.2 ± 12.4	14.3 ± 14.0	11.5 ± 11.5	8.5 ± 8.5	13.0 ± 12.5

continued on next page...



EXHIBIT 5.2 CONTINUED...

	Discharge Location					
	TOTAL	REHABILITATION/ COMPLEX CONTINUING CARE	LONG-TERM CARE	COMMUNITY WITH HOME CARE	COMMUNITY WITHOUT HOME CARE	DIED IN HOSPITAL
<b>PRESCRIBED DRUG THERAPY, n (%)</b>						
Number of distinct drugs prescribed, mean ± SD	14.4 ± 6.8	13.3 ± 6.6	12.2 ± 6.5	15.4 ± 6.8	14.3 ± 6.7	13.8 ± 6.6
Cholinesterase inhibitor use	996 (9.4)	255 (10.2)	124 (18.8)	354 (6.9)	19 (3.9)	236 (13.2)
<b>LONG-TERM CARE USE, n (%)</b>						
Any long-term care applications	1,231 (11.6)	292 (11.7)	234 (35.6)	382 (7.5)	31 (6.4)	281 (15.7)
Any long-term care placements	22 (0.2)	7 (0.3)	3 (0.5)	7 (0.1)	1 (0.2)	4 (0.2)

SD = Standard Deviation

ALC = Alternate Level of Care

**EXHIBIT 5.3 Health service use by medically complex home care clients aged 66 and older in Ontario in the year following April 1, 2007–March 31, 2008 (baseline), by discharge location**

	Discharge Location				
	TOTAL	REHABILITATION/ COMPLEX CONTINUING CARE	LONG-TERM CARE	COMMUNITY WITH HOME CARE	COMMUNITY WITH NO HOME CARE
Medically complex home care clients, N	8,851	2,488	658	5,122	482
<b>ACUTE CARE HOSPITAL USE, n (%)</b>					
<b>Emergency Department Visits</b>					
Any visits	6,098 (68.9)	1,355 (54.5)	375 (57.0)	3,956 (77.2)	344 (71.4)
Any low-acuity visits	1,015 (11.5)	179 (7.2)	17 (2.6)	743 (14.5)	65 (13.5)
Any visits for potentially preventable conditions	2,897 (32.7)	528 (21.2)	165 (25.1)	2,030 (39.6)	154 (32.0)
Any visits for fall-related injuries	985 (11.1)	273 (11.0)	72 (10.9)	576 (11.2)	55 (11.4)
<b>Acute Care Hospital Admissions</b>					
Any acute care admissions	5,003 (56.5)	1,178 (47.3)	270 (41.0)	3,249 (63.4)	254 (52.7)
Number of acute admissions, mean ± SD	1.9 ± 1.3	1.6 ± 1.0	1.5 ± 0.9	2.0 ± 1.4	2.12 ± 1.59
Average acute care length of stay, mean ± SD	26.8 ± 33.8	28.0 ± 38.3	12.0 ± 17.5	27.6 ± 33.4	25.8 ± 28.3
Any ALC days	1,483 (16.8)	451 (18.1)	18 (2.7)	940 (18.4)	57 (11.8)
Average ALC length of stay for all hospitalized, mean ± SD	7.8 ± 23.6	11.5 ± 31.8	1.4 ± 12.3	7.2 ± 21.0	5.7 ± 15.4
Average ALC length of stay for only those with ALC days, mean ± SD	26.4 ± 37.2	30.0 ± 45.7	20.5 ± 44.4	24.8 ± 33.1	25.2 ± 23.8

continued on next page...

EXHIBIT 5.3 CONTINUED...

	Discharge Location				
	TOTAL	REHABILITATION/ COMPLEX CONTINUING CARE	LONG-TERM CARE	COMMUNITY WITH HOME CARE	COMMUNITY WITH NO HOME CARE
<b>PHYSICIAN CARE VISITS, n (%)</b>					
Any days with primary care visits	8,703 (98.3)	2,454 (98.6)	643 (97.7)	5,040 (98.4)	468 (97.1)
Days with primary care visits, mean ± SD	26.1 ± 23.7	33.4 ± 27.7	17.5 ± 13.2	23.6 ± 21.5	24.4 ± 21.0
Scheduled ED visits, mean ± SD	1.7 ± 2.3	1.4 ± 0.9	1.5 ± 0.7	1.8 ± 2.7	1.5 ± 1.2
Any specialist visits	8,382 (94.7)	2,333 (93.8)	582 (88.4)	4,918 (96.0)	458 (95.0)
Days with specialist visits, mean ± SD	20.2 ± 22.4	22.0 ± 24.2	8.7 ± 10.5	20.6 ± 22.2	21.4 ± 21.1
Any home visits	448 (5.1)	105 (4.2)	19 (2.9)	305 (6.0)	16 (3.3)
Days with home visits, mean ± SD	2.8 ± 4.3	3.0 ± 3.9	1.5 ± 0.9	2.9 ± 4.6	2.4 ± 3.2
<b>HOME CARE SERVICE VISITS, n (%)</b>					
Any home care visits	7,163 (80.9)	1,599 (64.3)	201 (30.5)	5,060 (98.8)	236 (49.0)
Average monthly home care visits, mean ± SD	14.8 ± 14.4	15.0 ± 15.1	3.5 ± 7.4	15.5 ± 14.3	9.5 ± 11.1
Any nursing visits	4,533 (51.2)	777 (31.2)	48 (7.3)	3,529 (68.9)	139 (28.8)
Average monthly nursing visits, mean ± SD	7.0 ± 6.6	7.1 ± 6.1	3.2 ± 3.4	7.1 ± 6.8	5.4 ± 4.2
Any personal service/homemaking visits	5,501 (62.2)	1,226 (49.3)	29 (4.4)	4,050 (79.1)	139 (28.8)
Average monthly personal service/ homemaking visits, mean ± SD	14.2 ± 13.3	15.4 ± 14.2	12.3 ± 15.2	13.9 ± 12.9	10.9 ± 12.8
<b>PRESCRIBED DRUG THERAPY, n (%)</b>					
Number of distinct drugs prescribed, mean ± SD	15.3 ± 7.1	15.1 ± 6.7	15.6 ± 6.4	15.5 ± 7.3	14.7 ± 7.1
Cholinesterase inhibitor use	899 (10.2)	299 (12.0)	150 (22.8)	410 (8.0)	32 (6.6)
<b>LONG-TERM CARE USE, n (%)</b>					
Any long-term care applications	1,749 (19.8)	697 (28.0)	17 (2.6)	940 (18.4)	70 (14.5)
Any long-term care placements	1,750 (19.8)	599 (24.1)	658 (100.0)	431 (8.4)	39 (8.1)

SD = Standard Deviation

ALC = Alternate Level of Care

### Community-Based Care

The number of health care providers that this population interacted with highlights the importance of implementing practice changes to improve care transitions and to help individuals navigate through a complex health care system. In total, 95.5% of the population had visited a specialist physician in the year prior to acute care. The average number of days spent visiting specialists was 17.6, while an average of 19.0 days was spent visiting primary care physicians. This volume of health care use indicates that most individuals in this population experienced substantive medical issues ([Exhibit 5.2](#)). The intensity of visits in the year after discharge increased slightly, averaging 20.2 days on visits to specialists and 26.1 days on visits to primary care physicians. There was a slight increase in the average number of visits from home care services, rising from 12.3 visits to 14.8 visits per month following hospitalization. Among patients discharged to the community who did not receive home care within two weeks of discharge, 49.0% began using home care in the subsequent months. Interestingly, the use of home care nursing did not change following hospitalization. Overall, 51.2% of our population had visits from home care nurses with an average of 7.0 visits per month among users. With more than 45 days in the year

spent visiting doctors and 15 visits per month from home care providers, it is important to consider the organization, information flow and patient-centredness of the health care system ([Exhibit 5.3](#)).

### Long-Term Care Placement

Only 35.6% of individuals who were discharged to LTC had an application for LTC placement in the year prior to their hospitalization, suggesting that the acute event precipitated LTC admission for the majority of these transitions ([Exhibit 5.2](#)). Of individuals discharged to home with home care, 8.4% were admitted to LTC within one year. The latter population represents one potential group that might benefit from the best possible coordination of community-based services to prevent LTC admission. Targeting high-risk individuals with such interventions is an important first step to enabling older adults to age in place.

### Targeting Interventions by Identifying Those at High Risk

Ontario has many examples of interventions that appear to be successful in reducing acute hospital readmissions and LTC admission. These include Home at Last, Home First, the Balance of Care, the Virtual Ward, and the System of Care for Seniors with Increased Risks. Community Care Access Centres

across Ontario are increasingly aligning their service levels and case-management to target 'high-risk seniors.' In order to ensure that effective interventions are provided across the population, we will require an accurate prognostic tool to tell us who is most likely to require institutional care (those at high risk) and to target interventions to these individuals. There is considerable variation on how to define 'high risk.' Many risk assessment tools are available, and health care decision-makers are selecting from among them, potentially without considering their original purpose and scope. We explored risk-assessment tools currently in use in Ontario to determine the usefulness of these tools in targeting interventions towards older high-needs individuals, with the goal of reducing hospital readmissions and LTC admissions.

In our final analysis, we evaluated three risk assessment scales across two outcomes that are important to policy makers and providers. The risk assessment scales evaluated were the LACE tool developed for predicting acute hospitalization, the MAPLe score developed to predict LTC admission, and the RAI Aggregate Risk Score used by several Ontario CCACs to target intensive case management and high home care service levels. The outcomes were acute care readmission (within 30 and

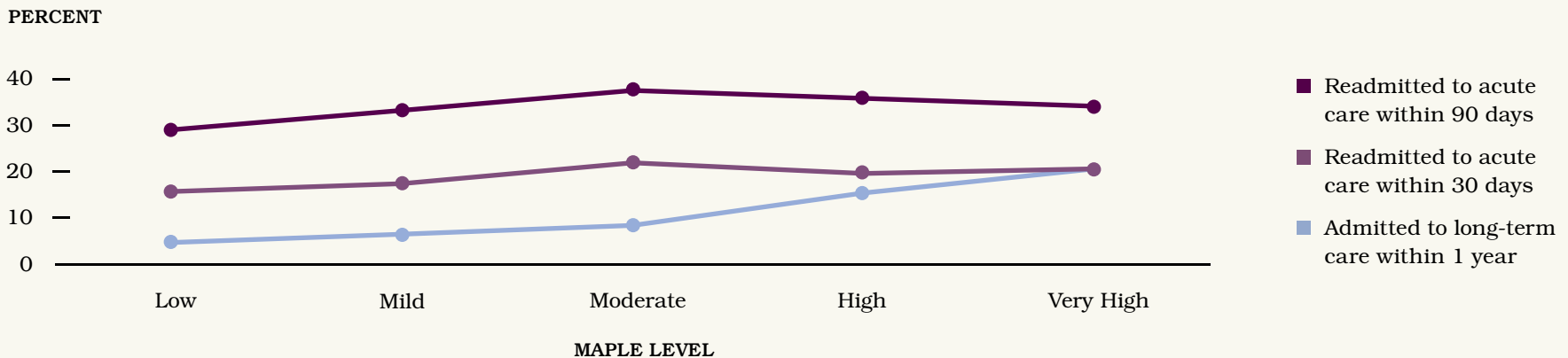
90 days), and LTC placement in one year following discharge.

[Exhibits 5.4a](#), [5.4b](#) and [5.4c](#) show the hospital readmission rates and LTC admission rates for individuals in our study population who were discharged from acute care to home care. These graphs exclude the 1,452 individuals who did not have a RAI assessment. The results clearly show that the LACE tool is most

discriminating for acute care readmissions, with 30-day readmission rates increasing from 9.6% to 27.8%, and 90-day readmission rates increasing from 17.6% to 46.8% from the lowest to highest levels on the LACE score. Thirty-day readmission rates varied between 17.2% and 22.8% across RAI Aggregate Risk Scores and between 15.7% and 20.6% across MAPLe levels, but not in any systematic pattern and without the clear discriminative

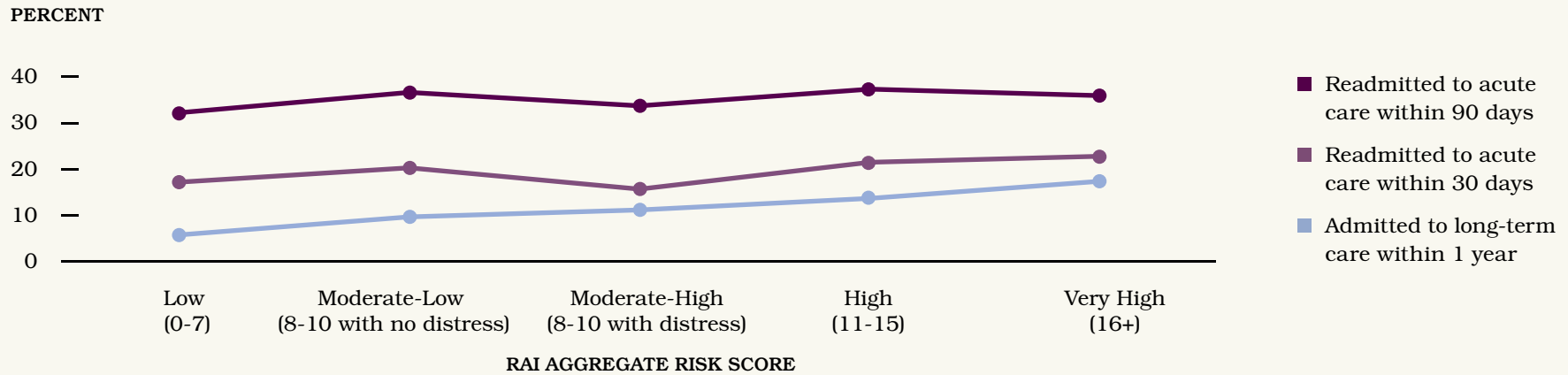
differentiation of the LACE score. The MAPLe level provided the greatest discrimination across groups for risk of LTC admission. The RAI Aggregate Risk Scores were less but still somewhat discriminating. LACE scores between 5 and 18 did not provide a strong prediction of LTC admission.

**EXHIBIT 5.4a Hospital readmission and long-term care admission rates for medically complex home care clients aged 66 and older in Ontario, by MAPLe level, 2007/08–2008/09**



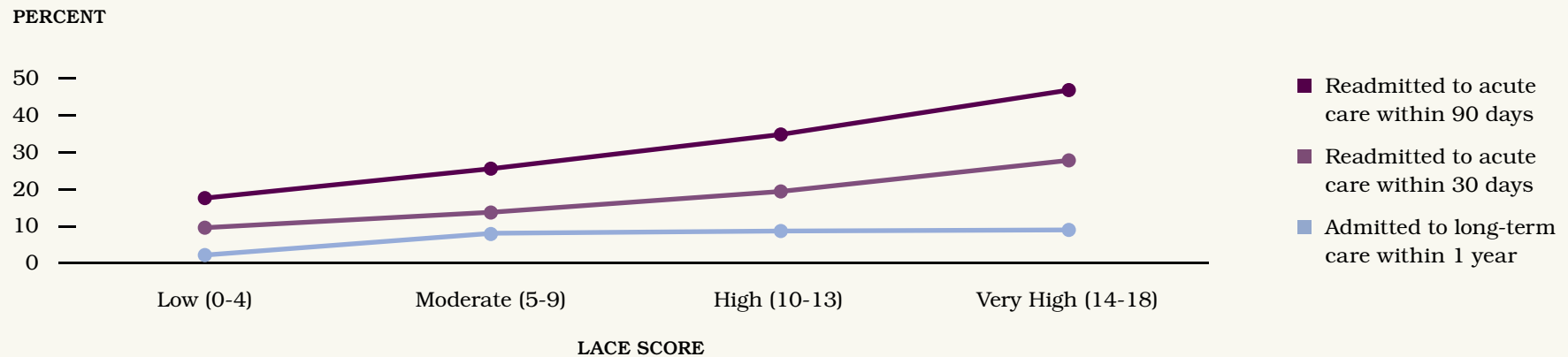
MAPLe = Method for Assigning Priority Levels

**EXHIBIT 5.4b Hospital readmission and long-term care admission rates for medically complex home care clients aged 66 and older in Ontario, by RAI Aggregate Risk Score, 2007/08–2008/09**



RAI = Resident Assessment Instrument

**EXHIBIT 5.4c Hospital readmission and long-term care admission rates for medically complex home care clients aged 66 and older in Ontario, by LACE score, 2007/08–2008/09**



LACE = Length of stay, Acuity of admission, patient Comorbidity, number of Emergency department visits

### Joint Distribution of Medically Complex Population Across Risk Scores

Exhibit 5.5 illustrates the number and proportion of individuals jointly distributed across the LACE and MAPLe score categories. In order to obtain a MAPLe score, individuals must have been administered a RAI assessment in the year prior to baseline. Individuals who scored high on the LACE scale were not necessarily the same individuals who scored high on the MAPLe. Among individuals with RAI assessments, results are shown for the full population discharged to any destination and the sub-population discharged to community with home care. Across Ontario, an average of 18.9% of the cohort were categorized as low risk in both MAPLe and LACE, 28.1% were at high risk in both scores, 45.7% were at low risk for LTC admission but high risk for acute care admission, and 7.4% were at low risk for acute care and high risk for LTC admission.

**EXHIBIT 5.5 MAPLe and LACE risk scores for medically complex home care clients aged 66 and older in Ontario, by discharge outcome, 2007/08–2008/09**

	ALL DISCHARGED ALIVE	DISCHARGED TO COMMUNITY WITH HOME CARE
Medically complex home care clients, N	6,577	3,670
<b>RISK SCORE, n (%)</b>		
MAPLe Low <sup>1</sup>		
LACE Low <sup>3</sup>	1,241 (18.9)	870 (23.7)
LACE High <sup>4</sup>	3,004 (45.7)	1,749 (47.7)
MAPLe High <sup>2</sup>		
LACE Low	485 (7.4)	301 (8.2)
LACE High	1,847 (28.1)	750 (20.4)

<sup>1</sup> MAPLe Low = levels of Low, Mild or Moderate

<sup>2</sup> MAPLe High = levels of High or Very High

<sup>3</sup> LACE Low = scores <10

<sup>4</sup> LACE High = scores 10+

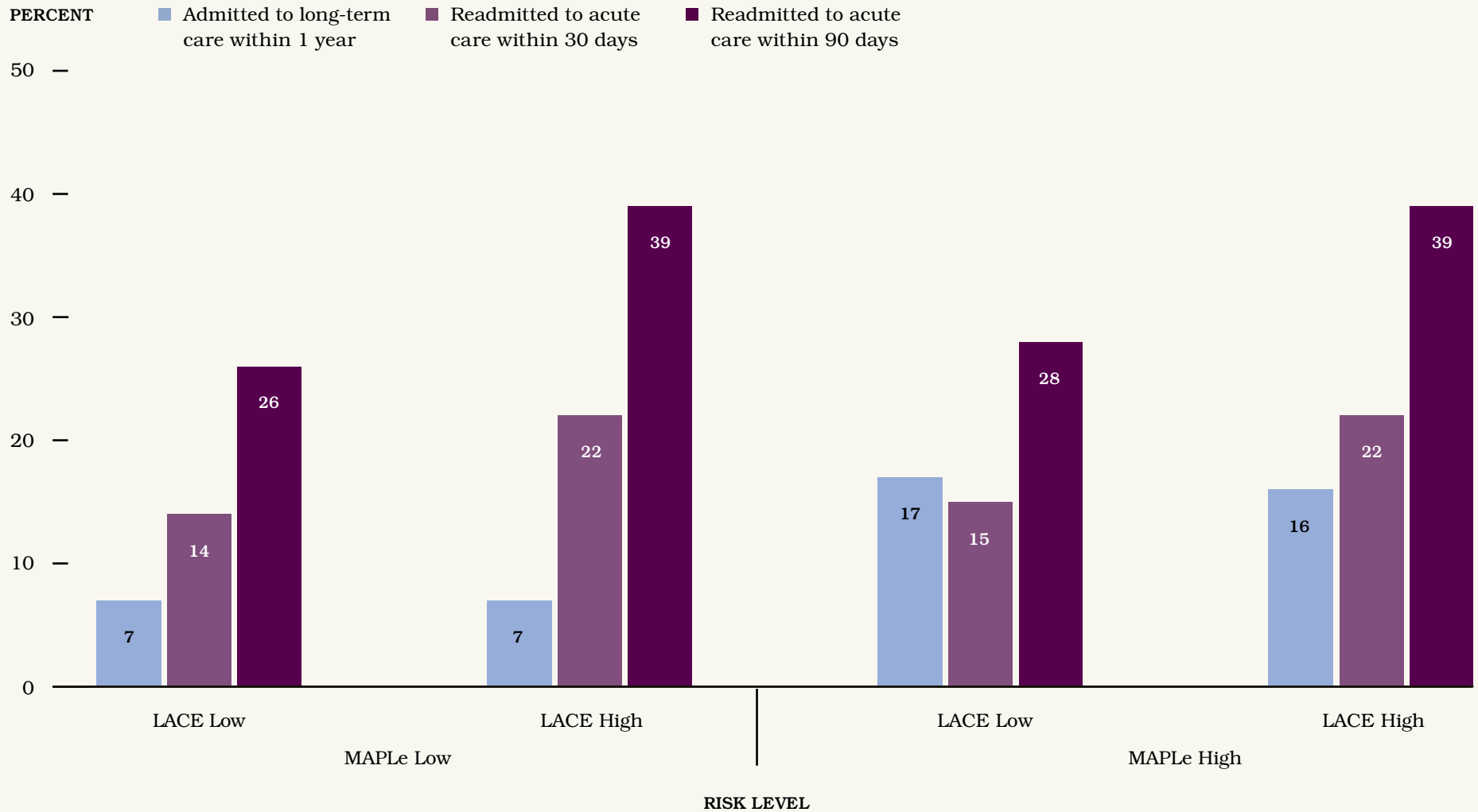
LACE = Length of stay, Acuity of admission, patient Comorbidity, number of Emergency department visits

MAPLe = Method for Assigning Priority Levels

[Exhibit 5.6](#) displays the pattern of outcomes for individuals discharged to the community with home care according to the joint distribution of high and low risk using the LACE and MAPLe levels. Consistent with results shown in [Exhibit 5.5](#), individuals with higher MAPLe levels were more likely to be admitted to LTC. However, among this population, there were no differences in LTC admission rates across LACE scores. In the group discharged to home with home care, the LACE score discriminated among those at risk for readmission to acute care and the MAPLe score provided no additional predictive information for acute readmissions.



**EXHIBIT 5.6 Distribution of hospital readmission and long-term care admission rates for medically complex older adults discharged to the community with home care in Ontario, by LACE and MAPLe risk scores, 2007/08–2008/09**



LACE = Length of stay, Acuity of admission, patient Comorbidity, number of Emergency department visits

MAPLe = Method for Assigning Priority Levels

## CONCLUSION

The results included in this chapter highlight the importance of using the right tools for the job. Specific risk assessment tools are needed to reduce specific adverse outcomes. Although our results show relatively high rates of acute and LTC admission following an acute hospitalization, the majority of individuals were maintained in the community without additional interventions. Using risk tools to assist in identifying individuals who would most likely benefit from new resource-intensive interventions is important to ensure value for additional or re-directed resources. The performance of the risk prediction tools described in this chapter illustrates the importance of using the right tool to address different program goals (i.e., preventing avoidable hospitalization and delaying or preventing LTC admission).

Interventions aimed at delaying or preventing LTC admission include community support services, transportation services, nursing care and respite care for individuals and their caregivers. Interventions aimed at preventing

acute hospital readmissions include early follow-up in the community from primary and home care, medication reconciliation (as many medications change following an acute care episode) and, for some older adults, intensive case management. Just as the needs and treatments (interventions) differ between the desired (avoided) outcome, so too do the most appropriate risk assessment scales. Some individuals will be at risk for both acute care readmission and LTC admission, and should receive an integrated and coordinated package of care services.

The results of this chapter show that interventions that aim to reduce LTC admissions should target individuals using the MAPLe (or the slightly less discriminating RAI Aggregate Risk Score), and interventions aimed at reducing acute readmissions should target individuals using the LACE score. All of these scales are easily available at the time of an older adult's discharge from acute care. We suggest that acute care discharge is the point where these interventions could be most effectively and appropriately implemented.

---

*“Using risk tools to assist in identifying individuals who would most likely benefit from new resource-intensive interventions is important to ensure value for additional or re-directed resources.”*

## REFERENCES

- 1 Nie JX, Wang L, Tracy CS, Moineddin R, Upshur RE. Health care service utilization among the elderly: findings from the Study to Understand the Chronic Condition Experience of the Elderly and the Disabled (SUCCEED project). *J Eval Clin Pract* 2008; 14(6):1044-9.
- 2 Broemeling AM, Watson DE, Prebtani F. Population patterns of chronic health conditions, co-morbidity and healthcare use in Canada: implications for policy and practice. *Healthc Q* 2008; 11(3):70-6.
- 3 Coleman EA, Parry C, Chalmers S, Min SJ. The care transitions intervention: results of a randomized controlled trial. *Arch Intern Med* 2006; 166(17):1822-8.
- 4 Naylor MD, Brooten DA, Campbell RL, Maislin G, McCauley KM, Schwartz JS. Transitional care of older adults hospitalized with heart failure: a randomized, controlled trial. *J Am Geriatr Soc* 2004; 52(5):675-84.
- 5 Coleman EA, Min SJ, Chomiak A, Kramer AM. Posthospital care transitions: patterns, complications, and risk identification. *Health Serv Res* 2004; 39(5):1449-65.
- 6 Nutting PA, Crabtree BF, Miller WL, Stange KC, Stewart E, Jaén C. Transforming physician practices to patient-centered medical homes: lessons from the national demonstration project. *Health Affairs* 2011; 30(3):439-45.
- 7 van Walraven C, Dhalla IA, Bell C, Etchells E, et al. Derivation and validation of an index to predict early death or unplanned readmission after discharge from hospital to the community. *CMAJ* 2010; 182(6):551-7.
- 8 Hirdes JP, Poss JW, Curtin-Telegdi N. The Method for Assigning Priority Levels (MAPLe): a new decision-support system for allocating home care resources. *BMC Med* 2008; 6:9.

# Older Adults Newly Placed in Long-Term Care

*An examination of service use and functional status during the wait*

**Lead Author**  
**Susan E. Bronskill**

**Contributors**  
**Andrea Gruneir**  
**Minnie M. Ho**  
**Ximena Camacho**

## INTRODUCTION

While the approximately 70,000 older adults who currently reside in Ontario's long-term care (LTC) homes account for a very small proportion of the total population of older adults, they are a particularly frail group with high care needs and frequent health system use.<sup>1,2</sup> These conditions are reflected in the regulations that govern LTC homes in the province; these regulations specify that such homes are designated for people who require the availability of 24-hour nursing care and supervision within a secure environment. The provincial government sets standards for care, inspects the homes annually and sets the rules governing eligibility for admission through a centralized process that is managed through regional waiting lists. The supply of LTC beds in Ontario is limited and, as such, is rationed through these waiting lists. Recent reports have highlighted significant regional variation in wait times for LTC placement across the province,<sup>3,4</sup> which raises questions about equity in access. A delicate balance is created when vulnerable older adults apply, are deemed eligible and must wait for placement in LTC at a time when their cognitive and/or functional status is failing. The time spent waiting for a LTC bed in Ontario can be a difficult period for older adults, and an increased burden on family members and caregivers is

common.<sup>5</sup> Therefore, we chose to examine a cohort of older adults newly placed in LTC, in the time period immediately preceding placement, in order to examine patterns in levels of need and health system use at this critical juncture.

The time older adults spend waiting for LTC placement has increased steadily in recent years,<sup>3</sup> and the location where the wait occurs has important implications for the effectiveness and efficiency of the entire health system. The transition of individuals to LTC is an important point of intersection with other parts of the health care system and other health care providers. With adequate home care and support, many older adults can remain in their homes for long periods of time.<sup>6</sup> One particularly complex issue is older adults who occupy hospital beds but no longer require acute hospital services. Often attributed to their continued care needs or to a lack of adequate community supports, these alternate level of care (ALC) patients occupy 17% of Ontario's acute care beds and account for 61% of the total number of ALC days in Ontario.<sup>7</sup> Prolonged hospitalization due to a delayed transfer from acute care to a LTC home has been associated with an increased incidence of adverse outcomes.<sup>8</sup> From a system perspective, the prolonged hospitalization of ALC patients can exacerbate

hospital emergency department wait times and can escalate other health system costs.<sup>9</sup> Adequate support is required to help individuals make the transition to LTC, with acute care used only as needed.<sup>10</sup> Therefore, we chose to examine how much contact individuals newly placed in LTC have with the broader health system in the period of time preceding placement in order to determine the common points of system contact where interventions to expand support might be possible.

This chapter considers the characteristics of individuals newly placed in LTC with the goal of examining levels of need in the period of time between application and placement, and describes transitions across and the use of different health services in the time before placement.

## METHODS

### Population Definition

The focus of this chapter is older adults who were newly placed in long-term care. In particular, we are interested in examining health system use in the time period immediately preceding placement and the association between levels of clinical and functional need and waiting time to placement. We chose this interval as a focus because the time spent

waiting for a LTC bed can be a difficult period for frail older adults and their caregivers. From a system perspective, it is useful to describe clearly when, and how frequently, individuals make contact with health care providers in order to identify common points of contact during the transition to LTC.

To create the cohort, we identified all adults in Ontario who were 66 years of age or older and who were newly placed in LTC (either interim or permanent placement) between April 1, 2007, and March 31, 2008. We chose to restrict inclusion to those aged 66 or older because of our interest in the needs of older adults and because several of our measures of health services use require looking in the year before baseline; this age restriction ensures that all measures capture use among those at least 65 years of age. We excluded older adults who transferred between LTC homes because these individuals were already in the LTC system, and we were interested in characterizing older adults newly entering this setting. One further distinction to note is that our starting point was placed individuals rather than individuals who opened an application for long-term care; therefore, the cohort excludes individuals who died while on the waiting list.

An important aspect of the time spent waiting for LTC placement is the setting in which the wait occurs. There are resource implications for the health system when individuals are waiting in hospital but no longer require acute care; there are also human resource and informal care implications when individuals are being care for in the community. The data presented in this chapter are stratified by an individual's location immediately preceding admission to LTC: the inpatient setting (acute care, chronic care, rehabilitation or psychiatric hospital) or the community. Where important differences existed in the characteristics of older adults placed from acute care as opposed to other inpatient settings, they are described. However, the majority of our findings report institutional setting as a single category.

### Measures

In addition to documenting the demographic, health services, and broad health status measures presented (see [Chapter 2](#)), we were interested in examining the length of time older adults spent waiting for LTC. We present additional statistics that quantify the distribution of wait times according to patient demographic and functional characteristics.

## RESULTS

### Characterizing Older Adults Newly Placed in Long-Term Care

We identified 19,256 older adults newly placed in LTC: 45.9% were placed from inpatient settings and 54.1% were placed directly from the community. In [Exhibit 6.1](#), we present key demographic and broad health status measures for these individuals along with some specific measures that were only for those who had undergone a RAI-HC assessment. [Exhibits 6.2-6.4](#) are complementary to these findings and highlight important differences in more detail.

**EXHIBIT 6.1 Demographic and broad health status measures of Ontario adults aged 66 and older newly placed in long-term care, by location at placement, 2007/08**

	Location at Placement		
	TOTAL	INPATIENT	COMMUNITY
Older adults newly placed in long-term care, N	19,256	8,832	10,424
<b>PLACEMENT CHARACTERISTICS, n (%)</b>			
<b>CCAC placement priority category</b>			
Priority 1A	4,098 (21.3)	1,398 (15.8)	2,700 (25.9)
Priority 2	12,824 (66.6)	6,874 (77.8)	5,950 (57.1)
Priority 3	237 (1.2)	17 (0.2)	220 (2.1)
Other	2,097 (10.9)	543 (6.1)	1,554 (14.9)
<b>Placement type</b>			
Interim	11,085 (57.6)	5,939 (67.2)	5,146 (49.4)
Final	8,171 (42.4)	2,893 (32.8)	5,278 (50.6)
<b>DEMOGRAPHIC MEASURES, n (%)</b>			
<b>Low income level</b>	5,308 (27.6)	2,042 (23.1)	3,266 (31.3)
<b>Age group (years)</b>			
66–69	643 (3.3)	348 (3.9)	295 (2.8)
70–74	1,529 (7.9)	783 (8.9)	746 (7.2)
75–79	3,174 (16.5)	1,522 (17.2)	1,652 (15.8)
80–84	5,072 (26.3)	2,323 (26.3)	2,749 (26.4)
85–89	5,117 (26.6)	2,225 (25.2)	2,892 (27.7)
≥90	3,721 (19.3)	1,631 (18.5)	2,090 (20.0)
<b>Sex</b>			
Male	6,620 (34.4)	3,273 (37.1)	3,347 (32.1)
Female	12,636 (65.6)	5,559 (62.9)	7,077 (67.9)

continued on next page...

EXHIBIT 6.1 CONTINUED...

	Location at Placement		
	TOTAL	INPATIENT	COMMUNITY
<b>HEALTH STATUS MEASURES, n (%)</b>			
Number of ADG comorbidity categories			
0–5	2,250 (11.7)	451 (5.1)	1,799 (17.3)
6–9	5,533 (28.7)	2,116 (24.0)	3,417 (32.8)
≥10	11,473 (59.6)	6,265 (70.9)	5,208 (50.0)
≥1 Diagnoses associated with frailty	8,976 (46.6)	5,126 (58.0)	3,850 (36.9)
≥2 Coexisting chronic conditions	17,878 (92.8)	8,452 (95.7)	9,426 (90.4)
<b>RAI-HC ASSESSMENTS, n (%)</b>			
Assessed in year prior to baseline*	18,558 (96.4)	8,513 (96.4)	10,045 (96.4)
<b>Living Status</b>			
Reported living alone	3,299 (35.9)	2,060 (39.4)	1,239 (31.2)
Reported a primary caregiver relationship			
Child/child-in-law	11,061 (59.6)	4,881 (57.3)	6,180 (61.5)
Spouse	4,194 (22.6)	1,960 (23.0)	2,234 (22.2)
Other relative	2,063 (11.1)	1,015 (11.9)	1,048 (10.4)
Friend/neighbour	999 (5.4)	513 (6.0)	486 (4.8)
Not reported	241 (1.3)	144 (1.7)	97 (1.0)
Reported co-residing with primary caregiver	7,507 (40.5)	3,266 (38.4)	4,241 (42.2)
Reported caregiver experiencing distress	5,875 (31.7)	2,634 (30.9)	3,241 (32.3)

\*All proportions calculated on only those who received a RAI-HC assessment.

continued on next page...

EXHIBIT 6.1 CONTINUED...

	Location at Placement		
	TOTAL	INPATIENT	COMMUNITY
<b>Functional Status</b>			
MAPLe level			
Low/mild/moderate	4,906 (26.4)	2,269 (26.7)	2,637 (26.3)
High	7,712 (41.6)	3,538 (41.6)	4,174 (41.6)
Very high	5,940 (32.0)	2,706 (31.8)	3,234 (32.2)
ADL Hierarchy Scale			
0	4,855 (26.2)	1,048 (12.3)	3,807 (37.9)
1+	13,703 (73.8)	7,465 (87.7)	6,238 (62.1)
CHES Scale			
0-1	8,023 (43.2)	2,929 (34.4)	5,094 (50.7)
2+	10,535 (56.8)	5,584 (65.6)	4,951 (49.3)
Cognitive Performance Scale			
0-2	7,999 (43.1)	3,688 (43.3)	4,311 (42.9)
3+	10,559 (56.9)	4,825 (56.7)	5,734 (57.1)
Depression Rating Scale			
0-2	14,922 (80.4)	6,981 (82.0)	7,941 (79.1)
3+	3,636 (19.6)	1,532 (18.0)	2,104 (20.9)
IADL Involvement Scale			
0-3	2,641 (14.2)	693 (8.1)	1,948 (19.4)
4+	15,917 (85.8)	7,820 (91.9)	8,097 (80.6)

CCAC = Community Care Access Centre

ADG = Aggregated Diagnosis Groups

RAI-HC = Resident Assessment Instrument—Home Care

MAPLe = Method for Assigning Priority Levels

ADL = Activities of Daily Living

CHES = Changes in Health, End-stage Disease, and Signs and Symptoms

IADL = Instrumental Activities of Daily Living



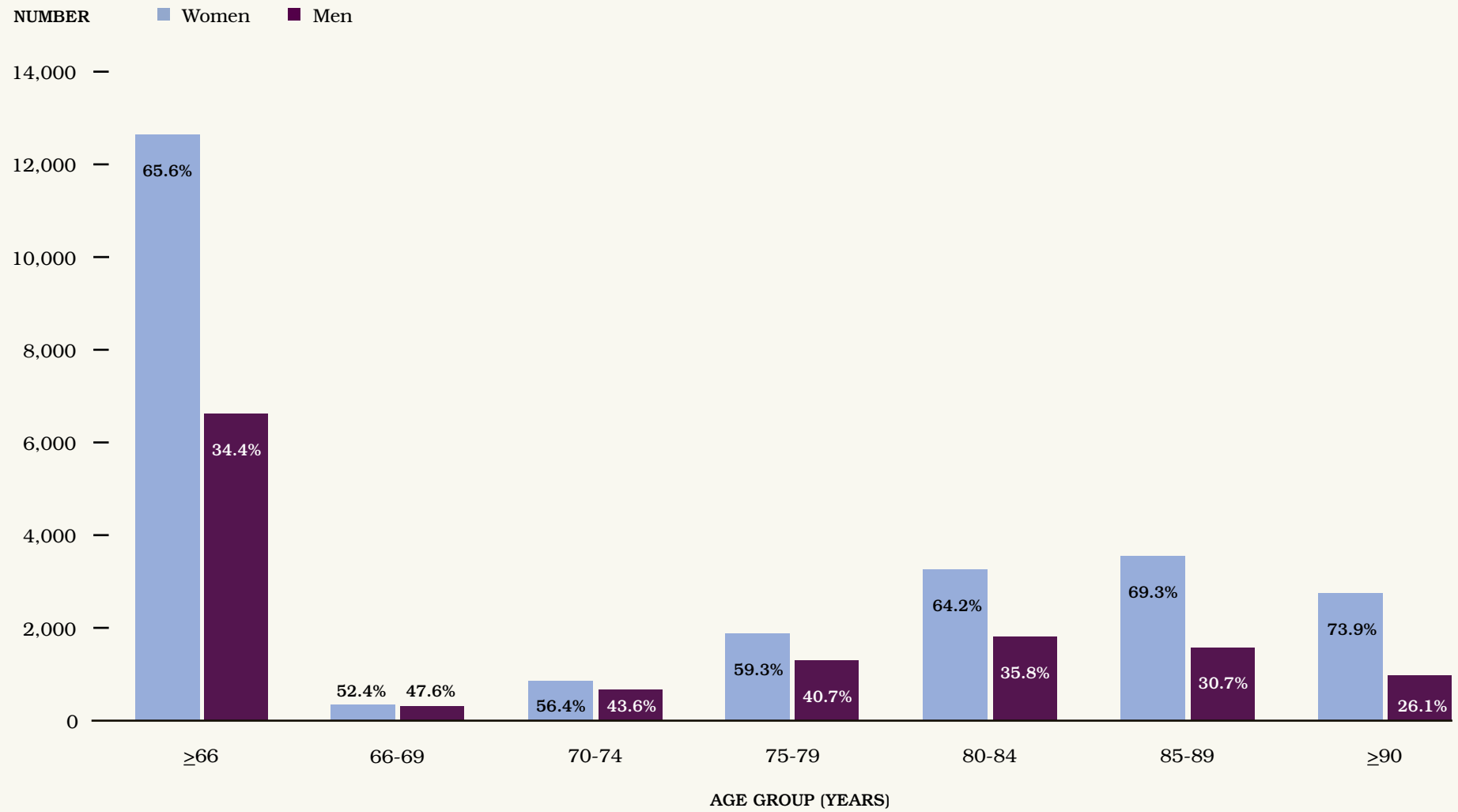
### Type of Placement

At application, individuals were classified according to the urgency for placement to long-term care. During the time period of this study, placement prioritization categories were defined by Community Care Access Centres as follows: category 1A denoted crisis applicants, category 2 denoted clients with identified need, and category 3 denoted clients with low or minimal need. For our work, we included individuals prioritized for placement in facilities operated by ethno-cultural/religious groups, as well as those waiting for spousal reunification in the category 'Other.' Older adults waiting to transfer between LTC homes were excluded from these analyses. These categories changed in July 2010 with the passing of updated legislation.<sup>11</sup> Overall, 21.3% of individuals were crisis applicants, and this percentage varied based on location at placement—15.8% of inpatient placements were in crisis, compared to 25.9% of those placed from the community. More individuals placed from the inpatient setting were interim placements (67.2%) compared to those placed from the community (49.4%).

### Demographic Measures

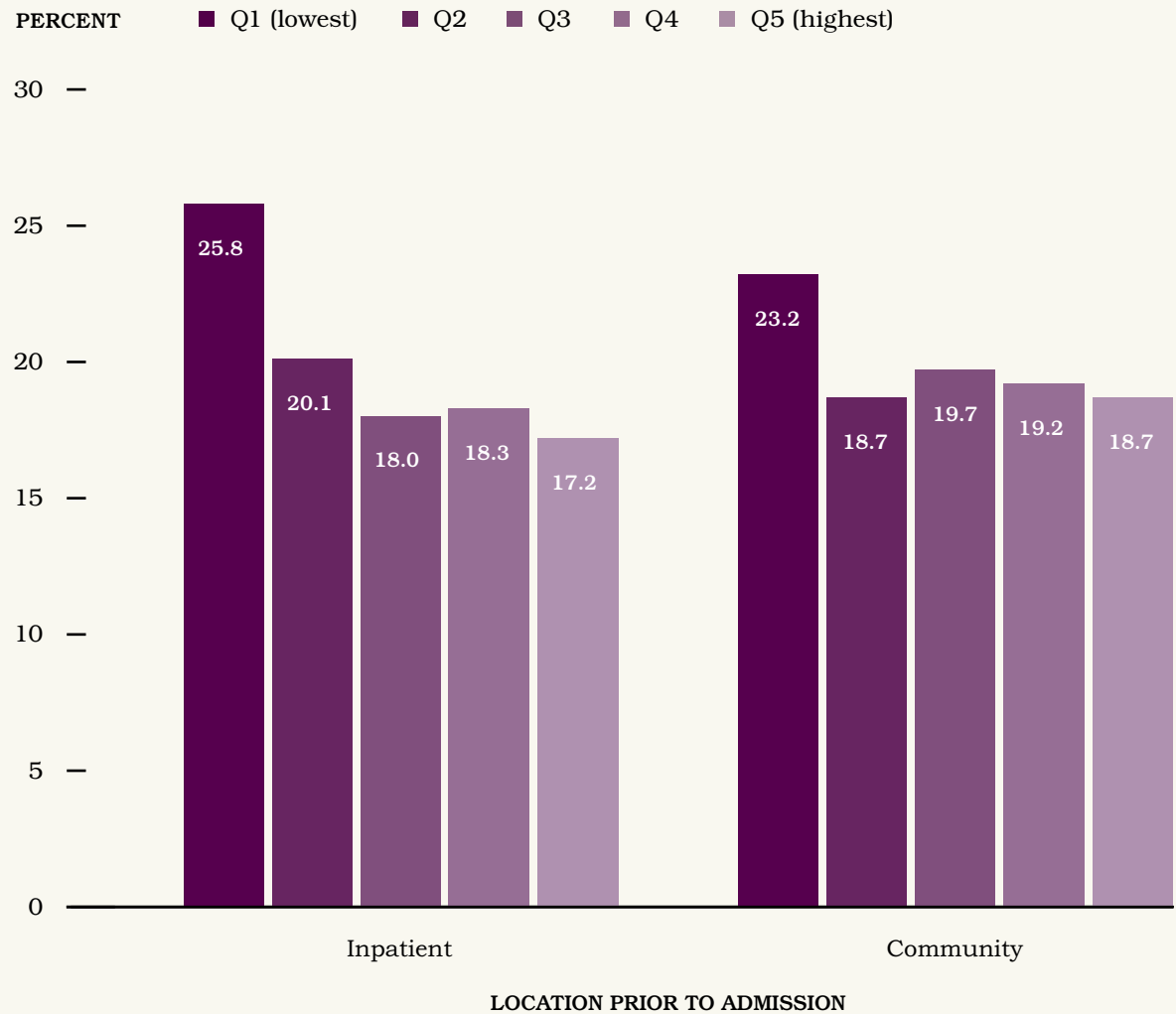
Seventy-two percent of the individuals placed in LTC were 80 years of age and older, and 19.3% were 90 years of age and older. This distribution was similar across admission locations. Overall, women accounted for 65.6% of LTC placements. [Exhibit 6.2](#) characterizes the joint distribution of age and sex for this population and illustrates the extent to which women accounted for an increasingly larger share of placements as individuals aged.

**EXHIBIT 6.2** Number and relative percent distribution of Ontario adults aged 66 and older newly placed in long-term care, by age group and sex, 2007/08



Overall, 27.6% of new placements to LTC were identified as eligible to pay reduced drug co-payments under the Ontario Drug Benefit plan due to their low income level. This percentage varied by location prior to placement; 31.3% of older adults placed from the community were considered low income by this definition, compared to 23.1% of those from inpatient facilities. Examination of census data reveals that individuals newly placed in LTC were slightly more likely to have resided in low-income neighbourhoods (24.4%) than would have been expected for the Ontario population as a whole (20.0% by definition) (see [Exhibit 6.3](#)). This pattern persisted across placement location; however, unlike access to other types of health care services, there was not a strong income gradient across the remaining four income quintiles. This finding likely reflects the significant levels of comorbidity and functional impairment among those eligible for LTC and reinforces the position that use of LTC services is not discretionary.

**EXHIBIT 6.3 Percentage of Ontario adults aged 66 and older newly placed in long-term care, by neighbourhood income quintile and location prior to admission, 2007/08**



### Health Measures (Broad)

In general, this population has a high burden of comorbid disease and frailty with 59.6% experiencing 10 or more Aggregated Diagnosis Group comorbidities, 46.6% exhibiting diagnoses associated with frailty, and 92.8% having two or more coexisting chronic conditions. Individuals placed from inpatient settings had more identified comorbidities than those from the community (however, this is likely due, in part, to information on diagnoses recorded during their inpatient admission).

### RAI-HC Assessments

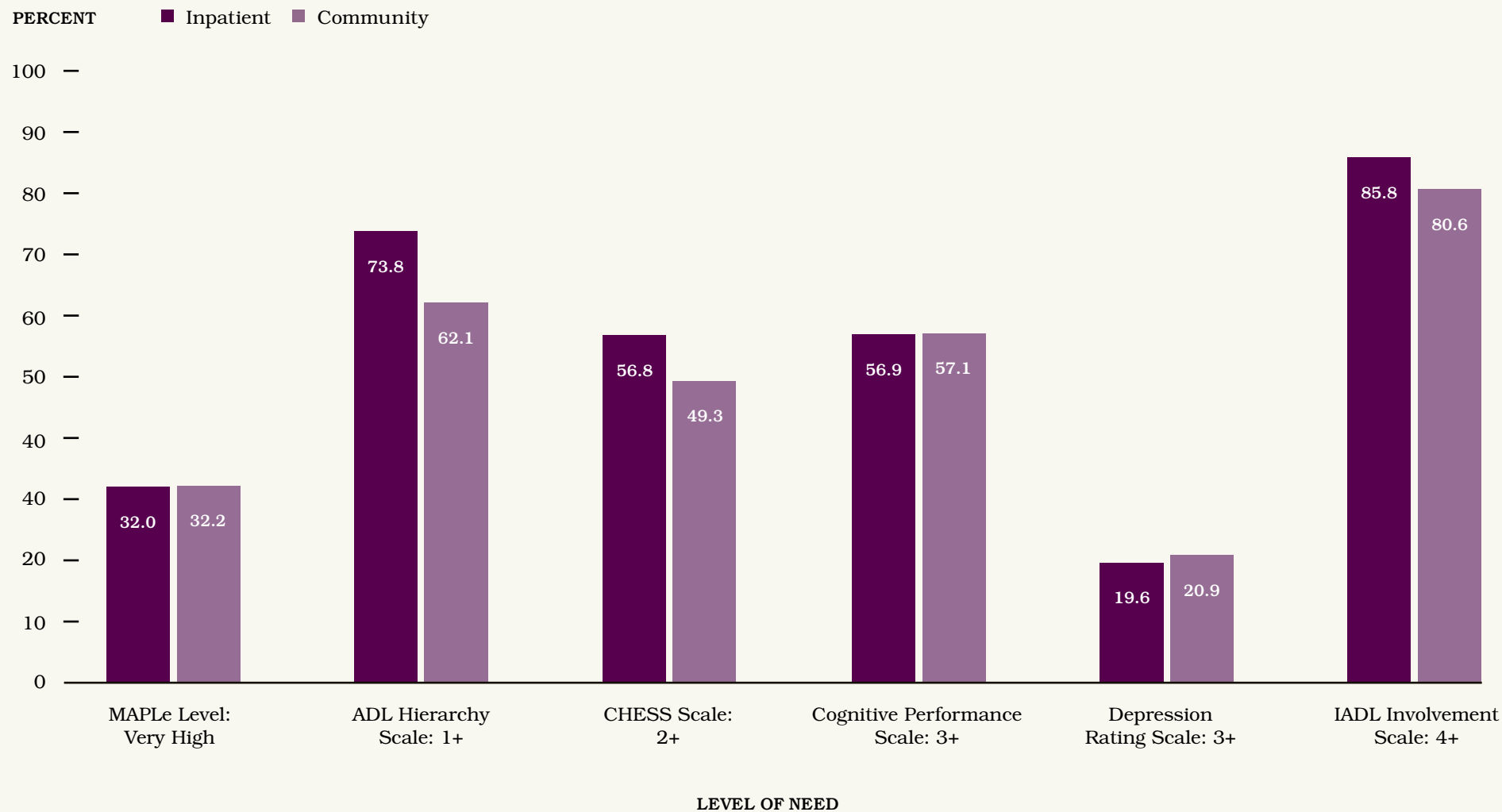
Over 96.4% of those placed in LTC had a RAI-HC assessment completed in the year prior to admission. For our cohort, the median time between the most recent assessment and placement was 38 days (interquartile range 14–88 days). Among those who had a completed

RAI-HC assessment, more detailed information was available about access to informal support, as well as functional status. In the following sub-sections, data is presented only on those members of the cohort who had a completed RAI-HC assessment.

**1 / Living status.** Less than half (35.9%) of older adults newly placed in LTC were living alone at the time of the RAI-HC assessment. Older adults admitted from inpatient settings (39.4%) were more likely to be living alone than those admitted from the community (31.2%). Forty percent of older adults co-resided with their primary caregiver. Primary caregivers were most often the children or children-in-law (59.6%) or spouses (22.6%). Approximately 32% of primary caregivers to individuals newly placed in LTC expressed feelings of distress, and this percentage did not differ across placement location.

**2 / Functional status.** In [Exhibit 6.4](#), we present information on various measures of functional status, assessed during the wait time, for older adults newly placed in LTC. In general, these individuals had a high level of need with 32.0% assessed with very high MAPLe levels, 73.8% requiring some level of assistance with activities of daily living (ADL), 56.8% at serious risk of decline (CHESS), 56.9% with cognitive performance problems (CPS), 19.6% with three or more symptoms of depression (DRS) and 85.8% having difficulty with instrumental activities of daily living (IADL). Older adults admitted from inpatient locations were more likely to experience problems with ADLs, risk of decline and IADLs than those placed from the community.

**EXHIBIT 6.4 Percentage of Ontario adults aged 66 and older newly placed in long-term care and exhibiting high levels of need, by location prior to admission and level of need, 2007/08**



MAPLe = Method for Assigning Priority Levels  
ADL = Activities of Daily Living

CHESS = Changes in Health, End-stage Disease, and Signs and Symptoms

IADL = Instrumental Activities of Daily Living

## Prior Health System Use

In [Exhibit 6.5](#), we present data on patterns of health system service use by individuals in the year prior to placement in long-term care. We focused on use of hospitals, physician services, home care and prescribed medications. Our aim was to identify common points of contact with health care providers in the year leading up to placement and to measure resource use broadly.

**EXHIBIT 6.5 Health service use by Ontario adults aged 66 and older newly placed in long-term care in the year prior to April 1, 2007–March 31, 2008 (baseline), by location at placement**

	Location at Placement		
	TOTAL	INPATIENT	COMMUNITY
Older adults placed in long-term care, N	19,256	8,832	10,424
<b>ACUTE CARE HOSPITAL USE, n (%)</b>			
<b>Emergency Department Visits</b>			
Any visits	15,309 (79.5)	8,428 (95.4)	6,881 (66.0)
Number of visits, mean ± SD	2.49 ± 2.26	2.51 ± 2.24	2.46 ± 2.27
Any low-acuity visits	2,763 (14.3)	1,078 (12.2)	1,685 (16.2)
Any potentially preventable visits	4,583 (23.8)	2,532 (28.7)	2,051 (19.7)
Any fall-related visits	4,304 (22.4)	2,319 (26.3)	1,985 (19.0)
<b>Acute Care Hospital Admissions</b>			
Any admissions	12,539 (65.1)	8,380 (94.9)*	4,159 (39.9)
Average length of stay, mean ± SD	45.13 ± 45.77	53.71 ± 48.33	27.83 ± 34.11
Any admission ALC days	8,818 (45.8)	6,907 (78.2)	1,911 (18.3)
Average ALC length of stay for only those with ALC days, mean ± SD	35.82 ± 41.30	37.88 ± 42.64	28.35 ± 35.06
<b>PHYSICIAN VISITS, n (%)</b>			
Any days with primary care visits	18,986 (98.6)	8,776 (99.4)	10,210 (97.9)
Any days with specialist visits	18,108 (94.0)	8,773 (99.3)	9,335 (89.6)
Any days with home visits	1,094 (5.7)	423 (4.8)	671 (6.4)
Any days with after-hours visits	2,026 (10.5)	803 (9.1)	1,223 (11.7)
Any days with mental health visits	12,692 (65.9)	5,858 (66.3)	6,834 (65.6)

\*This represents acute care admissions only. The remaining 5.1% had prior admission to complex continuing care, rehabilitation or mental health institutions.

continued on next page...

EXHIBIT 6.5 CONTINUED...

	Location at Placement		
	TOTAL	INPATIENT	COMMUNITY
<b>HOME CARE SERVICE VISITS, n (%)</b>			
Any home care services visits	12,724 (66.1)	5,158 (58.4)	7,566 (72.6)
Monthly home care services, mean $\pm$ SD	14.17 $\pm$ 16.03	12.87 $\pm$ 17.32	15.05 $\pm$ 15.03
Any nursing visits	5,177 (26.9)	2,379 (26.9)	2,798 (26.8)
Any physiotherapy visits	3,449 (17.9)	1,410 (16.0)	2,039 (19.6)
Any occupational therapy visits	5,036 (26.2)	1,962 (22.2)	3,074 (29.5)
Any personal service/homemaking visits	10,401 (54.0)	4,017 (45.5)	6,384 (61.2)
Monthly personal service/homemaking visits, mean $\pm$ SD	14.85 $\pm$ 15.89	13.22 $\pm$ 17.44	15.87 $\pm$ 14.74
<b>PRESCRIBED DRUG THERAPY, n (%)</b>			
Number of distinct drugs prescribed, mean $\pm$ SD	10.77 $\pm$ 6.08	10.63 $\pm$ 6.15	10.88 $\pm$ 6.03
Cholinesterase inhibitor use	5,238 (27.2)	1,590 (18.0)	3,648 (35.0)

SD = Standard Deviation

ALC = Alternate Level of Care

### Hospital Use

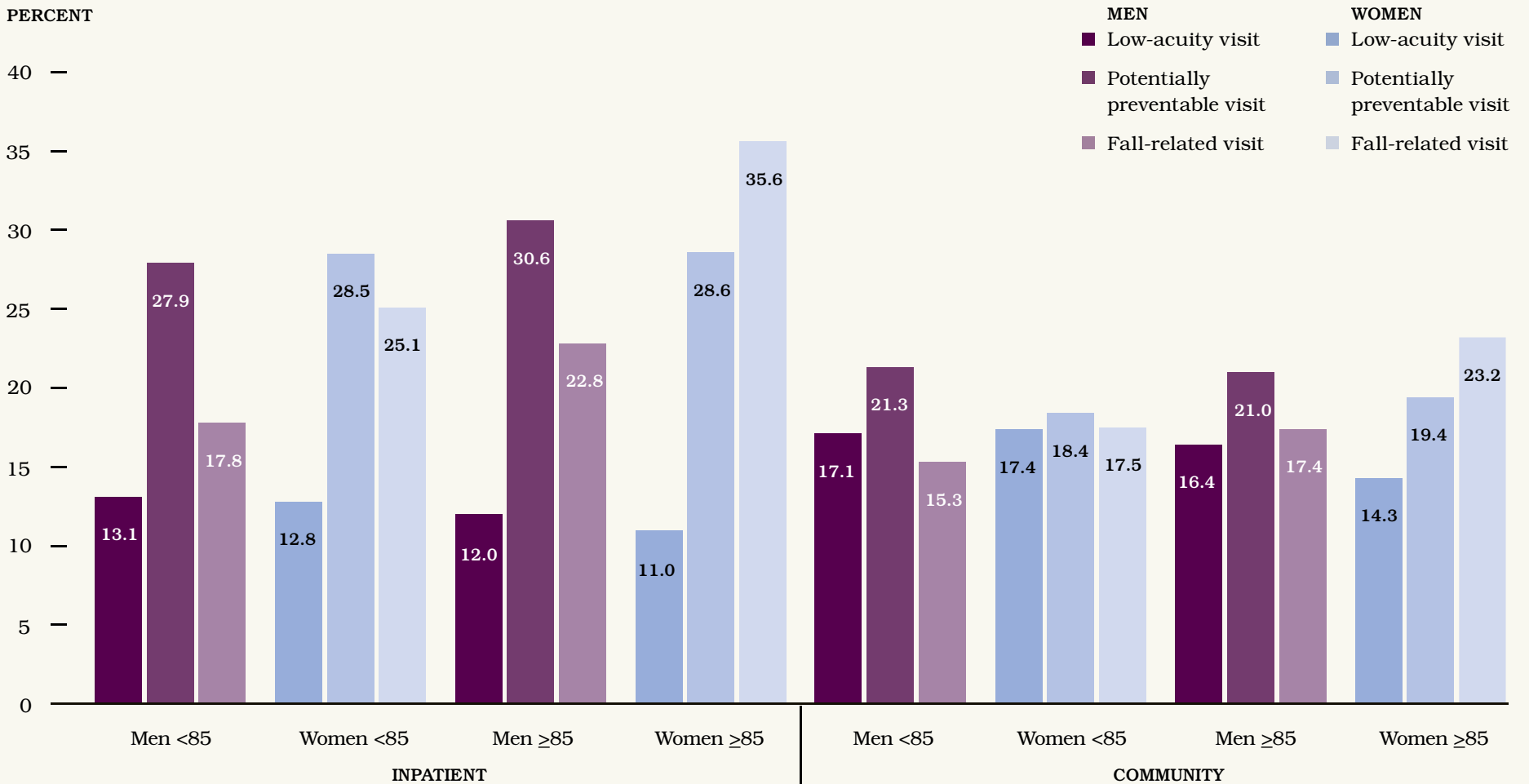
Close to 80% of older adults newly placed in LTC visited an emergency department (ED) in the year prior to admission. Almost all individuals placed from inpatient settings passed through the ED as a matter of process. However, 66.0% of those placed from the community had an ED visit in the year prior to admission. Low-acuity visits are defined as those that were triaged as non-urgent at registration in the ED and ended with the patient returning home.

Approximately 14% of those newly placed in LTC had a low-acuity visit prior to placement. Potentially preventable visits are defined as visits for specific health conditions that are known to be responsive to primary care and that could have been avoided if the condition

was better managed earlier in its course. We discovered that 23.8% of those recently placed in LTC made at least one visit for a potentially preventable condition. We also looked at the percentage of new LTC placements who had visited the ED for an injury caused by a fall and found that 22.4% of placements had such a visit. [Exhibit 6.6](#) explores these visit patterns by sex and by age subgroups. ED visits resulting from falls were most common among the oldest women and were much more likely among those placed from an inpatient setting. Low-acuity ED visits were more common in those placed from the community, regardless of age or sex, whereas ED visits for potentially preventable conditions were more common among those placed from inpatient settings.



**EXHIBIT 6.6 Percentage of Ontario adults aged 66 and older newly placed in long-term care with emergency department visits in the year prior to placement, by sex, age group and type of visit, 2007/08**



By definition, all individuals placed from inpatient settings had a previous inpatient admission, but almost 40% of individuals placed from the community had an acute care admission in the year prior to placement. During these prior hospitalizations, alternate level of care (ALC) days were more common among those placed from inpatient settings (78.2%), compared to community settings (18.3%). However, if ALC days were present, the average ALC length of stay was substantial for both groups (an average of 37.9 days for inpatient placements and 28.4 days for community placements).

### Physician Services

Physician visits are common among this population, and essentially all of those newly placed in LTC had seen a family physician (98.6%) or a specialist (94.0%) in the year prior to placement. A small proportion had received a home visit (5.7%) or after-hours visit (10.5%). Of those newly placed, 65.9% had a visit associated with mental health diagnoses in the year prior to placement.

### Home Care

Over 65% of those newly placed in LTC had received home care services in the year prior to placement. Those placed from the community were more likely to have received home care services than those placed from inpatient settings (72.6% vs. 58.4%, respectively). On average, individuals who required home care were receiving 14 visits per month. Personal and homemaking services were common (received by 61.2% of community placements and 45.5% of inpatient placements), as were occupational therapy (26.2% overall) and nursing visits (26.9% overall).

### Medication Use

The number of distinct medications prescribed in a year is another common measure of comorbidity. The older adults in this cohort, on average, received 10 distinct medications concurrently, indicating a significant drug burden. Over one-quarter (27.2%) of those newly placed in LTC (35.0% of community placements and 18.0% of inpatient placements) had been prescribed a cholinesterase inhibitor (a medication dispensed specifically for dementia) in the year prior to placement. This suggests a high level of cognitive impairment in this population.

### Subsequent Health System Use

In the year following placement, this cohort of older adults continued to make frequent contact with the health care system. [Exhibit 6.7](#) describes the use of acute care hospitals in the year following placement. Over one quarter (28.8%) of those newly placed in LTC died in the year following placement. Almost all placements (99.0%) had at least one visit with a family physician in the year subsequent to placement, and an average of 17.8 days with a visit (standard deviation  $\pm$  13.9) during the year (data not shown). Close to half of those placed in LTC visited an ED in the year following placement. Seventeen percent of individuals had an ED visit that was considered potentially preventable, and 12.8% had a fall-related ED visit. Over 30% of those newly placed in LTC had an acute care admission in the year following placement; however, only a small percentage (2.5%) incurred ALC days.

**EXHIBIT 6.7 Health service use in the year following placement by Ontario adults aged 66 and older newly placed in long-term care, April 1, 2007–March 31, 2008 (baseline)**

Older adults newly placed in long-term care, N	19,256
Died in the year following index, n (%)	5,545 (28.8)
<b>ACUTE CARE HOSPITAL USE, n (%)</b>	
<b>Emergency Department Visits</b>	
Any visits	9,536 (49.5)
Any low-acuity visits	459 (2.4)
Any visits for potentially preventable conditions	3,324 (17.3)
Any visits for fall-related injuries	2,471 (12.8)
<b>Acute Care Hospital Admissions</b>	
Any acute care admissions	6,024 (31.3)
Any Alternate Level of Care days	481 (2.5)
Alternate Level of Care length of stay for all acute care admissions, mean ± SD	1.52 ± 13.48
Alternate Level of Care length of stay among only those with ALC days, mean ± SD	19.01 ± 44.10

SD = Standard Deviation

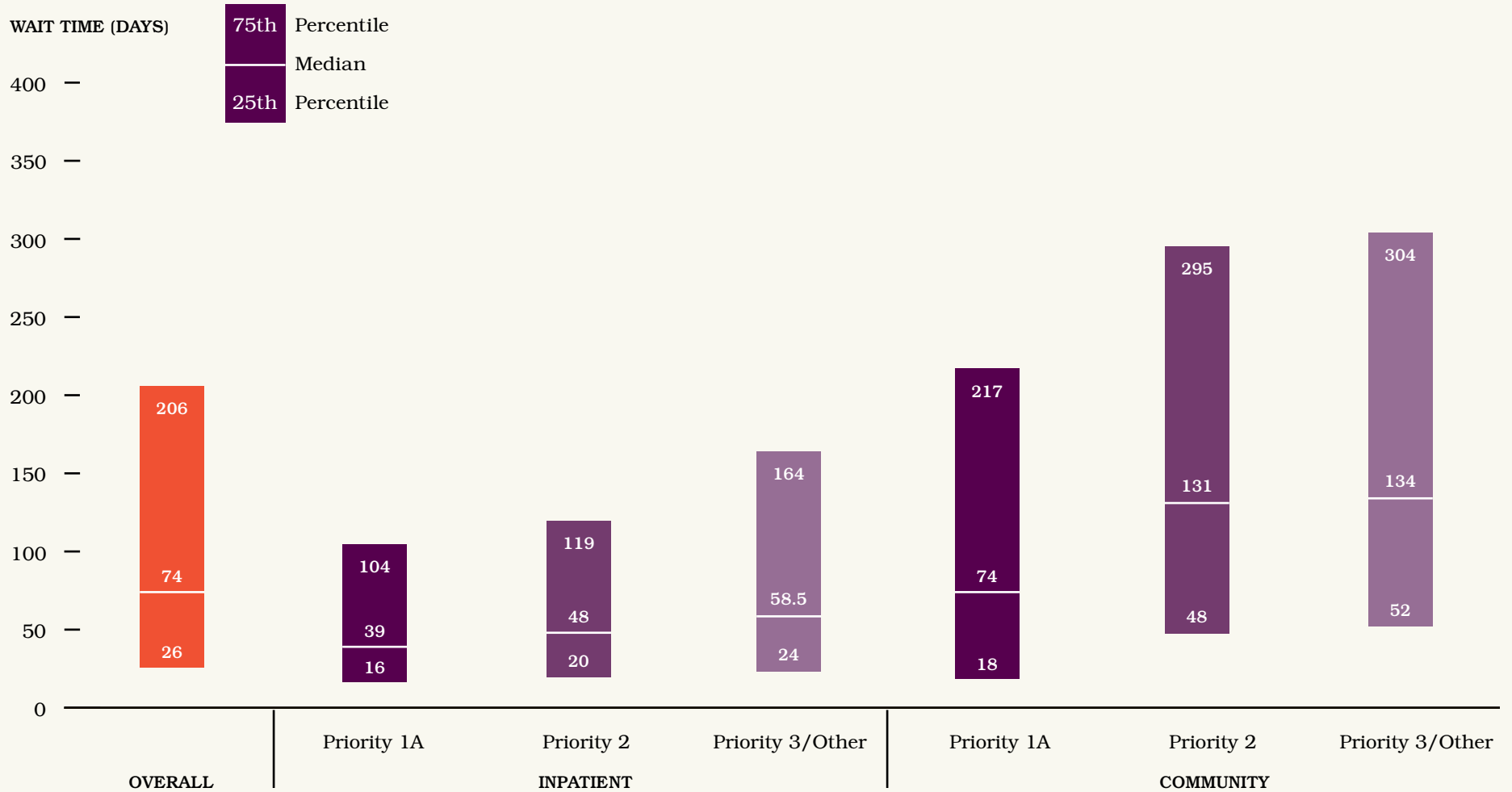
### Waiting for Long-Term Care Placement

The length of time spent waiting for placement was explored for the cohort. The overall distribution of waiting time is highly skewed by very long waits, and therefore medians (i.e., the 50th percentile wait statistic indicates that 50% of the cohort were placed by this time) were chosen to describe waiting patterns. The median wait time for the entire cohort was 74 days (interquartile range 26–206). However, there was substantial variation in the length of wait by wait location—those placed from inpatient settings had much shorter waits (median 47 days, IQR 17–104) than those placed from the community (median 115 days, IQR 38–280).

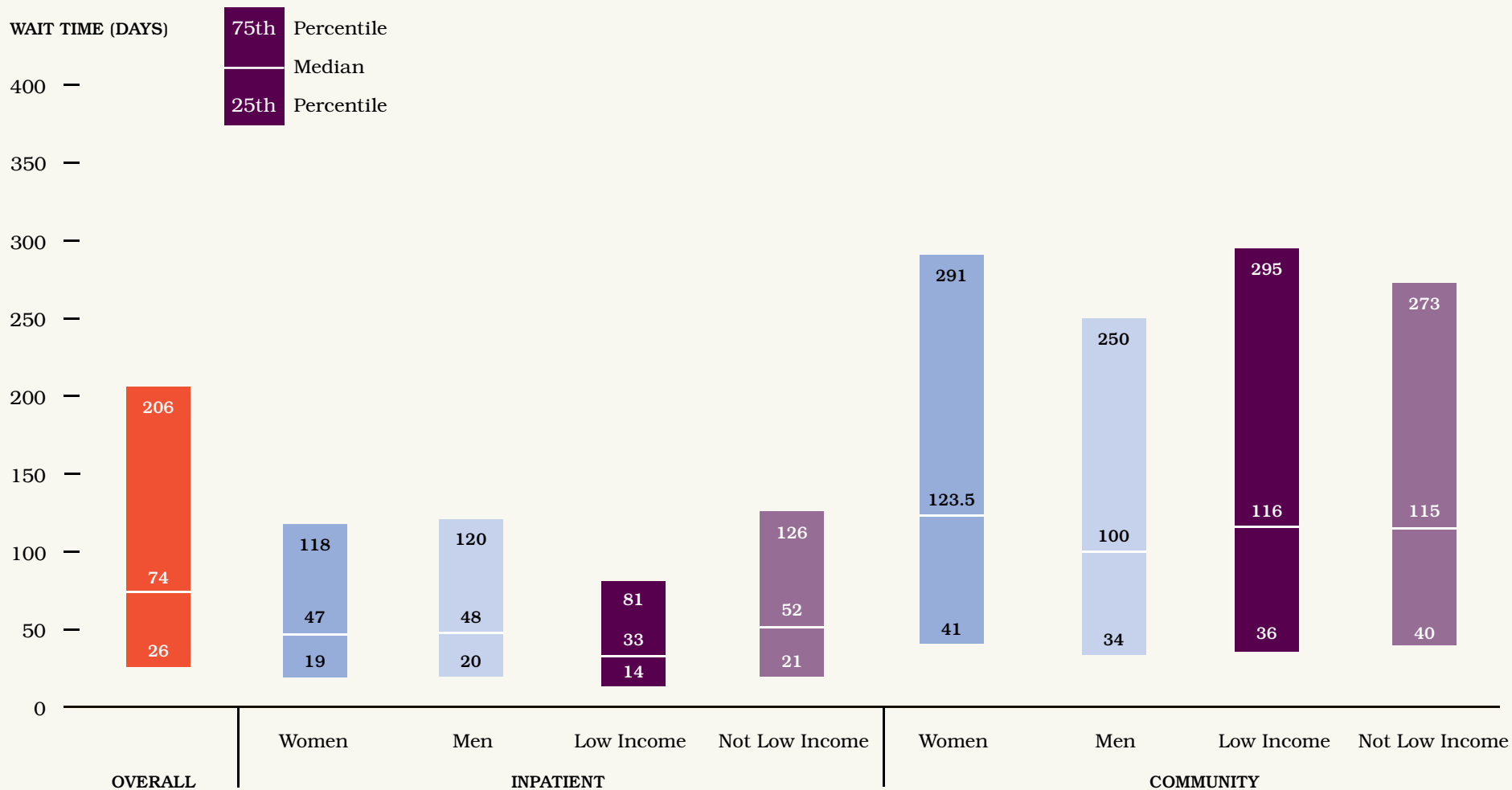
### Needs and Waiting Time

[Exhibit 6.8](#) examines the distribution of wait times for those newly placed in LTC by considering additional demographic and functional characteristics that might influence wait time, including CCAC priority levels, sex, low income level, frailty marker, MAPLe level, ADL score and CHES score. Across characteristics, placement from an inpatient setting was associated with the shortest waiting time. Within the inpatient setting, high CCAC priority level, low income level and increased functional impairment (ADL and CHES score) were associated with shorter waiting time. Within the community setting, CCAC priority, sex, frailty, MAPLe level and functional impairment were all associated with shorter wait times.

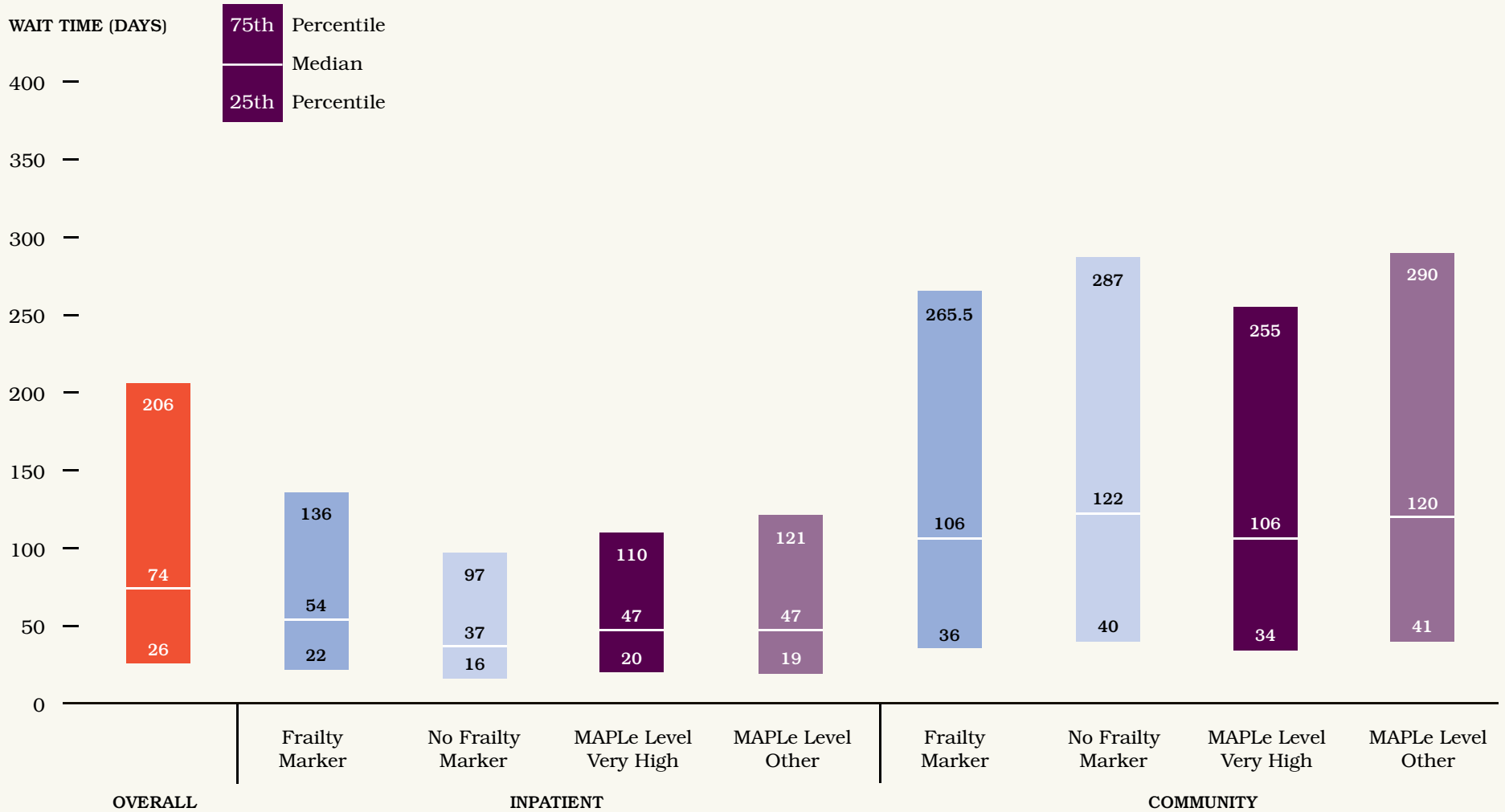
**EXHIBIT 6.8a Distribution of wait time to placement among Ontario adults aged 66 and older newly placed in long-term care, by CCAC priority level and location at placement, 2007/08**



**EXHIBIT 6.8b Distribution of wait time to placement among Ontario adults aged 66 and older newly placed in long-term care, by sex, income level and location at placement, 2007/08**

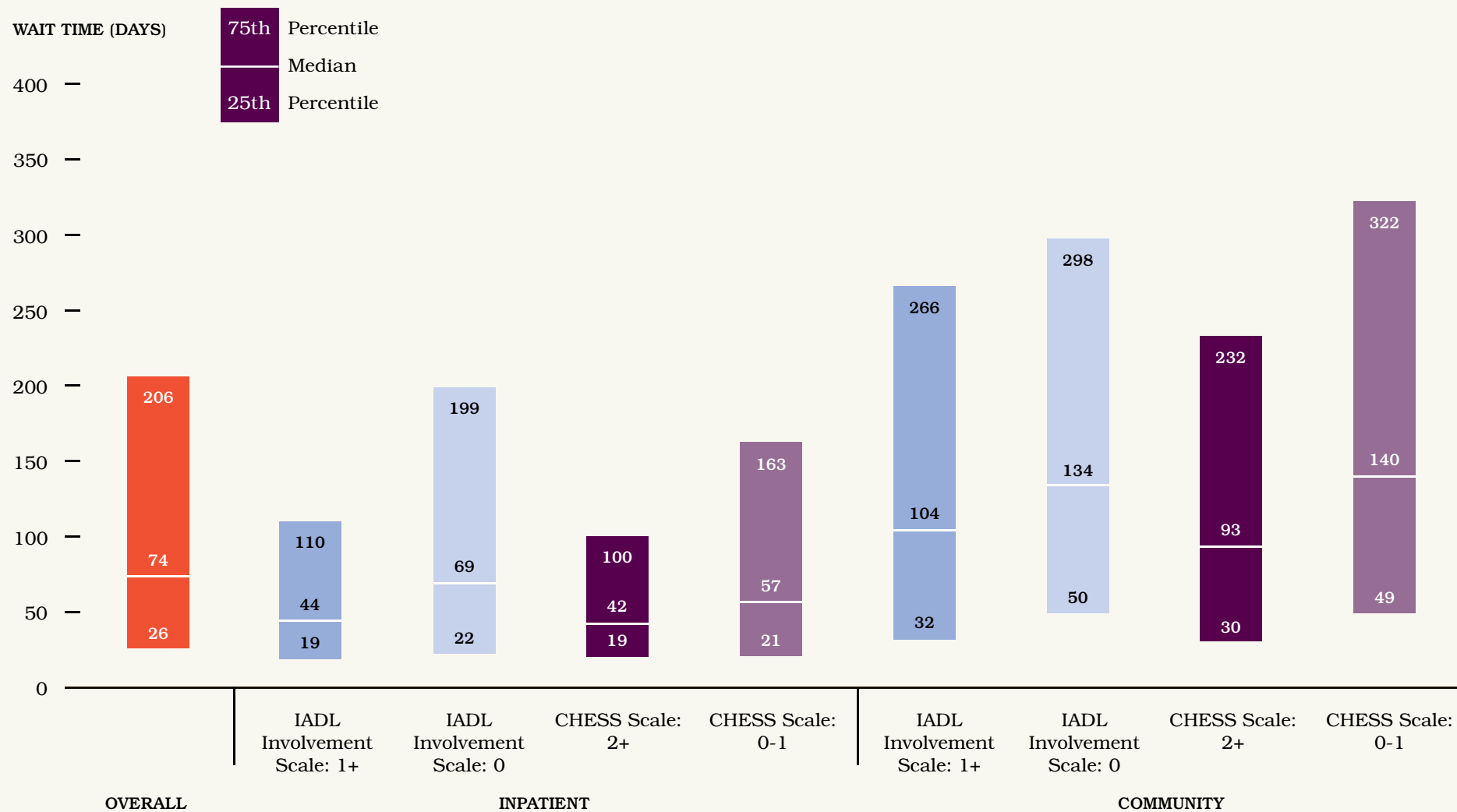


**EXHIBIT 6.8c Distribution of wait time to placement among Ontario adults aged 66 and older newly placed in long-term care, by presence of frailty, MAPLe level and location at placement, 2007/08**



MAPLe = Method for Assigning Priority Levels

**EXHIBIT 6.8d Distribution of wait time to placement among Ontario adults aged 66 and older newly placed in long-term care, by measure of functional status and location at placement, 2007/08**



IADL = Instrumental Activities of Daily Living

CHES = Changes in Health, End-stage Disease, and Signs and Symptoms



### Health System Use While on the Waiting List

In order to quantify the potential impact this cohort had on the broader health system, health system use during the wait was examined. A small number of individuals (n = 72) applied to LTC prior to 2002 and were excluded from this analysis due to coding changes in the data over time. In addition, complete historical home care data was not available for a number of individuals with very long placement times (n = 467 in quartile 4), and these individuals were excluded. [Exhibit 6.9](#) examines health system use during the wait for placement. Note that this exhibit is stratified by quartiles of waiting time in order to account for the possibility of increased service use the longer an individual spends waiting. Future work

should consider reporting this information in relation to the number of days spent waiting. Individuals with shorter wait times were more likely to report living alone and caregiver distress, although across all wait time quartiles, close to one-third of caregivers were experiencing distress. There was frequent contact with the health system during the wait. Of individuals with the longest wait times, 63.5% had emergency department visits and 43.6% had acute care hospital admissions during their wait. There were high levels of contact with primary care physicians across wait time quartiles. Home care services were used during the wait by 70.1% of individuals in the highest quartile of wait time.

---

*“Individuals with shorter wait times were more likely to report living alone and caregiver distress, although across wait time quartiles, close to one-third of caregivers were experiencing distress.”*

**EXHIBIT 6.9 Health service use in the year prior to placement by Ontario adults aged 66 and older newly placed in long-term care, by time spent waiting, 2007/08**

	Wait Time			
	QUARTILE 1 (0-26 DAYS)	QUARTILE 2 (27-74 DAYS)	QUARTILE 3 (75-204 DAYS)	QUARTILE 4 (≥205 DAYS)
Older adults newly placed in long-term care*, N	4,867	4,756	4,770	4,791
<b>LIVING STATUS, n (%)</b>				
Reported living alone	1,175 (37.5)	1,069 (35.7)	837 (34.8)	213 (32.8)
Reported caregiver experiencing distress	1,661 (35.4)	1,470 (31.8)	1,453 (31.4)	1,278 (28.1)
<b>ACUTE CARE HOSPITAL USE, n (%)</b>				
<b>Emergency Department Visits</b>				
Any visits	294 (6.0)	892 (18.8)	1,765 (37.0)	3,042 (63.5)
Average number of visits, mean ± SD	1.19 ± 0.64	1.32 ± 0.69	1.60 ± 1.08	2.76 ± 3.31
<b>Acute Care Hospital Admissions</b>				
Any admissions	324 (6.7)	802 (16.9)	1,293 (27.1)	2,087 (43.6)
Average length of stay, mean ± SD	9.26 ± 5.93	23.05 ± 16.18	36.95 ± 35.24	41.19 ± 56.56
Any acute care admissions with Alternate Level of Care	209 (4.3)	563 (11.8)	902 (18.9)	1,239 (25.9)
<b>PHYSICIAN VISITS, n (%)</b>				
Any days with primary care visits	3,203 (65.8)	4,047 (85.1)	4,420 (92.7)	4,700 (98.1)
Average number of days with primary care visits, mean ± SD	6.05 ± 5.42	12.93 ± 12.09	18.06 ± 20.07	30.88 ± 34.00
Any days with specialist visits	2,541 (52.2)	3,316 (69.7)	3,734 (78.3)	4,352 (90.8)
Average number of days with specialist visits, mean ± SD	4.88 ± 4.86	8.79 ± 10.49	10.79 ± 16.29	16.14 ± 23.56

continued on next page...

EXHIBIT 6.9 CONTINUED...

	Wait Time			
	QUARTILE 1 (0-26 DAYS)	QUARTILE 2 (27-74 DAYS)	QUARTILE 3 (75-204 DAYS)	QUARTILE 4 (≥205 DAYS)
<b>HOME CARE SERVICE USE*, n (%)</b>				
Any home care service	1,050 (21.6)	1,461 (30.7)	2,431 (51.0)	3,030 (70.1)
Monthly home care services, mean ± SD	8.33 ± 12.60	13.32 ± 17.06	15.11 ± 14.29	19.60 ± 21.08
Any nursing	334 (6.9)	473 (9.9)	792 (16.6)	1,126 (26.0)
Any physiotherapy	98 (2.0)	213 (4.5)	494 (10.4)	884 (20.4)
Any occupational therapy	182 (3.7)	346 (7.3)	734 (15.4)	1,166 (27.0)
Any personal service/homemaking	930 (19.1)	1,270 (26.7)	2,093 (43.9)	2,620 (60.6)
Average personal service/homemaking services per month, mean ± SD	7.65 ± 12.46	12.73 ± 14.16	15.46 ± 13.77	20.56 ± 20.37

\*Complete look-back available only for 4,324 individuals in quartile 4.

SD = Standard Deviation

## CONCLUSION

The data presented in this chapter provide a comprehensive description of older adults at the time of placement in LTC and show how they interact with the health system in the year prior to placement. Overall, we found that women accounted for an increasing share of placements as they aged and that, unlike access to other health services, there were not strong income gradients associated with LTC placement. Individuals placed in LTC had many co-existing comorbidities and significant functional impairments. Older adults newly placed in LTC made frequent contact with the health system in the year prior to placement, with particularly high rates of ED use. Wait

times for LTC placement varied significantly, with the shortest waits among those coming from the inpatient setting (likely driven by pressures on acute care facilities to avoid ALC days) and those with high CCAC priority levels. Individuals continued to use high levels of service while waiting, particularly acute care hospitals and home care services. Ongoing efforts to support this frail population as they make the transition to LTC will need to focus on expanding primary care and community support in an attempt to reduce the high levels of use of acute care services.

---

*“Overall, we found that women accounted for an increasing share of placements as they aged and that, unlike access to other health services, there were not strong income gradients associated with LTC placement.”*

## REFERENCES

- 1 Gruneir A, Anderson GM, Rochon PA, Bronskill S. Transitions in long-term care and potential implications for quality reporting in Ontario, Canada. *J Am Med Dir Assoc* 2010; 11(9):629-35.
- 2 Hirdes JP, Poss JW, Curtin-Telegdi N. The Method for Assigning Priority Levels (MAPLe): a new decision-support system for allocating home care resources. *BMC Med* 2008; 6:9.
- 3 Bronskill S, Carter MW, Costa AP, Esensoy AV, et al. *Aging in Ontario: An ICES Chartbook of Health Service Use by Older Adults*. Toronto: Institute for Clinical Evaluative Sciences; 2010.
- 4 Health Quality Ontario. *Quality Monitor: 2011 Report on Ontario's Health System*. Toronto, ON: HQO; 2011. Accessed October 19, 2011 at [http://www.ohqc.ca/pdfs/2011\\_report\\_-\\_english.pdf](http://www.ohqc.ca/pdfs/2011_report_-_english.pdf).
- 5 Hollander MJ, Chappell NL, Prince MJ, Shapiro E. Providing care and support for an aging population: briefing notes on key policy issues. *Healthc Q* 2007; 10(3):34-45.
- 6 Williams AP, Challis D, Deber R, Watkins J, et al. Balancing institutional and community-based care: why some older persons can age successfully at home while others require residential long-term care. *Healthc Q* 2009; 12(2):95-105.
- 7 Costa AP, Hirdes JP. Clinical characteristics and service needs of alternate-level-of-care patients waiting for long-term care in Ontario hospitals. *Healthc Policy* 2010; 6(1):32-40.
- 8 Baker GR, Norton PG, Flintoft V, Blais R, et al. The Canadian Adverse Events Study: the incidence of adverse events among hospital patients in Canada. *CMAJ* 2004; 170(11):1678-86.
- 9 Canadian Institute for Health Information. *Analysis in Brief: Alternate Level of Care in Canada*. Ottawa, ON: CIHI; 2009. Accessed May 15, 2011 at [http://secure.cihi.ca/cihiweb/products/ALC\\_AIB\\_FINAL.pdf](http://secure.cihi.ca/cihiweb/products/ALC_AIB_FINAL.pdf).
- 10 Chafe R, Coyte P, Hirdes JP. Improving the management of waiting lists for long term care. *Health Manage Forum* 2010; 23(2):58-62.
- 11 Legislative Assembly of Ontario. O. Reg. 79/10.

# Concluding Remarks

As the health care system adapts to meet the needs of aging seniors, it is imperative that we critically examine factors that determine entry into, exit from and length of stay in different health care settings. Understanding how settings of care relate to each other is necessary to inform policy decisions and to prepare for future health system utilization. In the preceding chapters, we considered factors relevant to the health of older women, health system encounters by community-dwelling older adults with dementia, the patterns and prevalence of care for individuals discharged from acute care hospitals after being treated for complex medical conditions, and health care usage by applicants awaiting entry into long-term care facilities.

*Health System Use by Frail Ontario Seniors* provides policy makers, planners, health care providers, advocates and Ontarians an in-depth look at how and where frail older adults use health care services. Our aim with this work is to expand the understanding of how Ontario's health system can improve quality of care and provide better health outcomes for some of the province's most vulnerable older adults.

**APPENDICES**

- 119 APPENDIX A**  
**Data sources**
- 120 APPENDIX B**  
**General cohort exclusions**
- 121 APPENDIX C**  
**Cohort of older women**
  - 121** C.1 Variables Assessed in the Historical Observation Windows
  - 122** C.2 Cohort-Specific Measures
- 124 APPENDIX D**  
**Cohort of community-dwelling older adults with dementia**
  - 124** D.1 Variables Assessed in the Historical Observation Windows
  - 124** D.2 Definition of Physician-Diagnosed Dementia
- 125 APPENDIX E**  
**Cohort of medically complex home care clients**
  - 125** E.1 Variables Assessed in the Historical Observation Windows
  - 126** E.2 Specific Claim Codes for Cohort Definition
  - 129** E.3 LACE Index and RAI Aggregate Risk Score
- 131 APPENDIX F**  
**Cohort of older adults newly placed in long-term care**
  - 131** Variables Assessed in the Historical Observation Windows
- 132 APPENDIX G**  
**Other variables**
  - 132** G.1 Diagnostic Codes for Potentially Preventable Conditions
  - 133** G.2 Aggregated Diagnosis Groups (ADGs) Used to Qualify an Individual as Having Two or More Coexisting Chronic Conditions
- 134 APPENDIX H**  
**Acronyms used**
- 135 APPENDIX REFERENCES**

## APPENDIX A / DATA SOURCES

A wide range of data sources was used to create the exhibits presented in this report, and a brief description of each is provided below. Many of these population-based databases can be linked, at the patient level, in a way that ensures the privacy and confidentiality of personal health information.

### Registered Persons Database (RPDB)

The RPDB is a historical listing of the unique health numbers issued to each person eligible for Ontario health services. This listing includes corresponding demographic information such as date of birth, sex, address, date of death (where applicable) and changes in eligibility status. When new RPDB data arrive at ICES, personal information such as name and street address is removed, and each unique health number is converted into an anonymous identifier, ensuring the protection of each individual's privacy. Data supplied to ICES by the MOHLTC is enriched with information from other ICES datasets. The RPDB overestimates the number of people living in Ontario for several reasons. Although improvements have been made in recent years, the RPDB still contains a substantial number of individuals who are deceased or no longer living in Ontario. To ensure that rates and estimates are correct, a methodology has been developed to adjust the RPDB so that regional population counts by age and sex match estimates from Statistics Canada.

### Ontario Health Insurance Plan (OHIP)

The OHIP database contains most claims paid for by the Ontario Health Insurance Plan. These claims provide information on the type of service provided.

Approximately 94% of Ontario physicians have a fee-for-service practice. Some of the alternate funding plans use shadow billing (that is, a record for the service appears in the OHIP database although the fee paid may be shown as \$0.00). These data are supplied to ICES by the MOHLTC.

### Discharge Abstract Database (DAD)

The DAD is a data collection tool developed by the Canadian Institute for Health Information (CIHI) to collect information on patients treated in acute care hospitals. Each time an individual is discharged from an acute care hospital the hospital submits to CIHI an electronic record that contains patient demographic, diagnostic and treatment data. The DAD is supplied to ICES by CIHI.

### National Ambulatory Care Reporting System (NACRS)

NACRS is a data collection tool developed by CIHI to capture information on patient visits to emergency departments. The NACRS data used in this report are collected on a routine basis by all emergency departments (ED) in Ontario. NACRS data are supplied to ICES by CIHI.

### Post-Censal Population Files

Statistics related to population size by sex, age and geographic area are collected in the census every five years by Statistics Canada. All estimates are for the population on July 1 of the given year. These data are supplied to ICES by Statistics Canada.

### Home Care Database (HCD)

Ontario's Community Care Access Centres (CCACs) are the organizations established by the MOHLTC to provide access to government-funded home and community services and long-term care homes. The HCD is a clinical client-centric database that captures all services provided by or coordinated by CCACs. These data are supplied to ICES by the Ontario Association of Community Care Access Centres.

### Ontario Resident Assessment Instrument for Home Care Database (RAI-HC)

The Resident Assessment Instrument for Home Care (RAI-HC) was developed by interRAI, an international consortium of researchers, and was implemented by Ontario's Community Care Access Centres (CCACs) in 2004. It is a standardized, multi-dimensional assessment system for determining client needs, which includes quality exhibits, client assessment protocols, outcome measurement scales and a case-mix system. These data are supplied to ICES by the Ontario Association of Community Care Access Centres.

### Client Profile Database (CPRO)

The Client Profile Database (CPRO) was developed by the Long-Term Care Redevelopment Project and contains long-term care home application information at the client level. The dataset contains three broad types of information: 1) client characteristics and location at application, 2) LTC home choices, and 3) milestone (date) events through the LTC placement process. These data are supplied to ICES by the Ontario Association of Community Care Access Centres.



**APPENDIX B / GENERAL COHORT EXCLUSIONS**

<b>Cohort</b>	<b>General exclusions (in order)</b>
<b>Older women</b>	<ul style="list-style-type: none"> <li>• Death on or prior to baseline date</li> <li>• Invalid/missing age and sex</li> <li>• Non-Ontario resident</li> <li>• Living in a chronic care, rehabilitation or psychiatric facility</li> <li>• Living or having lived in a long-term care facility during the six months prior to baseline date</li> <li>• Date of last contact with the health care system more than five years prior to baseline date because this would indicate death or movement out of Ontario</li> </ul>
<b>Community-dwelling older adults with dementia</b>	<ul style="list-style-type: none"> <li>• Death on or prior to baseline date</li> <li>• Invalid/missing age and sex</li> <li>• Non-Ontario resident</li> <li>• Living in a chronic care, rehabilitation or psychiatric facility</li> <li>• Living or having lived in a long-term care facility during the 30 days prior to baseline date</li> <li>• Date of last contact more than five years prior to baseline date</li> </ul>
<b>Medically complex home care clients</b>	<ul style="list-style-type: none"> <li>• Death on or prior to baseline date</li> <li>• Invalid/missing age and sex</li> <li>• Non-Ontario resident</li> <li>• Living in a chronic care, rehabilitation or psychiatric facility</li> <li>• Living or having lived in a long-term care facility during the six months prior to baseline date</li> </ul>
<b>Older adults newly placed in long-term care</b>	<ul style="list-style-type: none"> <li>• Death on or prior to placement date</li> <li>• Invalid/missing age and sex</li> <li>• Non-Ontario resident</li> <li>• Placement in a long-term care facility in the year prior to baseline (April 1, 2007)</li> <li>• Transfers between long-term care homes</li> </ul>

## APPENDIX C / COHORT OF OLDER WOMEN

### C.1 Variables Assessed in the Historical Observation Windows

Look-back windows	Variables	
1 year	<ul style="list-style-type: none"> <li>• Prior admissions to acute care (CIHI-DAD)</li> <li>• Prior same-day surgeries (SDS)</li> <li>• Prior emergency department visits (NACRS)</li> <li>• Previous primary care/specialist visits (OHIP)</li> <li>• Prior home care use (HCD)</li> <li>• Prior long-term care applications (CPRO)</li> <li>• Total number of medications (ODB)</li> </ul>	
2 years	<ul style="list-style-type: none"> <li>• Prior hospitalizations (CIHI-DAD) (for ADG calculation)</li> <li>• Prior ED visits (NACRS) (for ADG calculation)</li> <li>• Prior OHIP visits (for ADG calculation)</li> </ul>	
5 years (cohort-specific measures; CIHI-DAD/NACRS)	<ul style="list-style-type: none"> <li>• Arthritis</li> <li>• Asthma</li> <li>• Cancer</li> <li>• Cardiovascular conditions (acute myocardial infarction, congestive heart failure, stroke)</li> <li>• Chronic obstructive pulmonary disease</li> <li>• Dementia</li> </ul>	<ul style="list-style-type: none"> <li>• Depression</li> <li>• Diabetes</li> <li>• Multiple conditions</li> <li>• Other mental health conditions</li> <li>• Osteoporosis</li> <li>• Urinary incontinence</li> <li>• Fractures</li> </ul>

## C.2 Cohort-Specific Measures

<b>Arthritis and related conditions</b>	ICD-10-CA: M05–M06 (rheumatoid arthritis); M15–M19 (osteoarthritis); M07, M10, M11–M14, M30–M36 (other inflammatory and connective tissue diseases); M00–M03, M20–M25, M65–M79 (other arthritis and rheumatic conditions) <b>or</b> OHIP: 274 (gout); 446, 710 (connective tissue disorders); 711, 716, (traumatic arthritis, pyogenic arthritis); 714 (rheumatoid arthritis); 715 (osteoarthritis); 718, 728 (joint derangement, Dupuytren’s contracture); 720 (ankylosing spondylitis ); 727 (synovitis ); 729 (fibrositis); 739 (other MSK disorders)		
<b>Asthma</b>	ICD-10-CA: J45.^ Diagnosis type M (but not type M and 2) <b>or</b> ICD-10-CA: J45.^ Type 1, W, X, Y (but not also as type [2] with another diagnosis type M and 2) <b>or</b> OHIP: 493		
<b>Cancer</b>	ICD-10-CA: C00–C26, C30–C44, C45–C97, Z51.0, Z51.1		
<b>Cardiovascular conditions</b>	<ul style="list-style-type: none"> <li>• <b>Acute myocardial infarction</b> ICD-10-CA: I21.^, I22.^ Diagnosis type M (but not also as type 2) <b>or</b> ICD-10-CA: I21.^, I22.^ Type 1, W, X, Y (but not also as type 2 with another diagnosis type M and 2) <b>or</b> ICD-10-CA: Coronary artery disease I25.0, I25.1^, I25.8, I25.9 as type M, AMI as type 1, W, X, Y but not also as type 2, along with percutaneous coronary intervention 1.IJ.50^, 1.IJ.54.GQ–AZ, 1.IJ.57.GQ^ or coronary artery bypass graft 1.IJ.76.^</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Congestive heart failure</b> ICD-10-CA: I26.0, I27.9, I50.^ Diagnosis type M (but not also as type 2) <b>or</b> ICD-10-CA: I26.0, I27.9, I50.^ Type 1 (but not also as type 2 with another diagnosis type M and 2) <b>or</b> OHIP: 428</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Stroke</b> ICD-10-CA: I60.^, I61.^, I62.^, I63.^, I64 Diagnosis type M (but not also as type 2) <b>or</b> ICD-10-CA: I60.^, I61.^, I62.^, I63.^, I64 Type 1, W, X, Y (but not also as type 2 with another diagnosis type M and 2)</li> </ul>
<b>Chronic obstructive pulmonary disease</b>	ICD-10-CA: J10.0, J11.0, J12–J16, J18, J20, J21, J22, J41, J42, J43, J44, J47 Diagnosis type M (but not type M and 2) <b>or</b> ICD-10-CA: J10.0, J11.0, J12–J16, J18, J20, J21, J22, J41, J42, J43, J44, J47 Type 1, W, X, Y (but not also as type [2] with another diagnosis type M and 2) <b>or</b> OHIP: 491, 492, 496		

<b>Dementia</b>	See Dementia cohort in <a href="#">Appendix D</a>
<b>Depression</b>	Mental Health and Addictions ICD-10-CA codes (All Diagnosis Types): F320–323, F328–334, F338–339, F412, F480 <b>or</b> OMHRS records with a diagnosis in: <ul style="list-style-type: none"> <li>• Group 3 (“Major depression”) Q2AA, Q2AB, Q2AC, or Q2B = 296.20–296.39 <b>or</b></li> <li>• Group 5 (“Other unipolar depression”) Q2AA, Q2AB, Q2AC, or Q2B = 311^</li> </ul>
<b>Diabetes</b>	In ICES Ontario Diabetes Database during each time period
<b>Other mental health conditions</b>	ICD-10-CA codes (All Diagnosis Types): complete list available upon request <b>or</b> OMHRS records (from 2005/06 to 2008/09) with a Q2AA, Q2AB, Q2AC or Q2B diagnosis between DSM-IV 290^ to 347^, or in (V6110, V6112, V6120, V6121, V6180, V6190, V6220, V6230, V6240, V6281, V6282) (where not in above dementia or depression code lists).
<b>Osteoporosis</b>	ICD-10-CA: M81, M82 <b>or</b> OHIP: 733
<b>Urinary incontinence</b>	ICD-10-CA: N393, N394, R32, R3914
<b>Fractures</b>	ICD-10-CA: S22.0, S22.1 (thoracic spine); S32 (lumbar spine and pelvis); S42.2–S42.4, S42.7–S42.9 (shoulder/upper arm); S52, S62.0–S62.4, S62.8 (wrist/forearm); S72 (hip/femur); S82 (lower leg/ankle)

## APPENDIX D / COHORT OF COMMUNITY-DWELLING OLDER ADULTS WITH DEMENTIA

### D.1 Variables Assessed in the Historical Observation Windows

Look-back windows	Variables
1 year	<ul style="list-style-type: none"> <li>• Prior admissions to acute care (CIHI-DAD)</li> <li>• Prior same-day surgeries (SDS)</li> <li>• Prior ED visits (NACRS)</li> <li>• Previous primary care/specialist visits (OHIP)</li> <li>• Prior home care use (HCD)</li> <li>• Prior LTC applications (CPRO)</li> <li>• Total number of medications (ODB)</li> </ul>
2 years	<ul style="list-style-type: none"> <li>• Prior hospitalizations (CIHI-DAD) (for ADG calculation)</li> <li>• Prior ED visits (NACRS) (for ADG calculation)</li> <li>• Prior OHIP visits (for ADG calculation)</li> </ul>

### D.2 Definition of Physician-Diagnosed Dementia

Look-back windows	Codes used to define physician-diagnosed dementia
5 years	<p>Any 1 code/claim occurring during the 5-year look-back period</p> <p>ICD-10-CA (CIHI-DAD): F00.0, F00.1, F00.2, F00.9, F01.0, F01.1, F01.2, F01.3, F01.8, F01.9, F02.0, F02.1, F02.2, F02.3, F02.4, F02.8, F03.^, F05.1, F06.5, F06.6, F06.8, F06.9, F09.^, G30.0, G30.1, G30.8, G30.9, G31.0 G31.1, R54.^ <b>or</b></p> <p>OHIP: 290, 331, 797 <b>or</b></p> <p>Any cholinesterase inhibitor script in ODB during 1 year prior to index, ODB subclnam =: 'CHOLINESTERASE INHIBITOR'</p>

## APPENDIX E / COHORT OF MEDICALLY COMPLEX HOME CARE CLIENTS

### E.1 Variables Assessed in the Historical Observation Windows

Look-back windows	Variables
6 months	<ul style="list-style-type: none"> <li>• Prior involvement in palliative care (CIHI-DAD)</li> </ul>
1 year	<ul style="list-style-type: none"> <li>• Prior admissions to acute care (CIHI-DAD)</li> <li>• Prior same-day surgeries (SDS)</li> <li>• Prior ED visits (NACRS)</li> <li>• Previous primary care/specialist visits (OHIP)</li> <li>• Prior home care use (HCD)</li> <li>• Prior LTC applications (CPRO)</li> <li>• Total number of medications (ODB)</li> </ul>
2 years	<ul style="list-style-type: none"> <li>• Prior hospitalizations (CIHI-DAD) (for ADG calculation)</li> <li>• Prior ED visits (NACRS) (for ADG calculation)</li> <li>• Prior OHIP visits (for ADG calculation)</li> </ul>

## E.2 Specific Claim Codes for Cohort Definition

Cohort definition codes (first CIHI-DAD record between April 1, 2007, and March 31, 2008, satisfying criterion 1 or 2 below will be identified as baseline—entire baseline hospitalization must fall within fiscal year)	
1. Discharge from acute care with two or more diagnoses of the following acute care-sensitive conditions (ACSC) in the same record (definitions of ACSC obtained from <i>CIHI Health Indicators 2008, Technical Notes, Code Conversions document</i> )	
<b>Angina</b>	ICD-10-CA: I20, I23.82, I24.0, I24.8, I24.9; diagnosis type M (but not 2), 1, W, X, Y; any diagnosis field EXCLUDING CCI: 1HA58, 1HA80, 1HA87, 1HB53, 1HB54, 1HB55, 1HB87, 1HD53, 1HD55, 1HH59, 1HH71, 1HJ76, 1HJ82, 1HM57, 1HM78, 1HM80, 1HN71, 1HN80, 1HN87, 1HP76, 1HP78, 1HP80, 1HP82, 1HP83, 1HP87, 1HR71, 1HR80, 1HR84, 1HR87, 1HS80, 1HS90, 1HT80, 1HT89, 1HT90, 1HU80, 1HU90, 1HV80, 1HV90, 1HW78, 1HW79, 1HX71, 1HX78, 1HX79, 1HX80, 1HX83, 1HX86, 1HX87, 1HY85, 1HZ53 rubric (except 1HZ53LAKP), 1HZ54, 1HZ55 rubric (except 1HZ55LAKP), 1HZ56, 1HZ57, 1HZ59, 1HZ80, 1HZ85, 1HZ87, 1IF83, 1IJ50, 1IJ54GQAZ, 1IJ55, 1IJ57, 1IJ76, 1IJ80, 1IK57, 1IK80, 1IK87, 1IN84, 1LA84, 1LC84, 1LD84, 1YY54LANJ in any procedure field ( <i>incode1-20</i> ). If status attribute ( <i>inatstat1-20</i> ) = 'A' then do not include in exclusion criteria.
<b>Asthma</b>	ICD-10-CA: J45; diagnosis type M (but not 2), 1, W, X, Y; any diagnosis field
<b>Chronic obstructive pulmonary disease</b>	ICD-10-CA: J41, J42, J43, J44, J47; diagnosis type M (but not 2), 1, W, X, Y; any diagnosis field <b>or</b> J10.0, J11.0, J12–J16, J18, J20, J21, J22 with diagnosis type M (but not 2), 1, W, X, Y in any diagnosis field, with any diagnosis other than most responsible = 'J44'
<b>Diabetes</b>	ICD-10-CA: E10.0, E10.1, E10.63, E10.9, E11.0, E11.1, E11.63, E11.9, E13.0, E13.1, E13.63, E13.9, E14.0, E14.1, E14.63, E14.9; diagnosis type M (but not 2), 1, W, X, Y; any diagnosis field
<b>Grand mal status and other epileptic convulsions</b>	ICD-10-CA: G40, G41; diagnosis type M (but not 2), 1, W, X, Y; any diagnosis field

<b>Heart failure and pulmonary edema</b>	ICD-10-CA: I50, J81; diagnosis type M (but not 2), 1, W, X, Y; any diagnosis field EXCLUDING CCI: 1HA58, 1HA80, 1HA87, 1HB53, 1HB54, 1HB55, 1HB87, 1HD53, 1HD55, 1HH59, 1HH71, 1HJ76, 1HJ82, 1HM57, 1HM78, 1HM80, 1HN71, 1HN80, 1HN87, 1HP76, 1HP78, 1HP80, 1HP82, 1HP83, 1HP87, 1HR71, 1HR80, 1HR84, 1HR87, 1HS80, 1HS90, 1HT80, 1HT89, 1HT90, 1HU80, 1HU90, 1HV80, 1HV90, 1HW78, 1HW79, 1HX71, 1HX78, 1HX79, 1HX80, 1HX83, 1HX86, 1HX87, 1HY85, 1HZ53 rubric (except 1HZ53LAKP), 1HZ54, 1HZ55 rubric (except 1HZ55LAKP), 1HZ56, 1HZ57, 1HZ59, 1HZ80, 1HZ85, 1HZ87, 1IF83, 1IJ50, 1IJ54GQAZ, 1IJ55, 1IJ57, 1IJ76, 1IJ80, 1IK57, 1IK80, 1IK87, 1IN84, 1LA84, 1LC84, 1LD84, 1YY54LANJ in any procedure field [ <i>incode1-20</i> ]. If status attribute ( <i>inatstat1-20</i> ) = 'A' then do not include in exclusion criteria.
<b>Hypertension</b>	ICD-10-CA: I10.0, I10.1, I11; diagnosis type M (but not 2), 1, W, X, Y; any diagnosis field EXCLUDING CCI: 1HA58, 1HA80, 1HA87, 1HB53, 1HB54, 1HB55, 1HB87, 1HD53, 1HD55, 1HH59, 1HH71, 1HJ76, 1HJ82, 1HM57, 1HM78, 1HM80, 1HN71, 1HN80, 1HN87, 1HP76, 1HP78, 1HP80, 1HP82, 1HP83, 1HP87, 1HR71, 1HR80, 1HR84, 1HR87, 1HS80, 1HS90, 1HT80, 1HT89, 1HT90, 1HU80, 1HU90, 1HV80, 1HV90, 1HW78, 1HW79, 1HX71, 1HX78, 1HX79, 1HX80, 1HX83, 1HX86, 1HX87, 1HY85, 1HZ53 rubric (except 1HZ53LAKP), 1HZ54, 1HZ55 rubric (except 1HZ55LAKP), 1HZ56, 1HZ57, 1HZ59, 1HZ80, 1HZ85, 1HZ87, 1IF83, 1IJ50, 1IJ54GQAZ, 1IJ55, 1IJ57, 1IJ76, 1IJ80, 1IK57, 1IK80, 1IK87, 1IN84, 1LA84, 1LC84, 1LD84, 1YY54LANJ in any procedure field [ <i>incode1-20</i> ]. If status attribute ( <i>inatstat1-20</i> ) = 'A' then do not include in exclusion criteria.
<b>OR</b>	
2. Discharge from acute care with any of the following diagnosed conditions that have been targeted for care transition interventions <sup>1</sup>	
<b>Stroke</b>	ICD-10-CA: I60, I61, I62, I63, I64; diagnosis type M (but not 2), 1, W, X, Y Note: Stroke definition for readmissions in the Clinical Utilization and Outcomes Technical Summary of the <i>Hospital e-Scorecard Report 2008: Acute Care</i> . <sup>2</sup>
<b>Cardiac arrhythmia</b>	ICD-10-CA: I46.0, I46.1, I46.9, I48.0, I48.1; diagnosis type M (but not 2), 1, W, X, Y
<b>Spinal stenosis</b>	ICD-10-CA: M480; diagnosis type M (but not 2), 1, W, X, Y
<b>Hip fracture</b>	ICD-10-CA: S72.0, S72.1, S72.2; diagnosis type M (but not 2), 1, W, X, Y



<b>Peripheral vascular disease</b>	<p>1. CCI: 1VC93, 1VG93, 1VQ93, 1WA93, 1WE93, 1WJ93, 1WL93, 1WM93</p> <p>EXCLUDING: ICD-10-CA: C40, C41, C46.1, C47, C49, D160, M46.2, M86, M87, M89.6, M90.0–M90.5, Q00, Q38–Q40, S02.0, S04.0, S09.0, S15, S25, T26; any diagnosis field, any diagnosis type</p>	<p>2. CCI: 1KG35HAC1, 1KG35HHC1, 1KG50, 1KG57, 1KG76</p> <p>EXCLUDING: ICD-10-CA: I60, I67.1, I71, I72, 177.0, 179.0, Q14.1, Q24.5, Q25.4, Q25.7, Q27.3, Q27.8, Q28.0–Q28.3; any diagnosis field, any diagnosis type</p>
<b>Deep vein thrombosis or pulmonary embolism</b>	<p>ICD-10-CA: I26.0, I26.9, I80.1, I80.2, I80.3, with diagnosis type 2 <b>or</b></p> <p>ICD-10-CA: T81.7, T82.8, T83.8, T84.8, T85.8 with diagnosis type 2, and I26.0, I26.9, I80.1, I80.2, I80.3 with diagnosis type 3.</p> <p>DO NOT INCLUDE: ICD-10-CA T86.822, T86.832, T86.842, T86.882</p>	
<b>Discharge exclusions</b>	<p>Obtained from Table 2: General Exclusions in the Clinical Utilization and Outcomes Technical Summary of the <i>Hospital e-Scorecard Report 2008: Acute Care</i><sup>2</sup></p>	
<ul style="list-style-type: none"> <li>• Diagnosis of cancer listed on the discharge record of the index event (ICD-10-CA: C00–C26, C30–C44, C45–C97, Z51.0, Z51.1, Z51.2); any diagnosis field</li> <li>• Diagnosis of AIDS/HIV listed on the discharge record of the index event (ICD-10-CA: B24, R75, Z21); any diagnosis field</li> <li>• Diagnosis of violent trauma listed on the discharge record of the index event (ICD-10-CA: V01–V99, W00, W02, W09, W11–W17, W20–W23, W25–W27, W30, W31, W33–W40, W44, W45, W50–W60, W64–W77, W81–W99, X00–X19, X20–X29, X30, X31, X33–X38, X51, X53, X54, X57, X60–X84, X85–Y09, Y35.0–Y35.4, Y35.6, Y35.7, Y36; any diagnosis field and dxtype = '9')</li> </ul>		

### E.3 LACE Index and RAI Aggregate Risk Score

<b>LACE Index<sup>3</sup></b>		
<p>The LACE index is a recently published 19-point clinical tool for predicting the risk of death and unplanned readmission within 30 days of hospital discharge. It is comprised of four main components: length of stay (L), acuity of admission (A), patient comorbidity as measured by the Charlson comorbidity score (C), and emergency department visits within the previous six months (E). Each of the four components contributes to the final index score as outlined below. The final LACE score is calculated by summing up the contributions of each component.</p>		
<b>Component</b>	<b>Value</b>	<b>Contributed points</b>
<b>L: length of stay (days)</b>	<1	0
	1	1
	2	2
	3	3
	4–6	4
	7–13	5
	≥14	7
<b>A: acuity of admission</b>	Yes	3
	No	0
<b>C: comorbidity (Charlson score)</b>	0	0
	1	1
	2	2
	3	3
	≥4	5
<b>E: visits to the emergency department (6 months prior)</b>	0	0
	1	1
	2	2
	3	3
	≥4	4

<b>RAI Aggregate Risk Score</b>		
<p>The Resident Assessment Instrument (RAI) Aggregate Risk Score is a five-point index that uses functional status and caregiver distress information provided on the RAI Home Care assessment to provide a measure of risk of admission to long-term care.</p> <p>The MAPLe level, Activities of Daily Living Hierarchy Scale, Cognitive Performance Scale, IADL Involvement Scale and CHES Scale are summed to obtain a risk score. The calculated sum is then integrated with a measure of caregiver distress and categorized as follows:</p>		
<b>Summed risk score value</b>	<b>Caregiver distress</b>	<b>RAI composite risk score</b>
0-7	-	Low
8-10	None indicated	Moderate-Low
8-10	Some distress indicated	Moderate-High
11-15	-	High
≥16	-	Very High

## APPENDIX F / COHORT OF OLDER ADULTS NEWLY PLACED IN LONG-TERM CARE

### Variables Assessed in the Historical Observation Windows

Look-back windows	Variables
1 year	<ul style="list-style-type: none"> <li>• Prior admissions to acute care (CIHI-DAD)</li> <li>• Prior same-day surgeries (SDS)</li> <li>• Prior ED visits (NACRS)</li> <li>• Previous primary care/specialist visits (OHIP)</li> <li>• Prior home care use (HCD)</li> <li>• Prior LTC applications (CPRO)</li> <li>• Total number of medications (ODB)</li> </ul>
2 years	<ul style="list-style-type: none"> <li>• Prior hospitalizations (CIHI-DAD) (for ADG calculation)</li> <li>• Prior ED visits (NACRS) (for ADG calculation)</li> <li>• Prior OHIP visits (for ADG calculation)</li> </ul>

## APPENDIX G / OTHER VARIABLES

### G.1 Diagnostic Codes for Potentially Preventable Conditions

Condition	ICD-10-CA Diagnostic Codes	Exclusions
Angina	I20, I2382, I240, I248, I249	Cases with surgical procedures (CCI: 1^, 2^, 5^)
Asthma	J45	
Cellulitis	L03	Cases with surgical procedures (CCI: 1^, 2^, 5^)
Chronic obstructive pulmonary disease	J12–J16, J18 (only when “other diagnosis” of J41–J44, J47 is present); J20 (only when “other diagnosis” of J41–J44, J47 is present); J41–J44, J47	
Congestive heart failure	I50, J81	Cases with surgical procedures (CCI: 1HB53, 1HB54, 1HB55, 1HD53, 1HD54, 1HD55, 1HZ53, 1HZ55, 1HZ85, 1IJ50, 1IJ76)
Dehydration	E86	
Diabetes	E101, E106, E107, E109, E110, E111, E116, E117, E119, E130, E131, E136, E137, E139, E140, E141, E146, E147, E149	
Gastroenteritis	K52 (other noninfective gastroenteritis and colitis)	
Grand mal seizure disorders	G40, G41	
Hypertension	I100, I101, I11	Cases with surgical procedures (CCI: 1HB53, 1HB54, 1HB55, 1HD53, 1HD54, 1HD55, 1HZ53, 1HZ55,) 1HZ85, 1IJ50, 1IJ76)

Condition	ICD-10-CA Diagnostic Codes	Exclusions
Hypoglycemia	E162	
Kidney/urinary tract infection	N10, N11, N136, N151, N390	
Pneumonia	J12-J16, J18	
Severe ear, nose or throat infection	J02, J03, J312	

## G.2 Aggregated Diagnosis Groups (ADGs) Used to Qualify an Individual as Having Two or More Coexisting Chronic Conditions

ADG number and description <sup>4</sup>
<p>Group 5 – Allergies</p> <p>Group 6 – Asthma</p> <p>Group 10 – Chronic Medical: Stable</p> <p>Group 11 – Chronic Medical: Unstable</p> <p>Group 12 – Chronic Specialty: Stable - Orthopedic</p> <p>Group 13 – Chronic Specialty: Stable - Ear, Nose, Throat</p> <p>Group 14 – Chronic Specialty: Stable - Eye</p> <p>Group 16 – Chronic Specialty: Unstable - Orthopedic</p> <p>Group 17 – Chronic Specialty: Unstable - Ear, Nose, Throat</p> <p>Group 18 – Chronic Specialty: Unstable - Eye</p> <p>Group 24 – Psychosocial: Persistent/Recurrent, Stable</p> <p>Group 25 – Psychosocial: Persistent/Recurrent, Unstable</p> <p>Group 32 – Malignancy</p>

**APPENDIX H / ACRONYMS USED**

<b>ACG</b>	Adjusted Clinical Group	<b>GP/FP</b>	General Practitioner/Family Practitioner
<b>ACSC</b>	Ambulatory Care Sensitive Conditions	<b>HCD</b>	Home Care Database
<b>ADG</b>	Aggregated Diagnosis Group	<b>IADL</b>	Instrumental Activities of Daily Living
<b>ADL</b>	Activities of Daily Living	<b>LACE</b>	Length of stay, Acuity of admission, patient Comorbidity and number of visits to the Emergency department
<b>ALC</b>	Alternate Level of Care	<b>LHIN</b>	Local Health Integration Network
<b>CAP</b>	Clinical Assessment Protocol	<b>LTC</b>	Long-Term Care
<b>CCAC</b>	Community Care Access Centre	<b>MAPLe</b>	Method for Assigning Priority Levels
<b>CCC</b>	Complex Continuing Care	<b>MOHLTC</b>	Ministry of Health and Long-Term Care
<b>CHESS</b>	Changes in Health, End-stage Disease, and Signs and Symptoms	<b>NACRS</b>	National Ambulatory Care Reporting System
<b>CIHI-DAD</b>	Canadian Institute for Health Information—Discharge Abstract Database	<b>NRI</b>	Needs Risk Indicator
<b>CPRO</b>	Client Profile Database	<b>ODB</b>	Ontario Drug Benefit
<b>CPS</b>	Cognitive Performance Scale	<b>OHIP</b>	Ontario Health Insurance Plan
<b>DRS</b>	Depression Rating Scale	<b>RAI-HC</b>	Resident Assessment Instrument—Home Care
<b>ED</b>	Emergency Department	<b>RPDB</b>	Registered Persons Database

## APPENDIX REFERENCES

- 1 Coleman EA, Parry C, Chalmers S, Min SJ. The care transitions intervention: results of a randomized controlled trial. *Arch Intern Med* 2006; 166(17):1822-8.
- 2 Choy L, Pong HC, Zhang C. *Hospital e-Scorecard Report 2008: Acute Care. Clinical Utilization and Outcomes Technical Summary*. Toronto, ON: Hospital Report Research Collaborative; 2008. Accessed October 6, 2011 at <https://ozone.scholarsportal.info/bitstream/1873/13453/1/288309.pdf>.
- 3 van Walraven C, Dhalla IA, Bell C, Etchells E, Stiell IG, Zarnke K, Austin PC, Forster AJ. Derivation and validation of an index to predict early death or unplanned readmission after discharge from hospital to community. *CMAJ* 2010; 182(6):551-7.
- 4 Doupe M, Brownell M, Kozyrskyj A, Dik N, et al. *Using Administrative Data to Develop Indicators of Quality Care in Personal Care Homes*. Winnipeg, MB: Manitoba Centre for Health Policy; 2007. Accessed April 20, 2011 at <http://mchp-appserv.cpe.umanitoba.ca/reference/pch.qi.pdf>.



Institute for Clinical  
Evaluative Sciences (ICES)

G1 06, 2075 Bayview Avenue  
Toronto, Ontario M4N 3M4

**Email:** [info@ices.on.ca](mailto:info@ices.on.ca)  
**416.480.4055**



[www.ices.on.ca](http://www.ices.on.ca)

**ICES** Institute for Clinical  
Evaluative Sciences