

# **Caring for People with Multiple Chronic Conditions: A Necessary Intervention in Ontario**

**Working Paper Series  
Volume 2  
June 2013**



***Caring for People with Multiple Chronic Conditions:  
A Necessary Intervention in Ontario***

Gustavo Mery<sup>1,2</sup>, Walter P Wodchis<sup>1</sup>, Arlene S Bierman<sup>1,2,3</sup>, Maude Laberge<sup>1</sup>

Working Paper Series

Volume 2

June 2013

---

<sup>1</sup> Institute of Health Policy Management and Evaluation, University of Toronto, Canada

<sup>2</sup> Canadian Health Services Research Group

<sup>3</sup> Keenan Research Center, Li Ka Shing, Knowledge Institute. St. Michael's Hospital, Toronto, Canada

<sup>4</sup> Laurence S. Bloomberg Faculty of Nursing, University of Toronto, Canada

## Acknowledgements

The Health System Performance Research Network (HSPRN) is a multi-university and multi-institutional network of researchers who work closely with policy and provider decision makers to find ways to better manage the health system. The HSPRN receives funding from the Ontario Ministry of Health and Long-Term Care (MOHLTC). The views expressed here are those of the authors with no endorsement from the MOHLTC. Natasha Nanwa and Ellie Adler collaborated in a literature review in the early stages of this project, and Andrea Gruneir provided valuable comments. We thank the HSPRN Research Team for their support and suggestions.

Competing Interests: The authors declare that they have no competing interests.

Reproduction of this document for non-commercial purposes is permitted provided appropriate credit is given.

Cite as: **Mery G, Wodchis WP, Bierman A, Laberge M. *Caring for People with Multiple Chronic Conditions: A Necessary Intervention in Ontario. Working Paper Series. Vol 2.* Toronto: Health System Performance Research Network; 2013.**

This report is available at the Health System Performance Research Network Website: <http://hsprn.ca>.

For inquiries, comments and corrections, please email [info@hsprn.ca](mailto:info@hsprn.ca).

## Acronyms and Abbreviations

ACOVE	Assessing Care Of Vulnerable Elders
ACSC	Ambulatory Care Sensitive Conditions
ADLs	Activities of Daily Living
ALC	Alternate Level of Care
AMI	Acute Myocardial Infarction
CCM	Chronic Care Model
CHC	Community Health Centres
CHF	Congestive Heart Failure
COPA	French Acronym for Coordination of Professional Care for the Elderly
COPD	Chronic Obstructive Pulmonary Disease
ECCM	Expanded Chronic Care Model
ED	Emergency Department
EHR	Electronic Health Records
FHT	Family Health Teams
GRACE	Geriatric Resources Assessment and Care of Elders
HF	Heart Failure
IADLs	Instrumental Activities of Daily Living
LTCHs	Long-Term Care Homes
MCC	Multiple Chronic Conditions
MCDM	Multiple Chronic Disease Management
NP	Nurse Practitioner
OT	Occupational Therapist
PACE	Program of All-Inclusive Care for the Elderly
PACIC	Patient Assessment of Chronic Illness Care
PAM	Patient Activation Measure
PCAS	Primary Care Assessment Survey
PCAT	Primary Care Assessment Tool
PCP	Primary Care Physician
PCT	Primary Care Team
PRISMA	Program of Research to Integrate Services for the Maintenance of Autonomy
PROMs	Patient Reported Outcomes Measures
PSWs	Personal Support Workers
PT	Physiotherapist
RCT	Randomized Controlled Trial
RN	Registered Nurse
Sf-36	36-Item Short-Form
SIPA	French Acronym for System of Integrated Care for Older Persons
SW	Social Worker

## Table of Contents

<b>1. Introduction – Chronic Conditions in an Aging Population</b> .....	<b>7</b>
1.1. The Challenge of Multiple Chronic Disease .....	7
1.2. Purpose of the White Paper.....	8
<b>2. Magnitude of the Problem</b> .....	<b>9</b>
2.1. Definition and Prevalence .....	9
2.2. Burden and Impact in the Health Care System .....	9
2.3. Evidence from Ontario .....	10
2.4. Gaps and Challenges in the Health Care System .....	13
<b>3. Evidence-Based Care for Multiple Chronic Disease Management</b> .....	<b>14</b>
3.1. The Chronic Care Model and the Expanded Chronic Care Model .....	14
3.2. The Chronic Disease Prevention and Management Framework .....	14
3.3. Components of Interventions Applicable to Management of Older Adults with Multiple Chronic Conditions .....	17
3.4. Exemplar Intervention Models and Evidence of Impact on Health Outcomes .....	18
3.4.1. <i>The Geriatric Resources Assessment and Care of Elders Model</i> .....	18
3.4.2. <i>The Program of All-inclusive Care for the Elderly</i> .....	19
3.4.3. <i>The Guided Care Model</i> .....	20
3.4.4. <i>The SIPA/COPA Models</i> .....	21
3.4.5. <i>The PRISMA</i> .....	22
<b>4. Principles and Components of a Multiple Chronic Disease Management Model for Ontario</b> .....	<b>23</b>
4.1. Four Principles of an MCDM Model in Ontario.....	23
4.1.1. <i>Population-Based Patient-Centred Care</i> .....	23
4.1.2. <i>Organization in Primary Care</i> .....	24
4.1.3. <i>Interdisciplinary Collaboration</i> .....	25
4.1.4. <i>Community Embedded (Grounded in the Community)</i> .....	26
4.2. Eighteen Components of Standard Care for an MCDM Model in Ontario .....	26
<b>5. Measuring System Performance for People with Multimorbidity</b> .....	<b>38</b>
5.1. Performance Measurement in MCC Programs in the Literature.....	38
5.2. Performance measurement to promote high performance of MCC teams .....	41
5.3. Performance measurement for MCDM using the Ontario’s Chronic Disease Preventive and Management Framework .....	43

<b>6. Proposed Implementation Strategy for MCDM in Ontario .....</b>	<b>45</b>
6.1. Stage #1: Implement MCDM Programs in All Primary Care Teams .....	45
6.2. Stage #2: Enhance Primary Health Care with the Inclusion of Specialized Rehabilitation Services, Home Care Providers and Long-Term Care Homes .....	47
6.3. Stage #3: Inclusion of a Growing Number of Medical Specialties .....	48
6.4. Stage #4: Extension to a System Integrated in the Community with Inclusion of a Growing Number of Population Groups.....	50
<b>7. Conclusions .....</b>	<b>51</b>
<b>Reference List.....</b>	<b>53</b>

## List of Tables and Figures

<b>TABLES</b> .....	<b>10</b>
<b>Table 1</b> Top 5 combinations of chronic conditions by total number of persons in Ontario (2006-07) and corresponding number of primary care visits (average 2007-08 and 2008-09).....	10
<b>Table 2</b> List of recommended components of standard care for patients with MCC .....	27
<b>Table 3</b> Components of MCC management in the literature.....	28
<b>Table 4</b> Types of health care providers in the primary care teams for patients with MCC..	30
<b>Table 5</b> Performance measures for models for MCC management in the literature.....	40
<b>Table 6</b> Types of performance measures for high performer MCC teams.....	41
<b>FIGURES</b> .....	<b>12</b>
<b>Figure 1</b> Average annual cost of care for people with chronic conditions in 2009/10 Ontario.....	12
<b>Figure 2</b> Ontario’s Chronic Disease Prevention and Management Framework.....	15

# 1. Introduction – Chronic Conditions in an Aging Population

## 1.1. The Challenge of Multiple Chronic Disease

The problem of chronic conditions and their impact on the health care system is a worldwide concern.<sup>1;2</sup> In western societies, as the baby boomer cohort ages and chronic disease risk factors, such as sedentary lifestyle and obesity, increase in prevalence, an increasing number of individuals experience multiple chronic conditions (MCC).<sup>3-5;6-8</sup> Individuals with MCC drive a growing demand for health care services;<sup>9</sup> yet the current fragmented system is not organized to provide care to MCC patients effectively and efficiently. The challenges that this situation creates for the health care system are multiple and complex.<sup>5;10</sup> The way health care services are currently structured, focusing on management of single diseases and often oriented toward managing acute events, including exacerbations of chronic diseases, fails to meet the ongoing needs of patients with MCC. Quality and outcomes of care for these people are often suboptimal. There is a compelling need to transform the health system by restructuring the provision of care to deliver integrated patient-centred care. This fundamental restructuring of care delivery is one of the biggest and most exciting health care challenges to be accomplished in the coming years. Internationally, a growing number of models of integrated care are being designed to improve the quality and outcomes of care for people with MCC, who are high utilizers of the health care system. Some of these programs, by minimizing the occurrence of adverse events and by creating efficiency through reducing fragmentation and duplication of services, have the potential to both improve the patients' experience of care and reduce system costs.



## 1.2. Purpose of the White Paper

In this scoping review, we analyzed a few of the most promising models of integrated care for people with MCC with a focus on older populations where multimorbidity is common. We identify key characteristics and common goals in these models. From these elements, we propose our own Ontario model for the management of people with MCC, and a four-stage implementation approach.

## 2. Magnitude of the Problem

### 2.1. Definition and Prevalence

MCC or multimorbidity may be defined as the co-occurrence of two or more chronic illnesses within a single person.<sup>11;12</sup> In contrast to comorbidity, which focuses on co-occurring illnesses in individuals with a primary diagnosis such as heart disease or cancer, the term multimorbidity acknowledges that it is the combination of chronic conditions that influence clinical management and health outcomes. Other terms, such as polypathology and pluri-pathology, are also used to describe the same patient population, which may affect the consistency of findings in the literature. People with MCC have a higher incidence of disability and frailty, and higher clinical complexity.<sup>7;13</sup>

The estimates of the prevalence of multimorbidity in different countries range from 17% to 25% of the general population, and from 50% to 60% of adults aged 65 or over.<sup>13-19</sup> The Canadian Chief Public Health Officer's Report on the State of Public Health in Canada highlighted that 31% of adults aged 45-64 had two or more chronic diseases increasing to 65% for adults aged 65-79 and to 78% for those aged 80 and over.<sup>20</sup> The oldest age group is the one that will be growing at the fastest rate in the coming decades.<sup>21</sup>

### 2.2. Burden and Impact in the Health Care System

The presence of chronic conditions is associated with higher levels of health care service utilization. As the number of chronic conditions increases with age, so does the intensity of individual demand for care.<sup>3;22</sup> From a financial perspective, the increasing demand for health care services is expected to raise costs for the system. In US studies, the number of chronic conditions has been directly related to increased Medicare and Medicaid expenditures.<sup>3;23</sup>

### 2.3. Evidence from Ontario

The evidence in Ontario mirrors the experience of other jurisdictions. According to the Ontario Medical Association (OMA), chronic conditions affect 81% of Ontario adults aged 65 or over, of which 56% have MCC.<sup>5</sup> In a recent study using data at the Institute for Clinical Evaluative Sciences (ICES), Iron et al.<sup>24</sup> examined the prevalence of six common chronic conditions in Ontario: hypertension, asthma, diabetes, chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), and consequences of acute myocardial infarction (AMI). The number of Ontarians affected by at least one of these conditions was 3.7 million, with 24% of this population affected by two of the defined conditions and 11% affected by three or more. The researchers found that, compared with individuals with one condition, those with three or more diagnoses had 56% more primary care visits, 76% more specialist visits, 256% more inpatient hospital stays, 11% more emergency department visits, and 68% more prescriptions. Table 1 shows that a set number of these conditions accounted for a very high volume of primary care encounters in the health care system.

**Table 1: Top 5 combinations of chronic conditions by total number of persons in Ontario (2006-07) and corresponding number of primary care visits (average 2007-08 and 2008-09).**

Hypertension	Asthma	Diabetes	COPD	CHF	Number of persons	Annual average person-visits per year	Annual average number of visits per person
X	X		X		65,280	523,546	8.02
X		X	X		52,571	404,797	7.70
X	X	X			42,349	368,436	8.70
X		X		X	34,351	253,510	7.38
X	X	X	X		26,174	244,465	9.34

Data from Iron et al. (2011), Table 2.<sup>24</sup>

Additional evidence on the magnitude of the problem of chronic conditions and multimorbidity in Ontario has been described by Wodchis et al.<sup>25</sup> This study focused on identifying the transitions and costs associated with conditions that had been included in trials of care transition interventions. There is evidence that care transition interventions can improve care and reduce days in hospital, acute readmissions, and costs for these individuals.<sup>26-28</sup> Wodchis et al. identified 7,513 individuals over the age of 65 who were admitted to acute care in Ontario hospitals between April 1, 2006, and March 31, 2007, with two or more Ambulatory Care Sensitive Conditions (ACSC).<sup>i,ii</sup> The burden on the system in terms of care and cost for this population is reflected in its high utilization of health services. For instance, in the year prior to hospitalization, the average number of different prescriptions for these patients was 14.3, while the average number of Emergency Department (ED) visits was 2.13. Of the total cohort, 11% died during the index hospitalization and 67% survived at least another year. Among those discharged alive, 88% were discharged to the community. Rates for ED visits and readmission to acute care were 23% and 16% respectively at 30 days, and 39% and 28% within 90 days. In the year following discharge, 43.6% visited six or more different physicians in the community and 28% filled prescriptions from three or more different pharmacies.

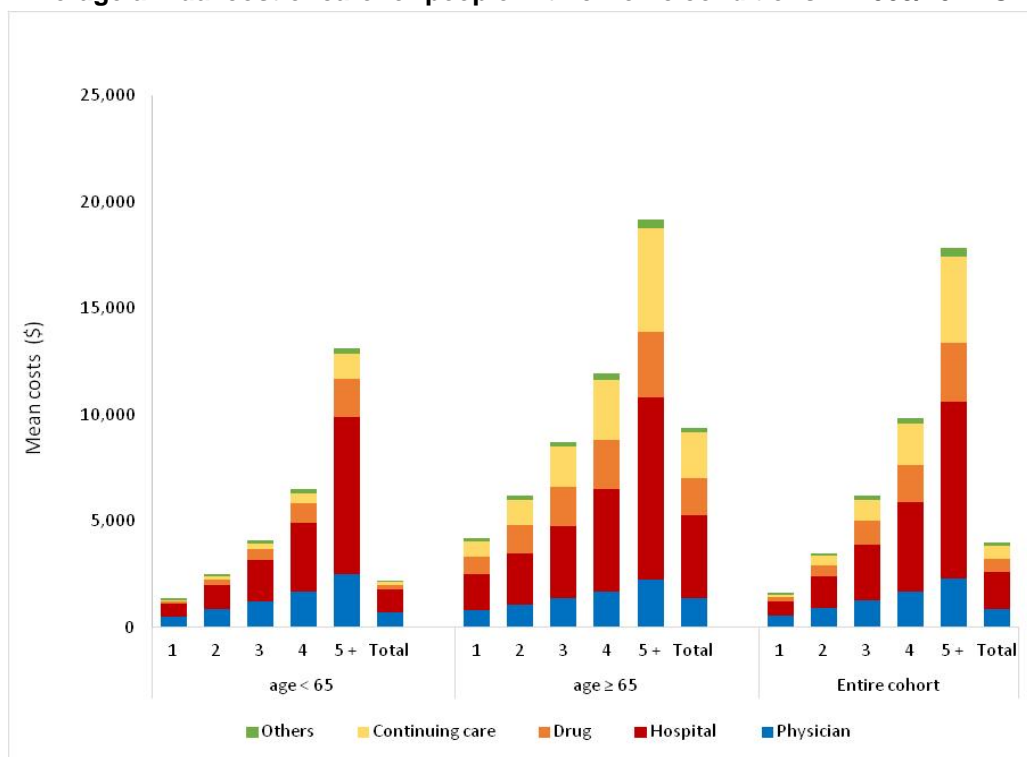
In a cohort of Ontarians aged 0 to 105 years old with one or more chronic conditions in 2009/10 the average annual cost for those individuals with five or more chronic conditions was 11 times higher than of those with one chronic condition, and this difference was 4.6 times higher for seniors aged 65 and older (Figure 1).<sup>29</sup>

---

i ACSCs include: angina, asthma, chronic obstructive pulmonary disease (COPD), diabetes, grand-mal status and other epileptic convulsions, congestive heart failure (CHF), pulmonary edema, and hypertension.

ii Additional exclusion criteria: admission to acute care from other health institutions, patients who were in palliative care in the past 6 months, patients with cancer, HIV/AIDS, a diagnosis of violent trauma or psychiatric conditions as listed on the initial hospitalization abstract.

**Figure 1: Average annual cost of care for people with chronic conditions in 2009/10 in Ontario**



Source: Thavorn et al. (2013) Economic Burden of Multimorbidity in Ontario's Health Care System.<sup>29</sup>

Heart failure (HF) presents a good example of why a single disease focus falls short in meeting the needs of most older adults with MCC. HF is the leading cause of hospital admission in older adults and has a significant impact on quality of life and functional status. The prevalence of HF is growing due to an aging population, increased survival of patients after a myocardial infarction, and rising prevalence of risk factors such as diabetes. Forty percent of HF patients age 65 and older have 5 or more non-cardiac comorbid conditions, contributing to increased rates of preventable hospitalizations.<sup>30</sup> The Project for an Ontario Women's Health Evidence-based Report (POWER) Study examined differences in hospitalization rates associated with sex, age and income. In Ontario, there were 18,809 hospital admissions for HF in 2006-07, the overwhelming majority of them among adults aged 65 and older, with the highest rates of admission occurring among those aged 80 and older.<sup>31</sup>

## 2.4. Gaps and Challenges in the Health Care System

The literature suggests that fragmentation, a single disease focus in services and guidelines, lack of integration between medical and social services, and lack of adequate measures of performance are the major reasons for poor chronic care management. According to the Engelberg Center for Health Care Reform at Brookings,<sup>23</sup> key challenges in the U.S. to improving the delivery of care to older adults include fragmented financing and care, the lack of integration between medical services and social supports, and the need for more effective measures to evaluate long-term services and supports. Despite being a considerably different model of health care finance and organization, the Canadian health care system faces similar challenges. Tsasis & Bains<sup>32</sup> attribute the Canadian health care system's poor ranking on indicators of performance in the care of chronic diseases to a system that is focused on acute care, fragmented delivery, and deficiencies in patient centredness, among other factors. Kodner<sup>33</sup> considers that different countries confront broadly similar challenges, including fragmented services, disjointed care, less-than-optimal quality, system inefficiencies, and difficulties in cost control. Bergman et al.<sup>34</sup> add negative incentives and the absence of accountability as additional gaps.

### **3. Evidence-Based Care for Multiple Chronic Disease Management**

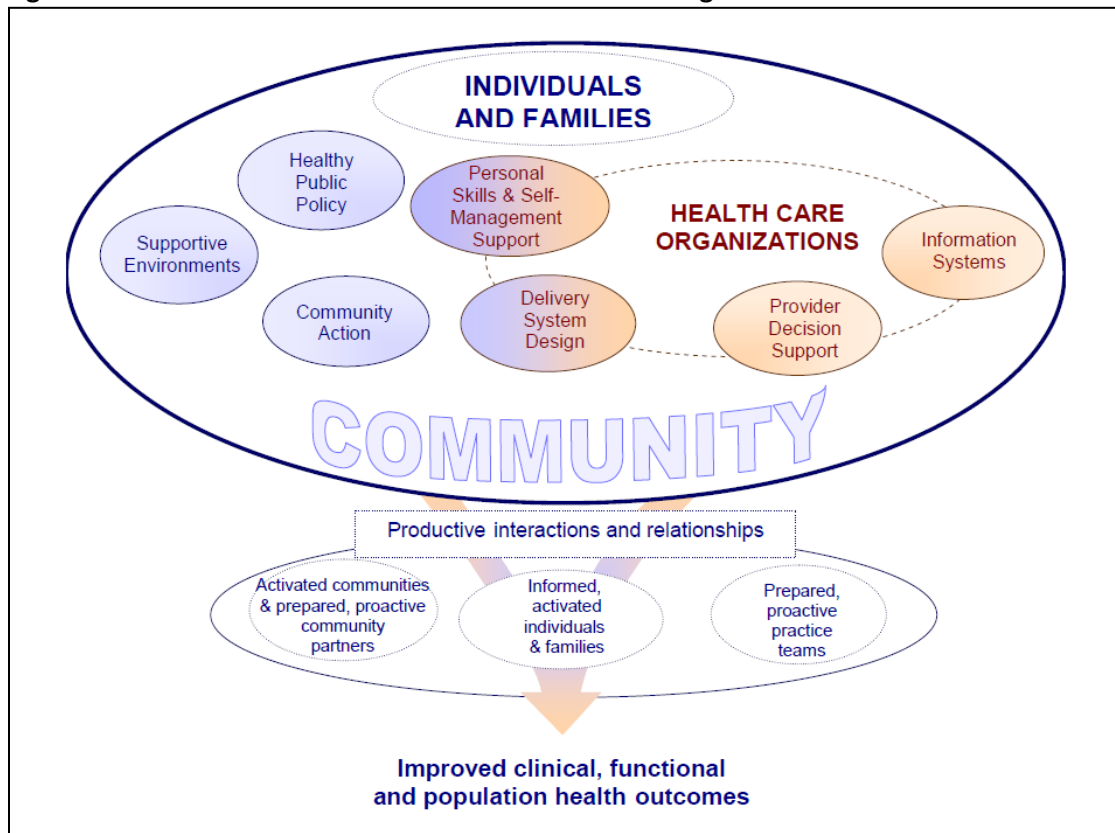
#### **3.1. The Chronic Care Model and the Expanded Chronic Care Model**

The Chronic Care Model (CCM) was initiated by Wagner et al.,<sup>35</sup> who identified common characteristics of successful intervention programs in chronic illness and proposed a model of chronic care management based on integrated, patient-centred care. Further developed by the MacColl Institute for Healthcare Innovation and the Institute of Healthcare Improvement,<sup>36</sup> the CCM aims to improve “functional and clinical outcomes” through the “productive interactions” between an “informed, activated patient” and a “prepared, proactive practice team.” The model has five main elements: 1) self-management support, 2) decision support, 3) delivery system design, 4) clinical information systems, and 5) community resources and policies. The Expanded CCM (ECCM), developed by Barr et al.,<sup>37</sup> broadens the CCM and adds three community components: 1) building healthy public policy, 2) creating supportive environments, and 3) strengthening community action. Ontario has adopted the ECCM for their Chronic Disease Prevention and Management Framework.<sup>38</sup>

#### **3.2. The Chronic Disease Prevention and Management Framework**

The Ontario Ministry of Health and Long Term Care adopted the ECCM, adapting it to the Ontario’s Chronic Disease Prevention and Management Framework.<sup>38</sup> The seven components of the model, pictured in Figure 2, are described below.

Figure 2: Ontario's Chronic Disease Prevention and Management Framework



From: Ontario Ministry of Health and Long-Term Care (2007).<sup>38</sup>

- 1) **Personal Skills and Self-Management Support** refers to the importance of the central role that patients have in managing their own care, but also to the development of personal skills for health and wellness, with strategies both in the community and in the health system.
- 2) **Delivery System Design** focuses on teamwork and an expanded scope of practice for team members to support chronic care. The ECCM encourages those in the health care sector to move beyond the provision of clinical and curative services to an expanded mandate that supports health of individuals and communities immersed in a broader social, political, economic, and physical environment.



- 3) **Provider decision support** encompasses providing tools to support clinical decision making, incorporating evidence not only from guidelines for disease and treatment but also for strategies for being well and staying healthy.
- 4) **Information systems** should be broadly based, including clinical, demographics, cultural, social, and economic information at the patient, community, and population levels, and should support patient-centred clinical management, quality improvement, and improvement of population health.
- 5) **Healthy public policy** involves working towards organizational and governmental policy and legislation that ensure safer and healthier goods, services, and environments, and active and non-sedentary lifestyles. It should foster greater equity in society as well as health policy that aligns incentives with patient needs and desired outcomes.
- 6) **Supportive environments** should generate conditions for optimal levels of health in social and community environments, with living and employment conditions that are safe, stimulating, satisfying, and enjoyable.
- 7) **Community action** refers to participation and empowerment of community groups to set priorities and achieve goals that enhance the health of the community.

The extension of the CCM to the ECCM is represented in a number of ways. First, the replacement of a solid line by a porous line indicates the interaction among health care organizations and the communities they serve, in terms of ideas, resources, and people. Another difference is the placement of the four components of the health system straddling the border with the community, which represents how the integration of activities in these areas addresses needs in both the health care delivery system and the community. Also, in the ECCM and the Ontario adaptation, outcomes include population health as well as individual functional and

clinical outcomes. Population outcomes include burden of illness, quality of life, and health care services utilization. Public policies to support population health, citizen participation, and social cohesion are also necessary.

### **3.3. Components of Interventions Applicable to Management of Older Adults with Multiple Chronic Conditions**

In 2009, a literature review by Boult et al.<sup>4</sup> identified 13 components of chronic care for older adults that address the need of patients with chronic conditions: 1) interdisciplinary primary care; 2) care or case management; 3) disease management; 4) preventive home visits; 5) comprehensive geriatric assessment (CGA) and geriatric evaluation and management (GEM); 6) pharmaceutical care; 7) chronic disease self-management; 8) proactive rehabilitation; 9) caregiver education and support; 10) transitional care; 11) substitutive hospital-at-home and early discharge hospital-at-home; 12) care in nursing homes; and 13) comprehensive inpatient care.

In 2005, in an analysis of 13 systematic reviews of programs of integrated care for chronically ill patients, Ouwens et al.,<sup>39</sup> identified reducing fragmentation and improving continuity of care and coordination of care as the main objectives of these programs. Similar to elements contained in the models identified by Boult et al., the six most common components identified by Owens et al. were: 1) self-management support and patient education; 2) structural clinical follow-up and case management; 3) multidisciplinary teams; 4) multidisciplinary evidence-based clinical pathways; 5) feedback and reminders; and 6) education for professionals. Other important elements mentioned were: a supportive clinical information system; a shared mission and leaders with a clear vision of the importance of integrated care; finances for implementation and maintenance; management commitment and support; and a culture of quality

improvement.

### **3.4. Exemplar Intervention Models and Evidence of Impact on Health Outcomes**

Several exemplar programs have been implemented and sustained with evidence of improved care and outcomes. We summarize four such programs here.

#### **3.4.1. The Geriatric Resources Assessment and Care of Elders Model**

The Geriatric Resources Assessment and Care of Elders (GRACE) model of primary care for low-income seniors and their primary care physicians (PCPs) was developed in the U.S. to improve geriatric care, decrease excess health care use and prevent nursing home placement.<sup>40</sup> The GRACE Support Team consists of a nurse practitioner and a social worker, who operate as case managers. A larger GRACE Interdisciplinary Team includes a geriatrician, pharmacist, physical therapist, mental health social worker, and a community-based services liaison. The care managers perform a comprehensive geriatric assessment of the patient upon enrolment, including medical history, medication use, social support, and the patient's goals and preferences. The patient then meets with the interdisciplinary team to develop an individualized care plan, including activation of protocols on common geriatric conditions. The GRACE support team meets to discuss this plan with the patient's PCP and implements it, based on the team's specialized training on GRACE Protocols. These recommendations are based on published guidelines and input from primary care providers on 12 geriatric conditions chosen by PCPs and public health opinion leaders (e.g., difficulty walking/falls, memory loss, chronic pain, etc.). During the implementation of the care plan, the GRACE Support Team conducts an annual assessment, calls the patient monthly, and visits the patient at home after a hospitalization or an

Emergency Department (ED) visit. Patient self-management support is provided, and the use of electronic medical records supports clinical management and continuity of care.

In a randomized controlled trial (RCT), the GRACE program resulted in improved quality in process of care measures in the Assessing Care of Vulnerable Elders (ACOVE) list, improved medical outcomes in the 36-Item Short-Form (SF-36) scales, reduced ED visits, and no differences in Activities of Daily Living (ADLs) or death. Reduced acute care hospitalizations was only found to be significant among high-risk groups.<sup>41</sup> The program has shown better patient and physician experience compared with usual care.<sup>42</sup> In another RCT, increases in chronic and preventive care costs were offset by reductions in acute care costs, but only in populations at high risk of hospitalization.<sup>43</sup> When the GRACE program targets high-intensity interventions to high-risk individuals, it achieves cost-effectiveness.

### 3.4.2. The Program of All-inclusive Care for the Elderly

The Program of All-inclusive Care for the Elderly (PACE), implemented in multiple states in the U.S., aims to enable the elderly to remain living in the community, and targets individuals who have been certified by their state as needing nursing home care. The key elements of PACE are its interdisciplinary teams delivering coordinated care, its focus on prevention, and a capitation funding system inclusive of primary care, community care, and acute care.<sup>44</sup> The program includes the following services: 1) adult day care; 2) medical care provided by a PACE physician; 3) home health and personal support care; 4) prescription drugs; 4) social services; 5) respite care; 6) medical specialists; and 7) hospital and nursing home care.<sup>45</sup>

Mukamel et al.,<sup>46;47</sup> in two studies using individual-level clinical data from DataPACE combined with direct-care staff survey data and interviews with management, studied the impact of PACE program characteristics and team performance on health and functional outcomes.

PACE team performance was associated with better functional outcomes (ability to perform ADLs) at 3 and 12 months and better 12-month urinary incontinence outcomes, but no differences in survival were found. As with many similar programs, PACE enrollees are near the end of life and extended survival may be a less important outcome than quality of life. Program characteristics (including financial factors, personnel, practice variables, case-mix, program age, and program size) were also associated with changes in ability to perform ADLs at 3 and 12 months, and a few characteristics were associated with improved self-assessed health status. Mortality was only associated with practice variables (services concentration and ratio of professional to nonprofessional staff).

### 3.4.3. The Guided Care Model

Guided Care is specifically designed for older adults with MCC. Its seven components are: 1) disease management; 2) self-management; 3) case management; 4) lifestyle modification; 5) transitional care; 6) caregiver education and support; and 7) geriatric evaluation and management. It involves a registered nurse, intensively trained in chronic care (Guided Care nurse), who uses a customized electronic health record in working with two to five PCPs to care for 50 to 60 patients.<sup>48</sup> The Guided Care nurse conducts a home assessment, which is discussed with the physician, the patient and the caregiver to create two comprehensive evidence-based management care plans: a *care guide* for health care professionals and an *action plan* for the patient and caregiver.<sup>48</sup>

The effect of Guided Care has been studied from various perspectives. In a cluster RCT conducted in the mid-Atlantic region of the U.S., Guided Care was shown to result in improved patient care using Patient Assessment of Chronic Illness Care (PACIC) and higher Guided Care nurse satisfaction after a year of the pilot program.<sup>49</sup> Physicians were shown to have experienced

higher satisfaction and knowledge of their older multimorbid patients using the Primary Care Assessment Tool (PCAT) and other validated survey questions.<sup>49;50</sup> The PACIC was also adapted to assess caregiver experience, showing higher overall quality of patient care, including subscales on goal setting, coordination of care, decision support, and patient activation. No differences were detected regarding depression, strain, and productivity loss among caregivers.<sup>51</sup>

In a nonrandomized prospective clinical trial conducted in urban Baltimore, Guided Care patients reported improved quality of physician-patient communication using the Primary Care Assessment Survey (PCAS).<sup>52</sup> These patients also showed inconclusive evidence of lower insurance expenditures and services utilization after six months in the program.<sup>53</sup>

#### **3.4.4. The SIPA/COPA Models**

The SIPA (French acronym for System of Integrated Care for Older Persons), developed in Quebec and replicated in France under the name COPA (French acronym for Coordination of Professional Care for the Elderly), is a system of integrated care for older persons based on community primary care. The systems are responsible for the delivery of all services for a cohort of eligible seniors, including health and social acute and long-term services in the community and institutions, in both acute care hospitals and nursing homes. The integration of health and social services is achieved via: a) case management; b) multidisciplinary teams; c) key role of PCPs; d) the application of guidelines and services evidence-based and adapted to local populations; e) a clinical model that includes all services; and f) participation of case managers in the planning of services following hospital discharge. Local SIPA organizations are responsible for a frail older population within a given territory, offering rapid and flexible needs-based responses and 24/7 on-call services. Funding of local SIPA budgets is via capitation and is coupled with financial responsibility for all services delivered. The PCPs play a key role that

includes recruitment of eligible patients, involvement in care plan development, integration with specialized care through community-based geriatricians, and participation in decision-making during hospitalizations.<sup>54-57</sup>

Evidence from an RCT showed increased accessibility for health and social home care services, and reduced hospital alternate level of care (ALC) days, with no differences in utilization and cost of EDs, or acute hospital inpatient and nursing home stays. SIPA patients showed reduced cost of institutional services and increased cost of community services, with no differences in total costs. Satisfaction was higher for SIPA caregivers, with no differences in burden of care and out-of-pocket costs. No differences in health status were detected.<sup>54</sup>

### 3.4.5. The PRISMA

The PRISMA (Program of Research to Integrate Services for the Maintenance of Autonomy) is a coordination-type integrated model that targets older adults at risk of functional decline. It is based on six components: 1) coordination of decision makers and managers at the regional and local levels; 2) single entry point; 3) single assessment instrument coupled with a case-mix management system; 4) case management for high-risk patients; 5) individualized service plans; and 6) a computerized clinical chart.<sup>58;59</sup>

In a population-based quasi-experimental study, PRISMA groups showed lower prevalence and incidence of functional decline and lower unmet needs. Patient satisfaction and empowerment were significantly higher, and ED visits were lower than expected.<sup>60</sup>

In a joint analysis of the PACE, SIPA, and PRISMA programs, Kodner<sup>33</sup> identified four main organizational elements leading to success synergistically: 1) umbrella organisational structure; 2) case-managed, multidisciplinary team care; 3) organized provider network; and, 4) financial incentives.

## 4. Principles and Components of a Multiple Chronic Disease Management Model for Ontario

We propose the adoption and implementation of a Multiple Chronic Disease Management (MCDM) model for patients with MCC in Ontario with four principles and 18 components of standard care, implemented sequentially in four stages over four years.

### 4.1. Four Principles of an MCDM Model in Ontario

The four basic principles for the model proposed are:

1. *Population-Based Patient-Centred Care*
2. *Organization in Primary Care*
3. *Interdisciplinary Collaboration*
4. *Community Embedded (Grounded in the Community)*

#### 4.1.1. Population-Based Patient-Centred Care

A population-based patient-centred model of care means that health care services focus attention on the population with MCC and are organized to deliver services according to the particular needs of this group of patients. The traditional model of health care delivery is centred on health care organizations and providers (e.g., a centre focused on mental health separated from an agency providing social services at home). A patient-centred approach focuses on attending the concurrent mental, physical, and social needs of the patient.

Some of the main characteristics of this principle are as follows:

- The elimination of the single disease focus: The model must address patients' multiple conditions and needs simultaneously and support the development of a management plan



that considers the mix and severity of their conditions, rather than a fragmented single disease approach.

- Simultaneous attention to physical, mental, and social needs: These three elements work together and interact constantly in the person, and should be balanced in MCC management.
- Active involvement of the patient, the family, and the community: Partnership with the patient, family, and community is vital for a patient-centred approach. The model should emphasize supporting self-management, the involvement of patient and family in decision making considering their concerns and care priorities, and support from community services.

A patient-centred health care system is not only desirable and necessary for attending the needs of the population with MCC. It is indeed essential for the development of an integrated health care system. Nevertheless, the population of multimorbid older adults will particularly benefit from integrated patient-centred care, and may be the starting point for the integration of the whole system.

#### **4.1.2. Organization in Primary Care**

Care from providers across multiple health care settings must start with primary care at the centre acting as manager, and gatekeeper of the system (a hub and spoke model). Thus, the primary care practice serves as a “medical home,” integrating care across the “medical neighborhood.” A patient-centred approach is intended to simultaneously address the diverse needs of patients with MCC. Collaborative care with specialists when indicated and the coordination of care across care transitions are important roles of primary care in improving

outcomes in patients with MCC. The most appropriate setting to organize and coordinate seamless care across the multiple levels of health and social services is the primary care setting.

#### **4.1.3. Interdisciplinary Collaboration**

Addressing the multiple and diverse needs of multimorbid patients simultaneously requires a range of different competencies. These competencies are provided by multiple providers and types of providers, collaborating to deliver patient-centred services. Every provider should be able to access other providers involved in the process of care delivery. Accountability, rewards, and incentives should be shared within interdisciplinary teams and networks.

PCPs in Ontario, if not integrated into a primary health care team, will have difficulties delivering all the necessary services to provide quality MCC management. Thus, it will be important to provide support to individual and small practices as Ontario transitions to integrated care for patients with MCC. Conditions for implementing a model to manage MCC patients may be present today in the Community Health Centres (CHC). Family Health Teams (FHT) that are already staffed with the appropriate health human resources should also implement integrated models of care for individuals with MCC. CHCs are promising because their model of care is already aimed at delivering comprehensive, accessible, client and community centred, interdisciplinary, and integrated services. FHTs are also composed of a group of physicians working with nurses and other providers and are meant to provide chronic disease management, disease prevention, and health promotion. Both of these models represent potentially ideal “medical homes” for patients with MCC.

#### **4.1.4. Community Embedded (Grounded in the Community)**

Care for individuals with MCC must be undertaken in partnership with the community for preventive services, healthy environments, and participation in decision making. Social support, including food, transportation, and housing, is needed to improve outcomes for multimorbid patients. Health care services, organized around primary care organizations, need to partner with community-based organizations in order to achieve optimal support for MCC patients.

#### **4.2. Eighteen Components of Standard Care for an MCDM Model in Ontario**

Table 2 presents the 18 essential components that we recommend be included as standard care for the multimorbid population in Ontario. Every component has been linked to a dimension of the Ontario's Chronic Disease Prevention and Management Framework (Figure 2).

**Table 2: List of recommended components of standard care for patients with MCC**

<b>Care component</b>	<b>Dimension of the Ontario Chronic Disease Prevention and Management Framework</b>
<b>1. Interdisciplinary primary health care teams</b>	→ delivery system design
<b>2. Patient enrolment and assessment</b>	→ delivery system design and personal skills & self-management support
<b>3. Interdisciplinary primary care team meetings</b>	→ delivery system design
<b>4. Individualized care plan</b>	→ delivery system design and personal skills & self-management support
<b>5. Involvement of patient and family in decision making</b>	→ personal skills & self-management
<b>6. Case management</b>	→ delivery system design
<b>7. Single entry point</b>	→ delivery system design
<b>8. Continuity of care and transition management</b>	→ delivery system design
<b>9. Mental health management</b>	→ delivery system design
<b>10. Medication management</b>	→ delivery system design and provider decision support
<b>11. Integration of home community-based services</b>	→ supportive environments, community action, and delivery system design
<b>12. Support for self-management</b>	→ personal skills & self-management support
<b>13. Caregiver education and support</b>	→ personal skills & self-management support
<b>14. Electronic health records</b>	→ information systems and provider decision support
<b>15. Guidelines for MCC</b>	→ provider decision support
<b>16. Performance measurement</b>	→ delivery system design and provider decision support
<b>17. Blended capitation remuneration system adjusted to patient need</b>	→ delivery system design
<b>18. Team-based financial payments</b>	→ delivery system design

**Table 3: Components of MCC management in the literature**

Program	GRACE	PACE	Guided Care Model	SIPA	PRISMA
<b>Evidence</b>	Counsell et al. (2007) <sup>41</sup>	Mukamel et al. (2006 & 2007) <sup>46,47</sup>	Boult et al. (2008) <sup>49</sup> Marsteller et al. (2010) <sup>50</sup> Wolff et al. (2010) <sup>51</sup> Boyd et al. (2008) <sup>52</sup> Sylvia et al. (2008) <sup>53</sup>	Beland et al. (2006) <sup>54</sup>	Hebert et al. (2010) <sup>60</sup>
<b>Care Components</b>					
<b>Interdisciplinary Primary Care Teams</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
<b>Patient enrolment assessment</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Team meetings</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
<b>Individualized care plan</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Involvement of patient and family in decision making</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Case management</b>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Single entry point</b>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Continuity of care and transition management (including nursing homes, acute and specialized medical care)</b>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Mental health management</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
<b>Medication management</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
<b>Integration of community-based services</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
<b>Support for self-management</b>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
<b>Caregiver education and support</b>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
<b>Electronic Health Records and information technologies</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
<b>Guidelines for MCC</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
<b>Performance measurement</b>		<input checked="" type="checkbox"/>			
<b>Capitation remuneration systems</b>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	

Table 3 shows the inclusion of care components in programs of MCC management and corresponding research studies providing evidence of improved outcomes, such as patient experience, functional status, cost, and services utilization. Performance measures used in these studies are listed in Table 5.

Below we briefly outline the 18 components, providing some Ontario context.

### **1. Interdisciplinary primary health care teams**

Most programs showing evidence of improved outcomes for multimorbid patients are based on interdisciplinary primary care teams. Team members work collaboratively, communicate frequently with each other and provide comprehensive primary care. Table 4 provides a summary of the types of providers comprising these teams in different programs. While the availability of these various disciplines is critical to the effective management of multimorbidity, all patients will not require intervention from all providers. Individualized care needs, personal resources and capacity, and risk of adverse outcomes should dictate the involvement of these internal team members in the patient's care. This should also be the criteria to decide the involvement and use of external care resources, ranging from additional specialist to home and community care services.

**Table 4: Types of health care providers in the primary care teams for patients with MCC**

	GRACE	PACE	SIPA
Primary Care Physician	Yes	Yes	Yes
Care manager (type)	NP & SW		RN
Nursing		RN & NP	
Social worker	Yes <sup>a</sup>	Yes	Yes
Physical therapist	Yes	Yes	
Occupational therapist		Yes	Yes
Respiratory therapist		Yes	
Speech language therapist		Yes	
Mental health care provider	Yes (SW)		Yes
Pharmacist	Yes		
Dietician		Yes	
Geriatrician	Yes		Yes

<sup>a</sup> GRACE defines the role as community-based services liaison instead of SW.

A brief description of these roles and responsibilities is as follows:

- Primary care physician:** The Primary Care Physician (PCP) is the lead in providing medical care and coordinating the medical management of the multimorbid patient, monitoring treatment by medical specialists and other healthcare providers. With the support of case managers and the primary care team, PCPs understand the physical, mental, and social context of the patient, as well as his/her preferences, making sure that these are reflected in medical decisions.
- Case manager nurse:** The nursing case management role starts with patient enrolment assessments in partnership with the case manager social worker (SW), and is especially responsible for the health component of the assessment. Coordination of

care and transition management are also major tasks of (registered nurse) RN or nurse practitioner (NP) case managers.

- **Case manager social worker:** The case manager SW also performs patient enrolment assessments in partnership with the case manager nurse, and is especially responsible for the social component of the assessment. Facilitating home and community-based services and caregiver education and support are also major tasks of the case manager SW.
- **Physiotherapist:** The physiotherapist (PT) role best addresses rehabilitation and ongoing maintenance to ensure the optimal physical functional condition of the patients with MCC.
- **Occupational therapist:** Ensuring the highest level of functional autonomy of older patients with MCC also involves adaptations best supported by an occupational therapist (OT).
- **Mental health care provider:** This role can be performed by a nurse or SW specially trained in mental health assessment and management for older multimorbid patients, to ensure the optimal mental and emotional status of patients with MCC.
- **Pharmacist:** The pharmacist manages and simplifies complex medication and advises the MCC team on medication reconciliation.
- **Dietician:** This role ensures optimal nutritional status of MCC patients.
- **Geriatrician:** Because most individuals with MCC are older, this expertise ensures gerontological principles are used and provides expert advice to the MCC team in the management of complex geriatric syndromes. The geriatrician also provides direct specialized medical care to the more complex older multimorbid patients.



## **2. Patient enrolment and assessment**

Case managers conduct a combined health and social assessment of patients upon enrolment, and reassess at least annually. The health component should ideally be led by a nurse and the social component by an SW in coordination with the PCP. Assessment sets the stage for deciding upon the use and intensity of each of the 18 components needed to best support the patients and their caregivers. Assessments are used to stratify patients into risk groups according to their care needs.

## **3. Interdisciplinary primary care team meetings**

Team meetings need active engagement that includes all MCC team members. Individualized care plans should be developed and approved in the context of interdisciplinary team meetings. These may be conducted as daily patient rounds.

## **4. Individualized care plan**

Developed upon patient enrolment, individualized care plans need to be presented and approved in the context of interdisciplinary team meetings. Risk management should be a key focus for individualized care planning to determine the appropriateness and intensity of each of the 18 components of the MCDM program. Case managers ensure participation of the patient and caregiver. Individualized care plans require periodic (at least annual) revision and team approval. Care plans should include patient goals and also ensure end-of-life planning and advanced directives.

## **5. Involvement of patient and family in decision making**

The MCDM program starts with the patients' and families' concerns and priorities for care, promoting their participation in developing and implementing individualized care plans.

## **6. Case management**

A central component of almost every MCDM program is the use of case management. This is essential in connecting the interdisciplinary team with the social context of the patients and their families. This role also coordinates the team's efforts and manages transitions between providers, ensuring timely access and information transfer. This role is generally performed by a SW, an RN, or an NP (Table 4). In the GRACE program, an RN and an SW perform case management functions as a team, which we consider the optimal approach. SWs are especially important in connecting the interdisciplinary team within the social context of the patients and their families, while RNs are especially important in team coordination. The intensity of case management should be determined based on the risk of patient decline.

## **7. Single entry point**

Access to all non-emergency services for patients in MCC programs should be exclusively through the MCC team, whose members are most aware of the physical, mental, and social context of the patients and their families. These services should include referral to and coordination of specialized medical care, ambulatory rehabilitation services, home care and long-term care, and social community services.

## **8. Continuity of care and transition management**

Case manager nurses coordinate attention and optimize transitions and information flow among different providers and different levels of care. Their role facilitates smoother, safer, and more-efficient transitions. Coordination of care and transitions management should include home care and long-term care homes, assisted living and supporting

housing facilities, specialized medical care, acute hospital care, and rehabilitation facilities.

## **9. Mental health management**

Although mental health management is led by the mental health team provider (RN, NP, or SW), all team members must be involved in mental health management from their specific roles, according to their disciplines. Patient-centred care requires understanding and support of the mental dimension of the patient in every activity of the team, with MCC team members interacting to improve and prevent mental and emotional decline. For example, case manager SWs play an essential role in detecting risky situations for poor mental health outcomes and coordinating mental health support from the community. In addition to their roles in mental health management, PCPs and geriatricians in the MCC teams should be supported in the diagnosis and treatment of mental health conditions by a psychiatrist and other mental health specialists working as a network.

## **10. Medication management**

Polypharmacy represents one of the main issues in MCC. Reducing complex medication regimens to those necessary and aligned with patient health goals should be central to the model. This is a key activity of the team pharmacist.

## **11. Integration of home and community-based services**

Case manager SWs need to ensure and optimize the necessary support services to avoid institutionalization for both acute and long-term care, and to coordinate support from community services. Nursing and other home health care services should be integrated with the primary care services provided by the MCC team. In addition, homemaking and

personal support services provided by personal support workers (PSWs) should be coordinated directly by the MCC case manager. Services should ensure increased family and community involvement in the care of multimorbid patients. Services should also consider transportation, social and physical activity, and housing. Assessment for services should focus on risk management and be coordinated with the regional authority responsible for funding home and community-based services.

### **12. Support for self-management**

Patients need to be supported in the development of skills for managing their chronic conditions, preventing complications, and adopting healthy lifestyles.

### **13. Caregiver education and support**

Support is needed for the development of caregivers' skills for taking care of dependent MCC patients and helping independent MCC patients self-manage their chronic conditions, including the adoption of healthy lifestyles. Support is also needed to address issues of caregiver health and to prevent or reduce distress. This can take the form of emotional or psychological support, respite care, complementary home care services, and other such services, according to need.

### **14. Electronic health records**

Electronic health records (EHR) with broad access within and outside of the team are necessary to support case management, team work, and continuity of care across and within teams, and for the generation of data for performance measurement. Information technologies, including portals to EHR, should be developed to facilitate communication and care coordination and to increase efficiency in consultations between multiple sites (networks), among providers in the same setting, and with patients and caregivers.

## **15. Guidelines for MCC**

The management of patients with MCC should be supported by guidelines or protocols especially developed for common geriatric syndromes, similar to the GRACE protocols,<sup>40</sup> and adapted to the Ontario context. These protocols must be evidence-based, with inputs from MCC teams. Such guidelines are a departure from traditional guidelines and clinical trials typically focused on single diseases. Multimorbidity should be a priority in clinical research and in the generation of new evidence. It is necessary to define and identify these populations broadly, and to identify subgroups with specific clusters of conditions. In addition, special care models should focus on subgroups at high risk of poor health outcomes. Team members will need special training on these guidelines.

## **16. Performance measurement**

Performance measurement is necessary to improve processes and monitor outcomes of quality of care and costs. It is also necessary for providing incentives for performance and teamwork, and ensuring shared accountability. Patient-centred outcome measures focus on multiple dimensions of the person, and are oriented to health care system performance rather than on single service goals. Simultaneously with the implementation of this MCDM model, studies should be conducted to monitor the results of the implementation and to generate adjustments. Performance measurement and shared accountability will be further addressed in the following section of this paper.

## **17. Blended-capitation remuneration system adjusted for patient need**

Implementation of a reimbursement method should include a capitation component for MCC teams. This should be blended with another remuneration model, such as salary or fee-for-service, depending on the type of provider and type of service. The blended-capitation remuneration system ensures that physicians are compensated for enrolling patients with multimorbidity. It should be adjusted for patient need as measured by appropriate comorbidity indices, such as those provided by the Johns Hopkins Ambulatory Care Groups (ACG©) model. The alignment between payment mechanisms and the provision of services is critical to the success of an integrated patient-centred model and for interdisciplinary collaboration, which is the third component of the MCDM model.

## **18. Team-based financial payments**

Team-based funding should provide resources to the team that encourage collaborative team-based work. Funding is linked to performance measures to which every team member has contributed.<sup>61-63</sup> These payments may be combined with individual incentives and others incentives linked to organizational goals. Incentives need to be aligned with the particular needs of the patients with MCC, using measures such as Patient Reported Outcomes Measures (PROMs) among others. This will be discussed further in the following section.

## 5. Measuring System Performance for People with Multimorbidity

Performance measurement in multimorbidity is particularly challenging compared to single disease measurement. First, the variability in the severity of each of the conditions and the mix of chronic conditions themselves, and how they interact with each other, make it difficult to develop adequate disease-specific measures.<sup>64</sup> The latter aspect relates to how some chronic conditions can be seen as being “concordant,” in that treatment for one condition is the same as treatment for another, or “discordant” in the sense that treatment for one is antagonistic for another.<sup>65</sup> Clinical guidelines are most often focused on a single condition; patients with MCC are usually excluded from clinical trials, which increases the difficulty of measuring clinical care processes and performance. Second, the mix of performance measures should reflect the interdisciplinarity of the care required, the integration of services, and the simultaneous physical, mental, and social approach to care required for patients with MCC. In addition, incentive mechanisms derived from these measures need to encourage teamwork and collaboration.

### 5.1. Performance Measurement in MCC Programs in the Literature

A list of examples of performance measures used in the research literature for assessing the impact of MCC management programs is presented in Table 5. Performance measures commonly used to assess programs for chronically ill older adults include cost and services utilization, such as number of ED visits and acute care hospitalizations, alternate level inpatient days, inpatient acute hospital and nursing home stays, and home care access.<sup>43;54</sup> Functional outcomes include the SF-36, ADL and Instrumental ADL (IADL), mortality, and self-assessed health.<sup>41;46;47</sup> Instruments for assessing processes of care as experienced by patients have also been used in MCC programs,<sup>41;65</sup> such as the Patient Assessment of Chronic Illness Care

(PACIC)<sup>51;66</sup> or the Patient Activation Measure (PAM),<sup>67</sup> as well as clinical measures included in the Assessing Care of Vulnerable Elders (ACOVE).<sup>68</sup> Additional measures include caregiver burden,<sup>51;54</sup> patient and physician experience,<sup>42;44;49;50;52</sup> and a team performance score.<sup>46</sup> A recent study found that independence was the most important health outcome for the majority of patients with MCC (76% of the 357 participants).<sup>69</sup>

Although the examples provided in Table 5 offer useful guidance, it is important to note the shortage of team-based performance measures in the literature. This element represents a fundamental research gap and a challenge for the development of adequate programs for patients with MCC. Next, we propose a simple framework for the types of performance measures that should be included in models for MCDM.



**Table 5: Performance measures for models for MCC management in the literature.**

Research Study	Model of MCC Management	Performance Measures
Counsell et al. (2007) <sup>41</sup>	GRACE	ACOVE quality indicators. SF-36 medical outcomes: physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional and mental health. Functional index score created from 7 instrumental and 6 basic ADLs. ED visits, acute care hospitalizations and mortality rates.
Mukamel et al. (2006 & 2007) <sup>46;47</sup>	PACE	Risk-adjusted outcomes at 3 and 12 months post PACE enrolment: - Self-assessed health status. - Functional status (ability to perform ADLs) - Mortality at 12 months.
Boult et al. (2008) <sup>49</sup>	Guided Care Model	PACIC (at 0 & 6 months) PCAT (PCP satisfaction, time allocation, knowledge, and care coordination; at 0 & 12 months) Nurses' job satisfaction instrument (at 12 months)
Marsteller et al. (2010) <sup>50</sup>	Guided Care Model	Physician satisfaction with chronic care, time allocation, and PCAT questions on knowledge and care coordination (at 0 & 12 months). Practice characteristics (physician panel size)
Wolff et al. (2010) <sup>51</sup>	Guided Care Model	PACIC adapted to caregivers (quality of chronic illness care), caregiver depression, strain, and productivity loss (at 0 & 18 months)
Boyd et al. (2008) <sup>52</sup>	Guided Care Model	PCAS (physician-patient communication, interpersonal treatment, knowledge of patient, integration of care, and trust in physician; at 0 & 6 months)
Sylvia et al. (2008) <sup>53</sup>	Guided Care Model	Insurance expenditures (6 months, for all fee-for-service care) Services utilization (hospital admissions, hospital days, and ED visits; 6 months)
Beland et al. (2006) <sup>54</sup>	SIPA	Admission, service utilization and public cost of care for: Inpatient acute care, ALC days, nursing homes, home health care, home social care Health status Satisfaction with care Out-of-pocket expenses Caregiver burden
Hebert et al. (2010) <sup>60</sup>	PRISMA	Disability, functional decline and unmet needs using the SMAF [French acronym for Functional Autonomy Measurement System] ED visits and hospitalization Utilization of community health and social services Health care satisfaction and empowerment questionnaires Caregiver's burden and desire to institutionalize

## 5.2. Performance measurement to promote high performance of MCC teams

Performance measures for providing integrated care to multimorbid patients should be focused on promoting provider collaboration in the achievement of common goals and obtaining associated incentives. Table 6 summarizes the types of measures that should be involved, including process and outcome measures at three levels of care delivery: individual, team, and organizational.

**Table 6: Types of performance measures for high performer MCC teams**

	<b>PROCESSES</b>	<b>OUTCOMES</b>
<b>Organizational level</b>	Inter-team collaboration and transitions	Accomplishment of organizational goals (organizational objectives, care delivery, and financial outcomes)
<b>Team level</b>	Composite processes of care (aggregate of individual tasks completed) Intra-team transitions Shared patient records and information	Health outcomes: - Patient-level targets of care - Patient-level health outcomes - PROMs System utilization Financial outcomes (costs)
<b>Individual level</b>	Individual tasks completed	Patient-level targets of care System utilization

The most critical measures for achieving high-performance MCC teams are at the team level of care delivery. Effective performance measures for teams reflect the work of all the team's members, or at least a majority of them. These indicators should be as simple and easy to understand as possible, and should be applied in a fair and objective manner.<sup>63</sup>

A useful type of team-level performance measure incorporates composite processes of care, which are an aggregate of tasks completed individually by team members. One

complication is that there are no widely used standard composite process measures, because they depend on the specific health, functional, and social needs of every patient. Therefore these performance measures, crucial for fostering team collaboration and successful patient outcomes, should be defined by the MCC team in every individualized patient care plan. As an example, a patient whose enrolment assessment includes COPD, depression, risk of functional decline, and increased risk of family caregiver distress, the ideal composite process measure would specify that the patient receives: a) corresponding seasonal vaccines by the team's RN; b) periodic evaluations by the mental health team provider; c) a program of functional support by the physical and/or occupational therapist; d) a follow-up assessment of family caregiving by the case manager; e) evaluations by PCP according to frequency as defined in the individual plan; and f) a medication reconciliation assessment by pharmacist. Teams should also share information on client goals and support, such as housing security, food security, equipment, and social capital.

Despite the critical role of team-level performance measures, they should be combined with measures at the individual level to maximize performance, at least for providers who make transcendent individual decisions or perform key tasks, such as PCPs and case managers. As well, performance measures at the organizational level are desirable in order to ensure the achievement of organizational goals, to incentivize inter-team collaboration, and to increase performance at the system level.

In addition, any set of measures to be implemented in Ontario should reflect the dimensions in the Chronic Disease Prevention and Management Framework<sup>38</sup>(Figure 2). Next, we propose an approach to align performance measurement for MCC patients in Ontario with this framework.

### 5.3. Performance measurement for MCDM using the Ontario's Chronic Disease Preventive and Management Framework

The proposed dimensions for a system of performance measurement in interventions for MCC patients are as follows:

- **Patient and family centred:** Outcome measures should capture patient and caregivers' experience in their interaction with providers and the health care system, considering patient information, participation in decision making, and respect for patient preferences.
- **Personal Skills and Self-Management Support:** Process and outcome measures in self-management of MCC patients, and in preventive and healthy behaviour in the general population, should include measures such as the PACIC and the PAM, or Therapeutic Self-Care.<sup>70</sup>
- **Delivery System Design:** Process and outcome measures focus on teamwork, system integration, continuity of care, and involvement of the interdisciplinary team with the community and with the development of public policies. The focus for delivery system design performance measurement includes the extent to which the 18 components are implemented.
- **System Utilization:** Measures include the number of ED visits, acute hospital admissions and length of stay, institutionalization, ambulatory visits, and system and disaggregated costs of care.
- **Evidence-Based Decision Support:** Compliance with appropriate guidelines and evidence-based practice, developed specifically for, or taking into account, MCC patients. A special focus on patient safety in relation to polypharmacy is necessary as well as developing evidence-based strategies for staying healthy.

- **Information systems:** Measures should include comprehensiveness, use, and sharing of information by different providers involved. Data generated should include not only health information, but also demographic and social data.
- **Determinants of health:** Process and outcome measures should be directed to assess the effectiveness of public health policies, level of support provided from the communities to multimorbid elderly patients, healthy social and community environments, quality of life, and participation and empowerment of community groups.
- **Population Health Outcomes/Functional and Clinical Outcomes:** Objectives of functional and clinical outcomes should be defined at the individual level and aggregated to the population level.<sup>37</sup>

Performance of MCDM is a multidimensional concept that necessitates integrating the perspectives of the patient, the family, health care providers, and policy-makers. It is only by considering these perspectives simultaneously and by combining the tools that have been developed with administrative data that we can begin to understand the complexity of the needs of MCC patients, to assess how well the current system is addressing their needs, and to determine the changes necessary to fill care gaps. Most of these measures have not yet been used or suggested in previous MCC programs and assessment studies.

## 6. Proposed Implementation Strategy for MCDM in Ontario

Changing to an integrated, patient-centred model of care involves the elimination of paradigms that have determined how the provision of health care services has been organized for decades. Therefore, a progressive implementation strategy should be considered in order to increase acceptability and the chance of success. We propose scaling-up in the following four stages:

### 6.1. Stage #1: Implement MCDM Programs in All Primary Care Teams

In Ontario, the expansion of interdisciplinary teams and the increased availability of various types of providers in primary care settings make it increasingly appropriate to implement an MCDM model. With the support of nurses, nurse practitioners, and social workers, some Primary Care Teams (PCTs) currently have the competencies and capacity to take on the role of care coordination. It is estimated that 68% of Ontarians are currently registered with a PCT.<sup>71</sup> Basing the first step of the implementation in existing PCTs is key to facilitating the adoption of the program.

Specific objectives of this stage are to generate awareness of and recognize the need for a special focus on MCC patients among health care providers and decision makers, and set the basis for building an integrated approach at different levels of the health care system.

To ensure the involvement of key stakeholders, members of the PCTs, as well as patients and caregivers, should participate in the local configuration and design of the program, treatment protocols, and performance measures. The intention of scaling-up the new integrated model of care in stages should be explicit from the beginning. Health care providers and administrators that will be involved in organizing subsequent stages of development and implementation should be engaged from the beginning of the design of the model.

Some of the main challenges at this stage are: 1) to align the vision of individuals and teams in primary health care, with clear knowledge of mid- and long-term benefits of implementing the entire program; 2) to foster interdisciplinary collaboration among professionals; 3) to establish an adequate reimbursement system for MCC patients, including a capitation component properly adjusted; 4) to show improved results in the early stages of implementation; and 5) to develop an adequate system to monitor performance.

Key stakeholders at this stage are the Ontario Ministry of Health and Long-Term Care, the Ontario Medical Association, the Ontario College of Family Physicians, the Ontario College of Nurse Practitioners, the Ontario College of Registered Nurses, the Ontario College of Social Workers, the Ontario Geriatric Association, other regulated health care professional associations, the PCPs and other health care professionals in PCTs (CHCs and FHTs), and geriatricians to be integrated to the PCTs.

The first stage should focus on implementation of the following components from those listed in Section 4.2:

- Interdisciplinary primary health care teams (component #1)
- Patient enrolment and assessment (component #2)
- Interdisciplinary primary care team meetings (component #3)
- Individualized care plan (component #4)
- Involvement of patient and family in decision making (component #5)
- Medication management (component #10)
- Support for self-management (component #12)
- Caregiver education and support (component #13)

## 6.2. Stage #2: Enhance Primary Health Care with the Inclusion of Specialized Rehabilitation Services, Home Care Providers and Long-Term Care Homes

The second stage involves the integration of home care and rehabilitation services into the MCDM programs and an expansion of the model to long-term care homes (LTCHs).

Health care professionals that coordinate and assess eligibility for home care services, nurses and social workers, should be integrated into PCTs and collocated in the same community setting. Since the services provided as home care are an essential component of the MCDM program, and a larger proportion of home care patients are affected by MCC, home care services should be organized by the PCT. Prescription and coordination of services provided by PSWs from agencies should come from the PCT for each patient in the program, because these teams know best the unique needs and conditions of their seniors, caregivers, and communities. Contracts with those agencies and payments may remain centralized at the regional level.

PCTs will work with LTCHs in the network. Physicians from the LTCHs will practice in PCTs within the network, and nurses at the LTCHs will assume the role of case managers and participate in the PCT's meetings. When the PCT determines that a patient in the MCDM program requires institutionalization in an LTCH, the role of case manager is transferred to a nurse in the LTCH.

Professionals in rehabilitation centres will be integrated into networks with a determined number of PCTs. Case managers follow up with patients enrolled in the MCDM program during treatment in rehabilitation facilities. Rehabilitation hospitals should implement ambulatory multidisciplinary programs to improve activation and reduce sedentary behaviours among patients with MCC. Case managers from the PCT will participate in rehabilitation team meetings. Representatives from rehabilitation hospitals should attend meetings of the MCDM



program in the primary care practice to review and plan care for these patients. Given the interaction between different settings, the use of information technologies is essential.

Some of the main challenges at this stage are: 1) to align the vision of different organizations used to operating separately; 2) to foster leadership, responsibilities, and accountability across organizations; 3) to overcome the risk of immobility due to multiple dependencies, enabling high levels of dynamism and flexibility in professional teams across institutions; and 4) to develop adequate performance measures across integrated practice settings.

Key stakeholders at this stage are the regional health authorities, represented by Local Health Integration Networks (LIHNs) and Community Care Access Centres (CCACs) in Ontario, as well as the administration and clinicians of rehabilitation hospitals and LTCHs.

The second stage should focus on implementation of the following components:

- Case management (component #6)
- Single entry point (component #7)
- Continuity of care and transition management (component #8)
- Mental health management (component #9)
- Integration of home community-based services (component #11)
- Electronic health records (component #14)
- Performance measurement (component #16)
- Team-based financial payments (component #18)

### **6.3. Stage #3: Inclusion of a Growing Number of Medical Specialties**

At this stage of implementation, additional medical specialties will be included in the MCDM model to fully address the needs of specialized care of MCC patients in an integrated

approach with the PCT. This will serve as the platform for implementing specialized care guidelines for MCC. A growing range of specialties will be involved, starting with those with a key role in MCC patients including, for example, psychiatry, cardiology, respirology, endocrinology, nephrology, etc. The dynamic of this integration should be through physicians working in a network with PCTs for the management of their older patients with MCC. Specialized physicians and services are accountable to PCTs. PCPs and other team members refer patients for specialized treatment, monitor the evolution of the treatment and illness, and work in close communication on extended teams with specialized providers.

The expanded use of EHR and information technologies, including telemonitoring, is critical at this stage of implementation. Specialists should participate in MCDM team meetings. The involvement of specialists increases the potential for leveraging existing programs, such as heart failure clinics and diabetes Chronic Disease Management programs.

An important additional task at this stage is for the PCTs to follow up with multimorbid patients through acute care episodes, maintaining contact with the acute care team and the patient during every inpatient stay.

The main challenge at this stage is relocating primary care at the centre of all medical care, which is necessary for a patient-centred system, and progressively arranging medical specialties as supporters of integrated medical care in the primary care setting. Key stakeholders are medical societies of specialists and the specialists themselves.

The third stage should focus on implementation of the following components:

- Guidelines for MCC (component #15)
- Blended-capitation remuneration system adjusted to patient need (component #17)

#### **6.4. Stage #4: Extension to a System Integrated in the Community with Inclusion of a Growing Number of Population Groups**

Specific programs and interdisciplinary teams should be created at this stage with the focus on attending population level needs related to social determinants of health. Following the ECCM framework, teams should collaborate with community groups and local government on building policy and legislation according to population needs, supporting healthy environments, and promoting participation in health-related community groups.

Some major challenges of this stage are: 1) to foster inter-sectoral collaboration, through a common vision on population health; 2) to change paradigms of health care teams, committed to the well-being of communities rather than of their patients only; 3) to counteract short-term goals of local authorities, which are potentially supportive of retaining acute care services; 4) to develop adequate indicators of health at the population level to evaluate program performance; and 5) to educate people and communities in evidence-based healthy behaviours.

## 7. Conclusions

The increasing problem of managing MCC in the elderly requires important changes in the way our health care services are delivered. This population group is not only growing, but also has one of the highest levels of health care services use. Consequently, inadequate attention to the health care needs of this group may prove to be one of the most costly problems the health care system will encounter.

An integrated, patient-centred system is the most effective approach to managing the needs of the MCC population, as broadly acknowledged by experts across several countries. Ontario faces an aging population and increased health care costs, similar to many other western societies. In the Ontario context, a highly fragmented health care system presents particular problems of access, shortage of health care professionals, insufficient systems to monitor performance, inadequate payment modalities, and delays in the penetration of information technologies. The gaps in Ontario are particularly important for MCC patients and the challenges are especially compelling for this population.

In this paper, we have integrated the literature and identified the elements and program components that must be implemented in Ontario for a model to appropriately manage our older adults with MCC. The MCDM model that we are suggesting is based on four principles, eighteen components of standard care, and a staged process of integration, with the gradual inclusion of professionals into interdisciplinary teams, and the progressive integration of services into a primary care-centred healthcare system. In the final stages of the model, integration of communities into preventive strategies and improvement of the social determinants of health should be accomplished.

We propose that transitioning to this model will improve the capacity of the system to meet the needs of people with MCC, and will also stimulate transformations across the entire health care system. The result should be a substantial advance in the necessary process of integration of services, integration with the community, and delivery of patient-centred care that will improve health for all Ontarians.

## Reference List

- (1) Yach D, Hawkes C, Gould CL, Hofman KJ. The global burden of chronic diseases: overcoming impediments to prevention and control. *JAMA* 2004;291:2616-2622.
- (2) Bloom DE, Cafiero ET, Jane-Llopis E, Abrahams-Gessel S, Bloom LR, Fathima S et al. The Global Economic Burden of Noncommunicable Diseases. 2011. Geneva, World Economic Forum.
- (3) Wolff JL, Starfield B, Anderson G. Prevalence, expenditures, and complications of multiple chronic conditions in the elderly. *Arch Intern Med* 2002;162:2269-2276.
- (4) Boulton C, Green AF, Boulton LB, Pacala JT, Snyder C, Leff B. Successful models of comprehensive care for older adults with chronic conditions: evidence for the Institute of Medicine's "retooling for an aging America" report. *J Am Geriatr Soc* 2009;57:2328-2337.
- (5) Ontario Medical Association (OMA). Policy on Chronic Disease Management. 2009.
- (6) Cornell JE, Pugh JA, Williams JW, Kazis L, Parchman ML. Multimorbidity Clusters: Clustering Binary Data From Multimorbidity Clusters: Clustering Binary Data From a Large Administrative Medical Database. *Applied Multivariate Research* 2007;12:163-182.
- (7) Valderas JM, Starfield B, Sibbald B, Salisbury C, Roland M. Defining comorbidity: implications for understanding health and health services. *Ann Fam Med* 2009;7:357-363.
- (8) Soubhi H, Bayliss EA, Fortin M et al. Learning and caring in communities of practice: using relationships and collective learning to improve primary care for patients with multimorbidity. *Ann Fam Med* 2010;8:170-177.
- (9) Canadian Institute for Health Information. Seniors and the Health Care System: What Is the Impact of Multiple Chronic Conditions? 2011.
- (10) Boyd CM, Darer J, Boulton C, Fried LP, Boulton L, Wu AW. Clinical practice guidelines and quality of care for older patients with multiple comorbid diseases: implications for pay for performance. *JAMA* 2005;294:716-724.
- (11) van den Akker M, Buntinx F, Roos S, Knottnerus JA. Problems in determining occurrence rates of multimorbidity. *J Clin Epidemiol* 2001;54:675-679.
- (12) Fortin M, Lapointe L, Hudon C, Vanasse A, Ntetu AL, Maltais D. Multimorbidity and quality of life in primary care: a systematic review. *Health Qual Life Outcomes* 2004;2:51.
- (13) Jadad AR, Cabrera A, Martos F, Smith R, Lyons RF. *When people live with multiple chronic diseases: a collaborative approach to an emerging global challenge*. Granada: Andalusian School of Public Health, 2010.
- (14) van den Akker M, Buntinx F, Metsemakers JF, Roos S, Knottnerus JA. Multimorbidity in general practice: prevalence, incidence, and determinants of co-occurring chronic and recurrent diseases. *J Clin Epidemiol* 1998;51:367-375.

- (15) Menotti A, Mulder I, Nissinen A, Giampaoli S, Feskens EJ, Kromhout D. Prevalence of morbidity and multimorbidity in elderly male populations and their impact on 10-year all-cause mortality: The FINE study (Finland, Italy, Netherlands, Elderly). *J Clin Epidemiol* 2001;54:680-686.
- (16) Fried LP, Ferrucci L, Darer J, Williamson JD, Anderson G. Untangling the concepts of disability, frailty, and comorbidity: implications for improved targeting and care. *J Gerontol A Biol Sci Med Sci* 2004;59:255-263.
- (17) Fortin M, Bravo G, Hudon C, Vanasse A, Lapointe L. Prevalence of multimorbidity among adults seen in family practice. *Ann Fam Med* 2005;3:223-228.
- (18) Britt HC, Harrison CM, Miller GC, Knox SA. Prevalence and patterns of multimorbidity in Australia. *Med J Aust* 2008;189:72-77.
- (19) Fernandez Miera MF. El Paciente Pluripatológico en el ámbito hospitalario. *Gaceta Sanitaria* 2008;22:137-141.
- (20) Public Health Agency of Canada. The Chief Public Health Officer's Report on the State of Public Health in Canada: Growing Older - Adding Life to Years. 2010.
- (21) Statistics Canada. Population Projections for Canada, Provinces and Territories: 2009 to 2036. [91-520-X]. 2010. Ottawa, Statistics Canada.
- (22) 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;11:70-76.
- (23) Engelberg Center for Health Care Reform at Brookings. Achieving Better Chronic Care at Lower Costs Across the Health Care Continuum for Older Americans. Brookings, editor. 2010. Washington, DC.
- (24) Iron K, Lu H, Manuel D, Henry D, Gershon A. Using linked health administrative data to assess the clinical and healthcare system impact of chronic diseases in Ontario. *Healthc Q* 2011;14:23-27.
- (25) Wodchis WP, Camacho X, Dhalla I, Lin E, Guttman A, Anderson G. Understanding and Identifying Target Populations for System Improvement. 28-6-2010. Boston, MA, AcademyHealth.
- (26) Rich MW, Beckham V, Wittenberg C, Leven CL, Freedland KE, Carney RM. A multidisciplinary intervention to prevent the readmission of elderly patients with congestive heart failure. *N Engl J Med* 1995;333:1190-1195.
- (27) 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;52:675-684.
- (28) Coleman EA, Parry C, Chalmers S, Min SJ. The care transitions intervention: results of a randomized controlled trial. *Arch Intern Med* 2006;166:1822-1828.

- (29) Thavorn K, Wodchis WP, Maxwell C, Koné A, Gruneir A, Bronskill S et al. Economic Burden of Multimorbidity in Ontario's Health Care System. *Canadian Association for Health Services and Policy Research (CAHSR)*. Vancouver, B.C. May 28, 2013.
- (30) Braunstein JB, Anderson GF, Gerstenblith G et al. Noncardiac comorbidity increases preventable hospitalizations and mortality among Medicare beneficiaries with chronic heart failure. *J Am Coll Cardiol* 2003;42:1226-1233.
- (31) Bierman AS, Ahmad F, Angus J, Glazier RH, Vahabi M, Damba C et al. Burden of Illness. Volume 1. 2009. Toronto. Project for an Ontario Women's Health Evidence-Based Report.
- (32) Tsisis P, Bains J. Chronic disease: shifting the focus of healthcare in Canada. *Healthc Q* 2009;12:e1-e11.
- (33) Kodner DL. Integrated care networks for the vulnerable elderly: North American prototypes, performance and lessons [abstract]Kodner DL. *International Journal of Integrated Care* 2008;8
- (34) Bergman H, Beland F, Lebel P et al. Care for Canada's frail elderly population: fragmentation or integration? *CMAJ* 1997;157:1116-1121.
- (35) Wagner EH, Austin BT, Von KM. Organizing care for patients with chronic illness. *Milbank Q* 1996;74:511-544.
- (36) Improving Chronic Illness Care. Our Mission: helping the chronically ill through quality improvement and research. 2011; <http://www.improvingchroniccare.org/>.
- (37) Barr VJ, Robinson S, Marin-Link B et al. The expanded Chronic Care Model: an integration of concepts and strategies from population health promotion and the Chronic Care Model. *Hosp Q* 2003;7:73-82.
- (38) Ontario Ministry of Health and Long-Term Care. Preventing and Managing Chronic Disease: Ontario's Framework. 2007.
- (39) Ouwens M, Wollersheim H, Hermens R, Hulscher M, Grol R. Integrated care programmes for chronically ill patients: a review of systematic reviews. *Int J Qual Health Care* 2005;17:141-146.
- (40) Counsell SR, Callahan CM, Buttar AB, Clark DO, Frank KI. Geriatric Resources for Assessment and Care of Elders (GRACE): a new model of primary care for low-income seniors. *J Am Geriatr Soc* 2006;54:1136-1141.
- (41) Counsell SR, Callahan CM, Clark DO et al. Geriatric care management for low-income seniors: a randomized controlled trial. *JAMA* 2007;298:2623-2633.
- (42) GRACE Team Care: Integrating Medical and Social Care for Vulnerable Seniors. Integrating Care for Older Persons with Complex Needs: Lessons for Ontario; Toronto, Canada: 2011.
- (43) Counsell SR, Callahan CM, Tu W, Stump TE, Arling GW. Cost analysis of the Geriatric Resources for Assessment and Care of Elders care management intervention. *J Am Geriatr Soc* 2009;57:1420-1426.



- (44) Program of All-inclusive Care for the Elderly (PACE): A Community Based Approach to Integrating Care for Older Persons with Complex Needs. Integrating Care for Older Persons with Complex Needs: Lessons for Ontario; Toronto, Canada: 2011.
- (45) National PACE Association. What is PACE? 2011; <http://www.npaonline.org/>.
- (46) Mukamel DB, Temkin-Greener H, Delavan R et al. Team performance and risk-adjusted health outcomes in the Program of All-Inclusive Care for the Elderly (PACE). *Gerontologist* 2006;46:227-237.
- (47) Mukamel DB, Peterson DR, Temkin-Greener H et al. Program characteristics and enrollees' outcomes in the Program of All-Inclusive Care for the Elderly (PACE). *Milbank Q* 2007;85:499-531.
- (48) Boyd CM, Boulton C, Shadmi E et al. Guided care for multimorbid older adults. *Gerontologist* 2007;47:697-704.
- (49) Boulton C, Reider L, Frey K et al. Early effects of "Guided Care" on the quality of health care for multimorbid older persons: a cluster-randomized controlled trial. *J Gerontol A Biol Sci Med Sci* 2008;63:321-327.
- (50) Marsteller JA, Hsu YJ, Reider L et al. Physician satisfaction with chronic care processes: a cluster-randomized trial of guided care. *Ann Fam Med* 2010;8:308-315.
- (51) Wolff JL, Giovannetti ER, Boyd CM et al. Effects of guided care on family caregivers. *Gerontologist* 2010;50:459-470.
- (52) Boyd CM, Shadmi E, Conwell LJ et al. A pilot test of the effect of guided care on the quality of primary care experiences for multimorbid older adults. *J Gen Intern Med* 2008;23:536-542.
- (53) Sylvia ML, Griswold M, Dunbar L, Boyd CM, Park M, Boulton C. Guided care: cost and utilization outcomes in a pilot study. *Dis Manag* 2008;11:29-36.
- (54) Beland F, Bergman H, Lebel P et al. A system of integrated care for older persons with disabilities in Canada: results from a randomized controlled trial. *J Gerontol A Biol Sci Med Sci* 2006;61:367-373.
- (55) de SM, Vedel I, Mauriat C et al. Diagnostic study, design and implementation of an integrated model of care in France: a bottom-up process with continuous leadership. *Int J Integr Care* 2010;10:e034.
- (56) Vedel I, Monette M, Beland F, Monette J, Bergman H. Ten years of integrated care: backwards and forwards. The case of the province of Quebec, Canada. *Int J Integr Care* 2011;11 Spec Ed:e004.
- (57) Integrated Models of Care for Older Persons: from SIPA (Quebec) to COPA (France). Integrating Care for Older Persons with Complex Needs: Lessons for Ontario; Toronto, Canada: 2011.

- (58) Hebert R, Durand PJ, Dubuc N, Tourigny A. PRISMA: a new model of integrated service delivery for the frail older people in Canada. *Int J Integr Care* 2003;3:e08.
- (59) Hebert R, Durand PJ, Dubuc N, Tourigny A. Frail elderly patients. New model for integrated service delivery. *Can Fam Physician* 2003;49:992-997.
- (60) Hebert R, Raiche M, Dubois MF, Gueye NR, Dubuc N, Tousignant M. Impact of PRISMA, a coordination-type integrated service delivery system for frail older people in Quebec (Canada): A quasi-experimental study. *J Gerontol B Psychol Sci Soc Sci* 2010;65B:107-118.
- (61) Paulus RA, Davis K, Steele GD. Continuous innovation in health care: implications of the Geisinger experience. *Health Aff (Millwood)* 2008;27:1235-1245.
- (62) Xyrichis A, Lowton K. What fosters or prevents interprofessional teamworking in primary and community care? A literature review. *Int J Nurs Stud* 2008;45:140-153.
- (63) Blumenthal DM, Song Z, Jena AB, Ferris TG. Guidance for structuring team-based incentives in healthcare. *Am J Manag Care* 2013;19:e64-e70.
- (64) Bayliss EA, Ellis JL, Steiner JF. Subjective assessments of comorbidity correlate with quality of life health outcomes: initial validation of a comorbidity assessment instrument. *Health Qual Life Outcomes* 2005;3:51.
- (65) Boyd CM, Fortin M. Future of Multimorbidity research: How Should Understanding of Multimorbidity Inform Health System Design? *Public Health Reviews* 2010;32.
- (66) Glasgow RE, Wagner EH, Schaefer J, Mahoney LD, Reid RJ, Greene SM. Development and validation of the Patient Assessment of Chronic Illness Care (PACIC). *Med Care* 2005;43:436-444.
- (67) Hibbard JH, Stockard J, Mahoney ER, Tusler M. Development of the Patient Activation Measure (PAM): conceptualizing and measuring activation in patients and consumers. *Health Serv Res* 2004;39:1005-1026.
- (68) Wenger NS, Shekelle PG. Assessing Care of Vulnerable Elders: ACOVE Project Overview. Vol.135, N.8, 642-646. 2001.
- (69) Fried TR, Tinetti ME, Iannone L, O'Leary JR, Towle V, Van Ness PH. Health outcome prioritization as a tool for decision making among older persons with multiple chronic conditions. *Arch Intern Med* 2011;171:1854-1856.
- (70) Doran DM, Harrison MB, Laschinger HS et al. Nursing-sensitive outcomes data collection in acute care and long-term-care settings. *Nurs Res* 2006;55:S75-S81.
- (71) Rosser WW, Colwill JM, Kasperski J, Wilson L. Progress of Ontario's Family Health Team model: a patient-centered medical home. *Ann Fam Med* 2011;9:165-171.

**Mery G, Wodchis WP, Bierman A, Laberge M. Caring for People with Multiple Chronic Conditions: A Necessary Intervention in Ontario. *Working Paper Series*. Vol 2. Toronto: Health System Performance Research Network; 2013.**

This report is available at the Health System Performance Research Network Website:  
<http://hsprn.ca>.

For inquiries, comments and corrections please email [info@hsprn.ca](mailto:info@hsprn.ca).