McMaster University

McMaster HEALTH FORUM

ISSUE BRIEF

DESIGNING INTEGRATED APPROACHES TO SUPPORT PEOPLE WITH MULTIMORBIDITY IN ONTARIO

21 OCTOBER 2013

EVIDENCE >> INSIGHT >> ACTION

Issue Brief:
Designing Integrated Approaches to Support People with Multimorbidity in Ontario

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McMaster Health Forum

For concerned citizens and influential thinkers and doers, the McMaster Health Forum strives to be a leading hub for improving health outcomes through collective problem solving. Operating at the regional/provincial level and at national levels, the Forum harnesses information, convenes stakeholders, and prepares action-oriented leaders to meet pressing health issues creatively. The Forum acts as an agent of change by empowering stakeholders to set agendas, take well-considered actions, and communicate the rationale for actions effectively.

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Funding

The issue brief, and the stakeholder dialogue it was prepared to inform, were both funded by the Canadian Institutes of Health Research (CIHR), through an expedited knowledge-synthesis grant, the Ontario Ministry of Health and Long-Term Care, through a Health System Research Fund grant entitled 'Harnessing Evidence and Values for Health System Excellence', and McMaster University's Labarge Optimal Aging Initiative. The McMaster Health Forum receives both financial and in-kind support from McMaster University. The views expressed in the issue brief are the views of the authors and should not be taken to represent the views of the funders.

Conflict of interest

The authors declare that they have no professional or commercial interests relevant to the issue brief. The funders played no role in the identification, selection, assessment, synthesis or presentation of the research evidence profiled in the issue brief.

Merit review

The issue brief was reviewed by a small number of policymakers, stakeholders and researchers in order to ensure its health system relevance and scientific rigour.

Acknowledgements

The authors wish to thank Asha Behdinan and Aunima Bhuiya for their help with assessing systematic reviews included in this brief. We are grateful to Steering Committee members and merit reviewers for providing feedback on previous drafts of the brief. We are especially grateful to Adalsteinn Brown, Mary Lewis, Moira Stewart and our steering committee for their insightful comments and suggestions. The views expressed in the issue brief should not be taken to represent the views of these individuals.

Citation

Wilson MG, Gauvin F-P, Lavis JN. Issue Brief: Designing Integrated Approaches to Support People with Multimorbidity in Ontario. Hamilton, Canada: McMaster Health Forum, 21 October 2013.

Product registration numbers

ISSN 1925-2269 (print)
ISSN 1925-2277 (online)

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KEY MESSAGES

What's the problem?

- Efforts to address the challenges associated with designing integrated approaches to care for people with multimorbidity (i.e., people with three or more medical conditions) will need to consider several features of the problem, including:
  - growing prevalence of multimorbidity coupled with the fact that prevalence grows steadily with age, meaning that the problem will continue to grow with an aging population;
  - impact of multimorbidity on healthcare utilization and costs (adults with multimorbidity are significant users of healthcare services and account for more than two-thirds of healthcare costs);
  - complexity of living with and treating multimorbidity given that the health risks associated with multiple conditions are numerous and varied, and self-management and treatment are made difficult given uncertainties about the benefits and harms of simultaneous treatments (e.g., by following multiple disease-specific guidelines that may provide conflicting or impractical recommendations);
  - system level factors such as fragmentation of current programs and treatment strategies for patients with multimorbidity, the heavy burden faced by patients with multimorbidity (e.g., people with multimorbidity have greater self-care needs and often rely on informal/family caregivers), remuneration models for providers that are not adapted to the types of care required by people with multimorbidity, and the lack of effective local governance, particularly at the primary care level, that is supportive of integrated care for people with multimorbidity.

What do we know (from systematic reviews) about three elements of a comprehensive approach to address the problem?

- **Element 1 (models of care):** ***Support primary care, community care and other providers to adapt and implement models of care for patients with multimorbidity that improve the patient experience, improve health and keep per capita costs manageable***
  - We identified several systematic reviews, with most focused on general models of coordinated / integrated care, but very few that were focused specifically on people with multimorbidity.
  - The reviews focused on multimorbidity found: mixed and inconclusive evidence regarding the use of comprehensive care models and patient-oriented interventions (although one review found that this type of approach is at least comparable to, or more beneficial than, usual care); interventions targeting more specific changes to care delivery within an organization (e.g., integrated treatment programs coordinated by care managers) were more effective than those with a broad focus (e.g., case management or changes in care delivery); and "complex and multifaceted pharmaceutical care" reduced inappropriate medication use and adverse drug events.
- **Element 2 (guidelines):** ***Enable primary care, community care and other providers to identify and use guidelines (or care pathways) that meet the needs of patients with multimorbidity***
  - We identified one systematic review that provided examples of sets of principles that have been suggested for the creation of multimorbidity guidelines, and several reviews that evaluated interventions to support the use of guidelines. The latter reviews found beneficial effects for educational materials, local opinion leaders, educational outreach/practice facilitation, audit and feedback, computerized decision support, and multifaceted interventions.
- **Element 3 (enabling self-management):** ***Enable primary care, community care and other providers to efficiently support self-management by patients with multimorbidity***
  - We identified two systematic reviews that found benefits (e.g., improved physical and mental health outcomes) for patient education and family interventions as possible approaches to helping patients with multimorbidity use self-management resources, as well as several reviews that outlined benefits from information and communication technology, home-based support and a range of interventions aimed at supporting appropriate medicine use by consumers.

What implementation considerations need to be kept in mind?

- Efforts to implement one or more of the elements could consider leveraging existing infrastructure (e.g., Health Links for models of care and supports for self-management) and investments (e.g., existing networks with expertise in research synthesis, guideline development and knowledge translation).

REPORT

Managing multiple medical conditions is part of the daily life of a growing number of Ontarians. As Fortin et al. observed, "patients with multiple conditions are the rule rather than the exception in primary care."(2) Multimorbidity (living with three or more medical conditions) has attracted significant attention among health system policymakers and stakeholders in Ontario, in part because adults with multimorbidity account for more than two-thirds of healthcare costs.(3)

Multimorbidity not only has a significant impact on healthcare utilization and costs, but affects quality of life, ability to work, employability, disability, processes of care and mortality.(4) Despite the burden of multimorbidity, patients often receive care that is "fragmented, incomplete, inefficient, and ineffective."(4) Thus, there have been growing calls for changes to health systems and clinical decision-making processes to more effectively and efficiently provide the complex care required by those with multimorbidity.(5;6)

One such response in Ontario has been Health Links, which was launched in December 2012 and now includes 26 'early adopters'. Health Links are designed to support local patient-care networks, led by a coordinating partner, and attempt to coordinate and optimize access to needed services, initially with a particular focus on the 5% of patients who consume about 66% of healthcare costs.(3;7) However, primary care, community care and other providers, whether working as part of or separate from Health Links, need support to achieve measurable successes in caring for patients with multimorbidity and preventing multimorbidity in those at risk, and to achieve health system transformation more broadly for this patient group.

This issue brief was designed to support the actions of those involved in addressing the challenges associated with providing care for people with multimorbidity. The issue brief first provides an overview of key features of multimorbidity as a health system problem, which include the growing prevalence of multimorbidity, the complexity of living with and treating multimorbidity, and the current health system arrangements that are not designed in a way that support integrated care for people with multimorbidity. Second, this brief discusses three elements of a (potentially) comprehensive approach to address the problem. Finally, this brief concludes with a discussion of

Box 1: Background to the issue brief

This issue brief mobilizes both global and local research evidence about a problem, three elements of a comprehensive approach for addressing the problem, and key implementation considerations. Whenever possible, the issue brief summarizes research evidence drawn from systematic reviews of the research literature and occasionally from single research studies. A systematic review is a summary of studies addressing a clearly formulated question that uses systematic and explicit methods to identify, select and appraise research studies, and to synthesize data from the included studies. The issue brief does not contain recommendations, which would have required the authors of the brief to make judgments based on their personal values and preferences, and which could pre-empt important deliberations about whose values and preferences matter in making such judgments

The preparation of the issue brief involved five steps:

1) convening a Steering Committee comprised of representatives from the partner organizations and the McMaster Health Forum;
2) developing and refining the terms of reference for an issue brief, particularly the framing of the problem and three viable elements of a comprehensive approach for addressing it, in consultation with the Steering Committee and a number of key informants, and with the aid of several conceptual frameworks that organize thinking about ways to approach the issue;
3) identifying, selecting, appraising and synthesizing relevant research evidence about the problem, elements of a comprehensive approach to address the problem, and implementation considerations;
4) drafting the issue brief in such a way as to present concisely and in accessible language the global and local research evidence; and
5) finalizing the issue brief based on the input of several merit reviewers.

The three elements of a comprehensive approach could be pursued singly, simultaneously with equal or different emphasis, or in a sequenced way.

Unlike a Forum evidence brief, a Forum issue brief does not involve as comprehensive an evidence review by Forum staff, in large part because it builds on a knowledge synthesis that we previously completed.(1)

The issue brief was prepared to inform a stakeholder dialogue for which research evidence is one of many considerations. Participants' views and experiences and the tacit knowledge they bring to the issues at hand are also important inputs to the dialogue. One goal of the stakeholder dialogue is to spark insights – insights that can only come about when all of those who will be involved in or affected by future decisions about the issue can work through it together. A second goal of the stakeholder dialogue is to generate action by those who participate in the dialogue, and by those who review the dialogue summary and the video interviews with dialogue participants.

the implementation considerations, including windows of opportunity, related to moving forward with one or more of the approach elements. Within this scope, the issue brief is focused on the best available research evidence and (as explained in Box 1) does not contain recommendations. In addition, while the issue brief strives to address all people, we highlight equity considerations (as explained in Box 2) for two groups (older adults and patients with mental health and addiction issues as one of their conditions) that are disproportionately affected by multimorbidity.

This issue brief draws on several terms and concepts including chronic disease, integrated chronic disease management, comorbidity and multimorbidity. In general, chronic diseases refer to "health problems that require ongoing management over a period of years or decades."(8) Integrated chronic disease management can be defined as the prevention and management of chronic disease that "aims to reduce overall risk in high-risk individuals and provide appropriate care by facilitating early case finding through affordable strategies and technologies, and equitable and good quality health care for major chronic diseases."(9) An extensively studied example of an integrated approach is the Chronic Care Model, which was used to develop Ontario's Chronic Disease Prevention and Management Framework,(10) and that Boyd et al. (2010) highlight as a promising framework to organize the essential elements of a health system providing optimal care for people with multimorbidity.(4) The Chronic Care Model combines the following six features:

- self-management support (i.e., empowering and preparing patients to manage their health and healthcare);
- decision support (i.e., promoting clinical care that is consistent with scientific evidence and patient preferences through, for example, embedding evidence-based guidelines as well as related patient decision aids into daily clinical practice, and supporting their implementation through continuing professional development);
- delivery system design (i.e., organizing programs and services to assure the proactive, culturally sensitive delivery of effective, efficient clinical care and self-management support by healthcare teams);
- clinical information systems (i.e., organizing patient and population data to facilitate more efficient care through, for example, an electronic health record that provides reminders for providers and patients and monitors the performance of healthcare teams and the system in which they work);

Box 2: Equity considerations

A problem may disproportionately affect some groups in society. The benefits, harms and costs of options to address the problem may vary across groups. Implementation considerations may also vary across groups.

One way to identify groups warranting particular attention is to use "PROGRESS," which is an acronym formed by the first letters of the following eight ways that can be used to describe groups†:

- place of residence (e.g., rural and remote populations);
- race/ethnicity/culture (e.g., First Nations and Inuit populations, immigrant populations, and linguistic minority populations);
- occupation or labour-market experiences more generally (e.g., those in "precarious work" arrangements);
- gender;
- religion;
- educational level (e.g., health literacy);
- socio-economic status (e.g., economically disadvantaged populations); and
- social capital/social exclusion.

This issue brief strives to address all people, but (where possible) it also gives particular attention to two groups:

- older adults; and
- patients with mental health and addiction issues as one of their conditions.

Many other groups (such as patients living in long-term care facilities or patients without a primary care provider) warrant serious consideration as well, and a similar approach could be adopted for any of them.

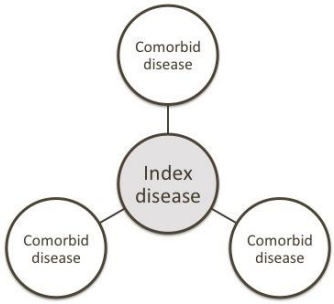
† The PROGRESS framework was developed by Tim Evans and Hilary Brown (Evans T, Brown H. Road traffic crashes: operationalizing equity in the context of health sector reform. *Injury Control and Safety Promotion* 2003;10(1-2): 11–12). It is being tested by the Cochrane Collaboration Health Equity Field as a means of evaluating the impact of interventions on health equity.

- health system changes (i.e., creating a culture, organization and mechanisms that promote safe, high-quality care, which can include visibly supporting comprehensive system change that moves beyond "silos" for primary healthcare, mental healthcare, home care, acute care and public health); and
- community resources and policies (i.e., mobilizing community resources to meet the needs of patients even though these resources are not formally part of healthcare systems).(11;12)

Although primary prevention of chronic diseases is an important concern that, according to the Chronic Care Model, must be addressed at the population level, it was deemed out of the scope of this issue brief, which focuses more specifically on how to design integrated approaches for people with multimorbidity.

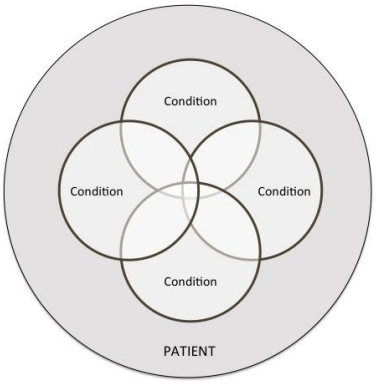
The terms comorbidity and multimorbidity are often used interchangeably in the literature. However, there are notable distinctions between the two concepts.(13) Comorbidity has been defined as "any distinct additional clinical entity that has existed or may occur during the clinical course of a patient who has the index disease under study."(14) As illustrated in the figure below (Figure 1), one disease is the central focus. According to Boyd et al., such conceptualization is inefficient and flawed in the presence of multiple chronic conditions unless one condition is "truly dominant in terms of the care and well-being of the individual."(4)

Figure 1: Conceptual representation of comorbidity (figure from Boyd et al., 2010)



In contrast, multimorbidity has been defined as "the co-existence of two or more chronic conditions, where one is not necessarily more central than the others."(4) As illustrated in the figure below (Figure 2), the concept of multimorbidity suggests that multiple diseases, syndromes and conditions may overlap and potentially interact, and consequently there may be interactions in their management.(4)

Figure 2: Conceptual representation of multimorbidity (figure from Boyd et al., 2010)



Multimorbidity is now the focus of a field of research, albeit one that remains at an early stage of development. While the concept of multimorbidity is predominantly found in the research literature, other concepts have sometimes been used, such as polymorbidity, multipathology and polypathology.(15) In addition, there have been calls for greater conceptual clarity to distinguish multimorbidity from related concepts such as complexity, frailty and polypharmacy.(16)

Most definitions in the literature usually refer to multimorbidity as having two or more conditions (although, as we explain below, we have adopted a definition of three or more conditions). However, simply counting the number of conditions may be too restrictive.(17) Another element to consider in the conceptualization of multimorbidity is the severity of the conditions, which can "range from mild and relatively asymptomatic to debilitating."(18) Furthermore, the nature of these conditions is likely to influence the complexity of the treatment approaches.(18) Some patients may have 'concordant' conditions representing the same overall pathophysiological risk profile, which may be more likely to have a clear and integrated treatment plan (e.g., diabetes, hypertension, retinopathy and cardiovascular disease). In contrast, some patients may have 'discordant' conditions that do not share the same pathophysiological risk profile. Discordant conditions may increase the risks of adverse clinical outcomes and give particular resonance to demands for integrated healthcare delivery (e.g., asthma, diabetes and cancer).(19)

Efforts have been made to adapt existing comorbidity indices to take into consideration the number of conditions, and weight them according to their severity.(17;20) For instance, Hudon et al. adapted the Cumulative Illness Rating Scale (CIRS) to measure the burden of multimorbidity in primary care.(20) The modified version of the CIRS scale identifies 14 domains: 1) cardiac, 2) vascular, 3) hematological, 4) respiratory, 5) otorhinolaryngological and ophthalmological, 6) upper gastrointestinal, 7) lower gastrointestinal, 8) hepatic and pancreatic, 9) renal, 10) genitourinary, 11) musculoskeletal and tegumental, 12) neurological, 13) endocrine, metabolic and breast, and 14) psychiatric. The total theoretical score for the modified CIRS scale ranges from 0 to 56, based on scoring from 0 to 4 for each domain (0 = no problem; 1 = minor current problem or significant history; 2 = morbidity or moderate discomfort requiring primary care treatment; 3 = severe problem which creates constant significant discomfort and chronic problem difficult to control; and 4 = extremely severe problem requiring immediate treatment).(20)

Given that the adapted CIRS does not provide a cut-off score to determine multimorbidity(17) and that there is for now greater consensus on defining multimorbidity in terms of the number of conditions, we have opted to follow the convention of some researchers in the multimorbidity community and adopted a definition of multimorbidity that focuses on three or more conditions (or three or more CIRS domains). While this definition may result in a lower prevalence of multimorbidity than the more commonly used definition (i.e., two or more conditions), our definition may be better for identifying patients with higher needs, which will be more clinically meaningful for people making treatment decisions.(21) We have used this definition of multimorbidity (three or more conditions) for prioritizing research evidence included in the synthesis of findings about the potential elements of a comprehensive approach to addressing multimorbidity (see Box 4 for an outline of our selection criteria). However, we draw on the broader literature in outlining the problem of multimorbidity and, given the small number of systematic reviews addressing the three approach elements, we also draw on systematic reviews focused on managing chronic conditions that were deemed to be relevant to one or more of the elements.

The following key features of the health policy and system context in Ontario were also taken into account in the preparation of this issue brief:

- delivery of healthcare is primarily the responsibility of provincial and territorial governments in Canada and financing is shared between the federal and provincial/territorial governments, and the federal government has available to it certain policy levers to support integrated approaches to care, such as transfer payments, and setting priorities for research funding;

- Ontario's publicly funded health system is distinguished by a long-standing private delivery/public payment agreement between government on the one hand, and physicians and hospitals on the other;
- the agreement with physicians has historically meant that most healthcare is delivered by physicians working in private practice with first-dollar (i.e., no deductibles or cost sharing), public (typically fee-for-service at least in part) payment;
- the private practice element of the agreement has typically meant that physicians have been wary of potential infringements on their professional and commercial autonomy (e.g., directives about the nature of the care they deliver or the way in which they organize and deliver that care);
- other healthcare providers such as nurses, physiotherapists and dietitians, as well as teams led by these providers, are typically not eligible for public fee-for-service payment (or at least not on terms that make independent healthcare practices viable on a large scale);
- other healthcare and community programs and services such as prescription drug coverage, home care, long-term care homes and hospice care receive partial public coverage in Ontario, but not with the same type of first-dollar coverage provided for hospital-based and physician-provided care (e.g., co-payment is required for publicly funded long-term care homes, and home care clients often pay for out-of-pocket expenses over and above the home care services funded by the provinces);
- the 14 geographically defined Local Health Integration Networks (LHINs) have responsibility for decisions relating to the planning, funding and integration of healthcare;
- the 14 Community Care Access Centres (CCACs) – one for each LHIN – have responsibility for the assessment, care planning, care coordination and quality monitoring of publicly funded home health services, as well as for providing information about and supporting referral to and navigation of available community services;
- a variety of pilot programs are currently underway in LHINs that aim to improve the integration of care teams and education for providers, and provide more seamless transitions of care; and
- the current 26 Health Links (of an anticipated total of 77 Health Links) operate at the sub-LHIN level to mobilize the delivery of integrated care across the continuum of care for those with complex needs.(22)

THE PROBLEM

Efforts to address the challenges associated with designing integrated care for people with multimorbidity will need to consider three key features of the problem: 1) the growing prevalence of multimorbidity; 2) the complexity of living with and treating multimorbidity; and 3) current system arrangements are not designed in a way that supports integrated care for people with multimorbidity.

Growing prevalence of multimorbidity

Chronic diseases are a significant and growing challenge in Canada. The Health Council of Canada conducted an analysis based on the responses to the 2010 Commonwealth Fund International Health Policy Survey and found that among the sample of Canadians surveyed, 29% had one chronic condition, 15% had two chronic conditions, and 7% had three or more chronic conditions.(23) A second analysis based on the 2011 Commonwealth Fund International Health Policy Survey focused more specifically on sicker Canadians (i.e., those who self-reported one or more chronic conditions and fair/poor health). The analysis revealed that 36% of sicker Canadians have three or more chronic conditions.(23)

Box 3: Mobilizing research evidence about the problem

The available research evidence about the problem was sought from a range of published and "grey" research literature sources. Published literature that provided a comparative dimension to an understanding of the problem was sought using three health services research "hedges" in MedLine, namely those for appropriateness, processes, and outcomes of care (which increase the chances of us identifying administrative database studies and community surveys). Published literature that provided insights into alternative ways of framing the problem was sought using a fourth hedge in MedLine, namely the one for qualitative research. Grey literature was sought by reviewing the websites of a number of Canadian and international organizations, such as the Canadian Institute for Health Information, Health Council of Canada, Ontario Ministry of Health and Long-Term Care and the International Research Community on Multimorbidity.

Priority was given to research evidence that was published more recently, that was locally applicable (in the sense of having been conducted in the province of Ontario or elsewhere in Canada), and that took equity considerations into account.

A recent study reviewed prevalence estimates from key studies using standardized age groupings for separate studies of multimorbidity in primary care from the Saguenay region of Quebec, south-western Ontario and Australia.(24) The study found that prevalence rates varied widely across the regions and by as much as 61% among women aged 45-64 (rates in Saguenay were very high at 95%, versus 34% in south-western Ontario). Overall, the rates of multimorbidity were lowest in south-western Ontario, but still high among those 65 years of age and older (58% for men and 54% for women) and among those between 45-64 years of age (39% for men and 34% for women). While the study points to a lack of standardization in methods for estimating prevalence, the overall picture is one of high levels of multimorbidity.

Additional data also suggest that the growing burden of multimorbidity disproportionately affects some groups in society. For example, older data (from 2005) from the Health Council of Canada indicate that 14% of Canadian women have two or more chronic conditions as compared to 11% of men (across all age groups). The same data from 2005 also suggest that the risks of multimorbidity are growing steadily with age, with only 13% of Canadian adults aged 20-39 reporting having one or more chronic conditions, as compared to 71% of adults aged 60-79 and 82% of adults aged 80 years and older.(25) In Ontario, data from the Canadian Institutes of Health Information indicate that 43% of adults over the age of 65 have two or more chronic conditions.(26) A review of community surveys also found that multimorbidity is affecting the most vulnerable groups in society (e.g., people who are less educated, have low incomes and/or are living in rural communities).(2;23;25) In 2005, 40% of low-income Canadians reported having one or more chronic conditions, compared to 27% of high-income Canadians. The poorest Canadians are almost three times as likely as the highest-income Canadians to have multimorbidity.(8) In addition, while not based on Canadian data, a large cross-sectional study of 1.75 million people registered in 314 medical practices in Scotland found that the onset of multimorbidity emerged 10-15 years earlier in those living in the most deprived areas as

compared to the most affluent areas.(27) The same study also found low socioeconomic status was highly associated with multimorbidity when mental illness was one of the conditions.

Some of the major chronic conditions in Canada include arthritis, high blood pressure, mood disorders, diabetes, heart disease, cancer and chronic obstructive pulmonary disease.(25) These chronic conditions not only share common risk factors and conditions, but they also commonly occur together. For instance, 75% of Canadians with diabetes, heart disease, cancer or chronic obstructive pulmonary disease also have one or more other chronic conditions. Furthermore, more than 50% of people with high blood pressure or arthritis have at least one additional chronic condition, and 25% of people with mood disorders have other chronic conditions.(25)

Complexity of living with and treating multimorbidity

Living with multimorbidity – health risks, risk factors and protective factors

The health risks, risk factors and protective factors for people with multimorbidity are numerous and varied. For instance, the literature suggests that people living with multimorbidity are more likely to die prematurely,(28) experience adverse clinical events,(13;29) have poorer quality of life,(30) experience loss of physical functioning,(2;31;32) and have limited capacity to attain and sustain employment.(4) We outline in Table 1 a summary of the health risks, risk factors and protective factors that we identified from the literature. For a fuller description of these findings, see our recent review from which this table was drawn.(1)

Table 1: Summary of key findings from the literature relevant to the health risks, risk factors and protective factors for multimorbidity (reproduced from (1))

Categories of findings	Summary of key findings
Health and related risks of multimorbidity	*Findings from systematic reviews* • physical–mental multimorbidity is common among long-term care (LTC) residents, and those with multimorbidity have been found to have more cognitive impairment and problem behaviours than those without(33) • functional impairment, poor quality of life, high healthcare utilization and high out-of-pocket costs are common risks of multimorbidity(34) • the higher number of diseases a patient had was found to consistently increase the odds or risk for disability(34) • the effect of multimorbidity on mortality is unclear, with one review finding that it disproportionately increased mortality (35) and another finding inconsistent evidence(34) • patients with multimorbidity have been found to use healthcare services more frequently as compared to those with only a single condition(35) • multimorbidity was found to be associated with increased healthcare charges in an outpatient setting and increase the likelihood of inpatient admission or death(35) and • certain combinations of chronic conditions have been found to increase the risk for physical decline and higher patient consultation rates(35) *Findings from primary studies* • an increase in the number of chronic conditions was found to be associated with an increase in primary care consultations, hospital outpatient visits, hospital admissions and total healthcare costs(36) • two studies exploring the quality of care received by older community-dwelling adults with multimorbidity concluded that multimorbidity is associated with better quality of care, although these somewhat counterintuitive findings have been the subject of much criticism (in terms of conceptual and methodological limitations in the studies)(37;38)
Risk factors for multimorbidity	*Findings from systematic reviews* • long-term care residents with mental–physical multimorbidity were found to be more likely to be younger, male and unmarried than other long-term care residents(33) • psychosocial risk factors (e.g., negative life events, an external health locus of control, and a social network of less than five people) may appear predominantly in conditions lacking a commonly known pathophysiological origin(35)

	• there is inconsistent evidence of the impact of patients' income, sex, age and ethnicity on multimorbidity(35) *Findings from primary studies* • multimorbidity was found to be associated with a wide range of risk factors including family structure, marital status, education level, country of birth, medication use, health service use, existence of depressive symptoms, smoking status, overall health status and obesity(39) • individuals in the poorest socioeconomic groups were found to be more likely to develop multimorbidity at a younger age (40) and more likely to die prematurely(27)
Protective factors for multimorbidity	*Findings from systematic reviews* • a large social network was found to play a protective role for the occurrence of multimorbidity(34)

Complexity of treating multimorbidity

Treating patients with multimorbidity also raises a number of challenges and uncertainties. Decisions are often made "in the context of multiple, often ill-defined, problems and fragmentary evidence."(16) For instance, there may be uncertainty about the benefits and harms of simultaneous treatments. There is also the potential risk of worsening one condition by treating a coexisting one. It is also especially challenging to treat patients with multimorbidity because there are competing outcomes. As observed by Smith et al., "the more complex the case, the more we should think in terms of outcomes that are relevant across diseases, e.g., nutrition, living situations, function, symptom burden, survival, and active life expectancy."(13) The challenge associated with balancing these competing outcomes highlights the need to engage patients and their caregivers to ensure that the prioritization process takes into account their values, needs and preferences.

Recent efforts to manage chronic conditions have led to the development of practice guidelines for the management of single chronic conditions or the management of multiple behavioural risk factors for patients with a chronic condition.(41) However, there is a paucity of guidelines that outline approaches for treating people with multimorbidity or that more generally take a patient-centred approach that allows for flexibility and takes into account patient preferences. Despite the growing number of people with multiple chronic conditions, the majority of treatment guidelines focus on single diseases and rarely address how to optimally integrate care for people with multimorbidity.(19;42-44) We recently conducted a review that, as one of the objectives, sought to identify promising guidelines for treating people with multimorbidity and models for developing such guidelines.(1) No guidelines were identified that specifically addressed the needs of multimorbidity, but we did identify several overviews of the applicability of existing guidelines to multimorbidity (19;42-46), and a small number of guidelines that provide implications or recommendations for treatment (but none that focused exclusively on multimorbidity).(47-52) In general, the overviews found that multimorbidity was inconsistently or not accounted for in the included guidelines, those guidelines that provided information had limited detail, cross-referencing to other guidelines of important comorbid conditions was rare, and few or none provided an assessment of the risks and benefits of the recommended treatments. In addition, one overview found that 17 of the 20 guidelines they studied provided considerations about comorbidity (but not multimorbidity) and considered it in treatment, but none actually specified preferred actions for patients with more than one concurrent condition.(19)

This lack of availability of multimorbidity-sensitive guidelines means that providers often have to turn to several guidelines focused on single conditions. As a result, there are recurring concerns about the treatment burden arising from this type of approach.(5;53) More generally, following guideline recommendations of any single disease would consume significant amounts of time for primary care physicians (54) and may become, in the context of multimorbidity, "impractical, irrelevant or even harmful."(4) In particular, disease-focused guidelines may not be appropriate for treating patients with multimorbidity when diseases are discordant (19;43;55;56) and problems may arise from:

- side effects of drugs that are prescribed as part of a treatment plan (e.g., drug-to-drug interactions from polypharmacy);

- exacerbation or variation in the clinical manifestations of one condition as a result of drugs that are prescribed for a different condition, or because of interactions between the conditions;
- single-disease guidelines leading to complex and sometimes contradictory treatments for multimorbidity;
- difficulty for patients and healthcare providers in establishing priorities for action from among the numerous recommended disease-specific interventions that apply to patients with multimorbidity; and
- patient factors precluding treating one or more conditions aggressively (e.g. cost of medicines, life expectancy, etc.).(42-44;56-58)

These challenges are also linked with limitations in how guidelines are developed. Guidelines are usually based on explanatory clinical trials which tend to exclude people with physical and mental comorbidities (and/or multimorbidity) as well as older adults, thereby limiting their applicability to these populations.(42;43;57) Other limitations that have been highlighted include the exclusion of information related to the burden of treatment for patients, short- and long-term goals, and other considerations related to patient preferences.(42;44;57) Tinetti et al. outline the underlying tension between guideline development and clinical practice: "The developers of guidelines recognize that decisions about prescribing must be individualized, with patients' overall health taken into account. Nevertheless, one of the hallmarks of quality-assurance programs is a reduction in the variation of practice patterns among providers."(56)

As a result, an approach increasingly advocated by those involved with processes to develop treatment guidelines for multimorbidity is to take a patient-centred focus (e.g., weighing the risks and benefits of treatments across a patient's health conditions and ensuring patient preferences for outcomes are considered) and provide recommendations that ensure the flexibility that both patients and providers can accept.(59) While this appears to be a challenging approach, guidelines are highlighted as being an important part of supporting integrated care for people with multimorbidity, given that it is very difficult for single providers to deliver appropriate care without a framework that adopts an integrated and holistic approach to care.

Current system arrangements are not designed in a way that supports integrated care for people with multimorbidity

Delivery arrangements

Current models of care are often described as "fragmented, incomplete, inefficient, and ineffective" for people living with multimorbidity,(4) which results in challenges for people getting the care they need from primary care, community care and other providers.(16) Fragmentation often occurs because programs/models and treatment strategies are typically focused on single discordant chronic conditions (e.g., diabetes, cancer and mental illness) rather than offering comprehensive approaches to simultaneously manage multiple conditions. Thus, existing approaches based on the "single disease paradigm" appear increasingly inappropriate for the growing number of patients with multimorbidity.(13)

The context in which encounters between patients and their primary-care physicians occur can also lead to suboptimal approaches to care. These encounters usually take the form of 15-minute, multi-agenda visits, and such an approach limits the provision of optimal care and supports for self-management, as well as efforts to engage them in collaborative decision-making.(60;61) In addition, patients with multimorbidity often see multiple healthcare providers in different settings,(5;53) which may increase "the risks of errors and poor care coordination."(62)

Multimorbidity also places a heavy burden on patients and caregivers for managing their care. Boyd et al. highlight that people with multimorbidity have greater self-care needs, and that complex older patients are more likely to rely on informal/family caregivers.(4) The burden for patients and caregivers may take various forms such as managing multiple appointments with multiple healthcare professionals in multiple settings,

following multiple and complex treatment regimens, as well as the stress the increased burden may generate.(63)

People with multimorbidity also report more negative experiences regarding their interactions with the health system. While sicker Canadians generally reported having timely access to care, they usually face three major problems: 1) significant cost barriers to accessing medication and follow-up care (described in more detail below); 2) poor coordination and information flow among the various healthcare providers; and 3) lack of engagement in their care as compared to the general public. Consequently, sicker Canadians give the lowest ratings to the health system and to the care they have personally received.(23)

Financial arrangements

At the level of individuals, patients with multimorbidity and informal/family caregivers can face significant financial burden. For example, patients often have to pay for additional home care and community supports that are needed, such as additional rehabilitation therapy, nursing care, other types of home care and transportation to and from medical appointments. In addition, the coverage of these services can vary across Local Health Integration Networks (LHINs) depending on how each LHIN has invested their funds. As a result, it is difficult for providers and organizations (e.g., CCACs) to develop comprehensive and customized packages of care and services for people with multimorbidity based on their specific needs (and irrespective of their ability to pay for these packages). With respect to caregivers, it is estimated that there are more than two million informal (i.e., unpaid) caregivers in Canada (64;65) and the estimated economic value of these contributions is in the range of $25 billion in Canada.(66) In addition, a systematic review found that those identified as either intensive caregivers and/or primary caregivers (as opposed to caregivers in general) were significantly less likely to be in the labour force as compared to non-caregivers.(67)

Remuneration models for primary-care providers and funding models for their many organizational partners in the system are typically not conducive to supporting coordinated/integrated care for patients with multimorbidity. For example, fee-for-service payment mechanisms that rely on discrete International Classification of Diseases (ICD) diagnoses and that are not adapted to the types of care required by people with multimorbidity may exacerbate fragmentation in the system.(5) Similarly, where capitation remuneration models are used (either alone or in blended models), there is a need to ensure that rates are adjusted to account for the additional time required to provide care for patients with multimorbidity. In addition, tying financial incentives to healthcare providers for guideline adherence for patients with multimorbidity may increase the burden placed on the patient for their care, increase the risks of drug-drug or drug-disease interactions, and lead to unrealistic expectations of physicians' care.(42;56)

Multimorbidity also places a heavy burden on the health system in terms of healthcare utilization and costs. Adults with multimorbidity are significant users of healthcare services at all adult ages, and account for more than two-thirds of healthcare spending.(5) Recent data about high-needs users of the health system in Ontario (i.e., those with the highest healthcare spending but not necessarily with multimorbidity) indicates that 1% of the population account for 33% of healthcare costs and 5% account for 66% of healthcare costs.(3) In addition, the estimated burden of chronic conditions in Ontario amounts to just over 55% of total direct and indirect healthcare costs, and this is expected to rise.(10) In terms of use of specific healthcare services, the Health Council of Canada estimates that patients with three or more chronic conditions represent 4% of the Canadian population, but use 9-10% of general practitioner and specialist consultations, 16% of nurse consultations and 23% of overnight stays in hospitals.(25) Furthermore, patients with multimorbidity are also at greater risk of potentially avoidable inpatient admissions or preventable complications in an inpatient setting, as well as being more susceptible to post-operative complications,(4;16) which places further strain on limited health system resources.

Given the greater need for healthcare among people with multimorbidity and/or high-needs users of the health system, higher healthcare utilization and costs may be entirely appropriate as compared to the rest of

population. However, since people with multimorbidity typically require more complex care and often from several providers and across different settings, the higher proportion of use of healthcare services points to an area where greater coordination and integration of services may have a significant impact on improving the efficiency with which care is delivered.

Governance arrangements

As noted earlier, current models of care are often fragmented for people living with multimorbidity,(4) but more generally, primary care is highly fragmented with no effective governance at the local level. As a result, in most communities primary care providers lack a collective voice and the capacity to collectively address community health needs. Accountability within patient-care networks is typically held by single healthcare providers and not by a clearly defined 'medical home' (or coordinating partner) which is accountable to the Local Health Integration Network (LHIN), or to which other providers are themselves accountable. Health Links are designed to begin to address this gap by supporting local patient-care networks that are led by a coordinating partner, and by attempting to coordinate and optimize access to needed services. However, while Health Links are now operating in 26 local communities, the partners in these initiatives often struggle to know what to do, are not always well supported by provincial and national initiatives (e.g., guideline producers), and lack a clear sense of how to operationalize approaches to monitoring and evaluation to determine whether measurable impacts have been achieved.

Additional equity-related observations about the problem

Multimorbidity affects many older adults (the first prioritized group that we outlined in Box 2) with approximately 43% of Ontarians over the age of 65 living with two or more chronic conditions, and the risk of multimorbidity growing steadily with age.(25;26) At a national level, data from the Canadian Institute of Health Information indicates that 24% of older adults in Canada report having three or more chronic conditions (as compared to only 12% of younger adults).(68;69) In addition, and related to patients with mental health and addiction issues as one of their conditions (the second prioritized group that we outline in Box 2), a recent systematic review evaluated the prevalence of mental-physical multimorbidity in middle-aged and elderly long-term care residents without dementia, and found only one small study describing multimorbidity consisting of a wide range of chronic psychiatric and somatic conditions.(33) Findings from this study suggest that physical–mental multimorbidity is common among long-term care residents. The remaining studies included in the review show prevalence rates of comorbid physical and mental illnesses ranging from 0.5%–64.7%, which appear to be aligned with prevalence rates reported in other studies of community-dwelling older people. The review also found that long-term care residents with mental–physical multimorbidity were more likely to be younger, male and unmarried than other long-term care residents. They also had more cognitive impairment and problem behaviours, but typically not dementia. The review found no studies describing the care needs of long-term care residents with physical-mental health multimorbidity.

Another recent review examined the occurrences, causes and consequences of multimorbidity in the elderly population.(34) The review found that very little is known about the risk factors for multimorbidity with no included studies having evaluated genetic background, biological causes (e.g., cholesterol, blood pressure and obesity), lifestyle factors (e.g., smoking, alcohol consumption, nutrition and physical activity) or environmental factors (e.g., air pollution and social environment) in relation to the development of multimorbidity. However, having a large social network was found to play a protective role. The review identified functional impairment, poor quality of life, high healthcare utilization and high out-of-pocket costs as major consequences of multimorbidity. In addition, the review also outlined that the number of diseases a patient had was consistently associated with increasing odds or risk for disability (see Table 1 for a fuller description of the health risks, risk factors and protective factors for multimorbidity).

Another important consideration for older adults with multimorbidity is the financial burden placed on them and their caregivers. As noted earlier in the section about financial arrangements, the number of informal caregivers in Canada is substantial, accounting for approximately 70% of care provided to older adults in the community.(70) Despite their extensive contributions, support for caregivers is often limited, even though *not* providing supports is associated with reduced labour supply, an elevated risk for poverty, and a higher prevalence of mental health issues such as anxiety and depression among family members providing care.(64;67;71-74) Given the preference of the majority of older adults to remain in their homes, but with many requiring some form of assistance from informal caregivers to do so,(64;75) policies and programs that support caregivers can be an important component of integrated approaches for older adults with multimorbidity.

Regarding the second prioritized group that we outlined in Box 2 (patients with mental health and addiction issues as one of their conditions), a central challenge of living with and treating multimorbidity is the complex interplay between mental health and physical chronic conditions.(76) As observed by Mercer, the relationship between mental health and physical conditions appears to be "bidirectional."(77) In other words, people with long-term physical conditions are more likely than the general population to experience mental health issues (e.g., anxiety, depression and other mood disorders), and people experiencing mental health issues are more likely to develop long-term physical conditions.(77) This relationship illustrates the need for more holistic approaches to treat multimorbidity that bridge the physical, psychological and social dimensions of health.(78) However, addressing the mental health issues of people living with multimorbidity may be particularly challenging given the pervasive stigma associated with mental illness, which may discourage patients with multimorbidity from disclosing their mental health concerns to their health professionals or caregivers.(77)

THREE ELEMENTS OF A COMPREHENSIVE APPROACH FOR ADDRESSING THE PROBLEM

Many elements could be selected as a starting point for deliberations about an approach for designing integrated approaches to support people with multimorbidity in Ontario. To promote discussion about the pros and cons of potentially viable approaches, we have selected three elements of a larger, potentially more comprehensive approach to supporting people with multimorbidity. The three elements were developed and refined through consultation with the Steering Committee and with key informants who we interviewed during the development of this issue brief. The elements are:

1) support primary care, community care and other providers to adapt and implement models of care for patients with multimorbidity that improve the patient experience, improve health and keep per capita costs manageable;
2) enable primary care, community care and other providers to identify and use guidelines (or care pathways) that meet the needs of patients with multimorbidity; and
3) enable primary care, community care and other providers to efficiently support self-management by patients with multimorbidity.

The elements could be pursued simultaneously or sequentially, or components could be drawn from each element to create a new (fourth) element. They are presented separately to foster deliberations about their respective components, the relative importance or priority of each, their interconnectedness and potential of or need for sequencing, and their feasibility.

The principal focus in this section is on what is known about these elements based on findings from systematic reviews. We present the findings from systematic reviews along with an appraisal of whether their methodological quality (using the AMSTAR tool)(78) is high (scores of 8 or higher out of a possible 11), medium (scores of 4-7) or low (scores less than 4) (see the appendix for more details about the quality appraisal process). We also highlight whether they were conducted recently, which we define as the search being conducted within the last five years. In the next section the focus turns to the barriers to and possible windows of opportunities for implementing these elements and to possible implementation strategies to address the barriers.

Box 4: Mobilizing research evidence about elements of a comprehensive approach for addressing the problem

The available research evidence about elements of a comprehensive approach for addressing the problem was sought primarily from Health Systems Evidence (www.healthsystemsevidence.org), which is a continuously updated database containing more than 3,000 systematic reviews and more than 1,600 economic evaluations of delivery, financial and governance arrangements within health systems. The reviews were identified by searching the database for reviews addressing chronic disease management, and identifying those relevant to each of the sub-elements.

The authors' conclusions were extracted from the reviews whenever possible. Some reviews contained no studies despite an exhaustive search (i.e., they were "empty" reviews), while others concluded that there was substantial uncertainty about the option based on the identified studies. Where relevant, caveats were introduced about these authors' conclusions based on assessments of the reviews' quality, the local applicability of the reviews' findings, equity considerations, and relevance to the issue. (See the appendices for a complete description of these assessments.)

Being aware of what is not known can be as important as being aware of what is known. When faced with an empty review, substantial uncertainty or concerns about quality and local applicability, or a lack of attention to equity considerations, primary research could be commissioned or an element could be pursued and a monitoring and evaluation plan designed as part of its implementation. When faced with a review that was published many years ago, an updating of the review could be commissioned if time allows.

No additional research evidence was sought beyond what was included in the systematic review. Those interested in pursuing a particular element may want to search for a more detailed description of the element or for additional research evidence about the element.

Element 1 – Support primary care, community care and other providers to adapt and implement models of care for patients with multimorbidity that improve the patient experience, improve health and keep per capita costs manageable

Sub-elements of this element might include:

- identifying the unique contexts in which (or cohorts for which) models of care are needed (e.g., children, adults with mental health and addiction issues, adults in long-term care facilities, adults at the end of life);
- identifying promising models of coordinated/integrated care for each of these contexts or cohorts (e.g., pharmacist-led shared medical appointments, patient-centred team-based collaborative care management, and communities of practice), their key attributes (e.g., patient-centredness as a principle, email addresses for all patients as a basic infrastructure requirement), and the factors that might influence their adaptation and implementation;
- supporting the local (context- or cohort-specific) adaptation and implementation of care models, as well as the supportive conditions for such models (e.g., methods to identify patients with multimorbidity within providers' patient pools); and
- developing performance-measurement frameworks that identify high-performing care models.

We identified reviews outlining benefits for each of the sub-elements, with most focused on the second sub-element (identifying promising models of coordinated/integrated care), but very few that were focused specifically on people with multimorbidity.

For the first sub-element, we found one recent but low-quality review that identified older adults as one group that is disproportionately affected by multimorbidity, and found that a strong social network may play a protective role for the occurrence of multimorbidity in this population context.(34)

Several reviews addressed the second sub-element about models of coordinated/integrated care. Of the systematic reviews that specifically focused on people with multimorbidity, two addressed comprehensive care models/patient-oriented interventions (i.e., those that are patient-centred and aim to structure and coordinate the delivery of healthcare services),(13;79) one addressed organizational interventions (e.g., changing care delivery to match the needs of patients with multimorbidity across a range of areas in an organization),(13) and one addressed pharmaceutical care.(80) While both reviews that evaluated comprehensive care models/patient-oriented interventions found mixed and inconclusive results, one found that comprehensive care programs were at least comparable to or more beneficial than usual care.(79) In addition, the other review found that patient-oriented interventions focusing on particular risk factors or on areas where patients with multimorbidity have difficulties were more effective than those with a broader focus.(13) Similarly, for organizational interventions, the same review found that interventions targeting more specific changes to care delivery within an organization (e.g., integrated treatment programs coordinated by care managers or individualized pharmaceutical care plans implemented by multidisciplinary teams) were more effective as compared to those with a broader focus (e.g., case management or changes in care delivery). The review focused on pharmaceutical care found that "complex and multifaceted pharmaceutical care" (e.g., outreach interventions by pharmacists, screening of automated drug alerts by consultant pharmacists visiting nursing homes, and clinical pharmacist interventions in various settings) reduced inappropriate medication use and adverse drug events.(80) In Table 2 we outline the findings from these reviews as well as from reviews that were not specifically focused on multimorbidity, but evaluated models of care for complex patients or people with comorbidities.

For the third sub-element, we identified one review that found benefits for culturally appropriate interventions (those using bilingual community health workers) as one possible example of how to support the local adaptation and implementation of care models. The review found that in culturally and linguistically diverse communities receiving such interventions, screening rates were increased and health status, healthy

behaviours, completion rates for health promotion programs, health knowledge, appointment attendance and self-management were improved.(81)

For the last sub-element, we identified two reviews that found benefits for quality-improvement strategies (as one possible component of developing performance-measurement frameworks that identify high-performing care models). One review found that collaborative quality-improvement interventions contributed to improvements in processes of care, patient care and organizational performance.(82) The other review found that clinician/patient-driven quality improvement was more effective than approaches driven by managers/policymakers.(83)

For those who want to know more about the systematic reviews contained in Table 2 (or obtain citations for the reviews), a fuller description of the systematic reviews is provided in Appendix 1.

Table 2: Summary of key findings from systematic reviews relevant to Element 1 - Support primary care, community care and other providers to adapt and implement models of care for patients with multimorbidity that improve the patient experience, improve health and keep per capita costs manageable

Category of finding	Summary of key findings
Benefits	• **Identifying the unique contexts in which (or cohorts for which) models of care are needed (e.g., children, adults with mental health and addiction issues, adults in long-term care facilities, adults at the end of life):** o *Groups affected by multimorbidity and their specific care needs*: A recent low-quality review found that among older adults (approximately half of which are affected by multimorbidity), a large social network appeared to play a protective role for the occurrence of multimorbidity.(34) • **Identifying promising models of coordinated/integrated care for each of these contexts or cohorts (e.g., pharmacist-led shared medical appointments, patient-centred team-based collaborative care management, and communities of practice), their key attributes (e.g., patient-centredness as a principle, email addresses for all patients as a basic infrastructure requirement), and the factors that might influence their adaptation and implementation** o *Comprehensive care models/patient-oriented interventions:* ▪ A recent high-quality review focused on interventions for patients with multimorbidity found that interventions focusing on particular risk factors or on areas where patients with multimorbidity have difficulties appear to be more effective than organizational interventions with a broader focus.(13) ▪ The same review found that patient-oriented interventions that were linked to the healthcare system (e.g., diet and physical activity intervention with self-management support delivered by a health educator) appeared more effective than those that are not linked.(13) ▪ Two older medium-quality reviews found benefits for people with mental health and addiction issues, with one finding that dual-diagnosis programs have benefits for clients who are homeless or do not respond to treatment,(84) and the other finding that chronic care programs improve coordination of care.(85) o *Organizational interventions:* A recent high-quality review focused on interventions for patients with multimorbidity found the effect of organizational interventions on health outcomes were mixed and inconclusive, but those interventions that have a specific focus (e.g., integrated treatment programs coordinated by care managers, or individualized pharmaceutical care plans implemented by multidisciplinary teams) tended to improve prescribing, medication use and adherence, whereas organizational interventions with a broad focus (e.g., case management or changes in care delivery) were less effective at achieving these outcomes).(13) o *Case management*: Two recent reviews found benefits related to case management approaches, with the medium-quality review finding reductions in emergency department use among frequent users,(86) and the low-quality review finding that nurse care managers have a positive impact on quality of life, patient satisfaction, treatment adherence, self-care and on clinical outcomes.(87) o *Multidisciplinary care*: A recent medium-quality review found that collaborative chronic care models can improve mental and physical outcomes for people with mental health conditions, but also found that effects are more variable for people with multimorbidity.(88) o *Integrated care*: A recent medium-quality review found that hospital-wide interventions improved physical and mental health outcomes and patient mortality, and reduced length of stay, readmissions and complications for older adults.(89)

	○ *Pharmaceutical care*: Three recent systematic reviews and one older review found benefits for interventions involving pharmaceutical care for people with comorbidities, geriatric care or polypharmacy: ▪ one of the recent high-quality reviews found that "complex and multifaceted pharmaceutical care" (e.g., outreach interventions by pharmacists, screening of automated drug alerts by consultant pharmacists visiting nursing homes, and clinical pharmacist interventions in various settings) reduced inappropriate medication use and adverse drug events;(80) ▪ the other recent high-quality review found a positive effect of pharmacist care on therapeutic, safety, hospitalization and adherence outcomes;(90) ▪ the recent medium-quality review found that pharmacist-led intervention for patients with chronic kidney disease contributed to significantly reducing all-cause hospitalizations (although the evidence was noted to be sparse and of variable quality);(91) and ▪ the older medium-quality review found that baseline medication adherence among adults with three or more chronic conditions was higher in the included studies evaluating interventions that were led by pharmacists (but also noted that the overall evidence is minimal and weak).(92) • **Supporting the local (context- or cohort-specific) adaptation and implementation of care models, as well as the supportive conditions for such models (e.g., methods to identify patients with multimorbidity within providers' patient pools)** ○ *Culturally appropriate interventions*: A recent medium-quality review of culturally appropriate interventions in culturally and linguistically diverse communities for managing chronic disease (e.g., using bilingual community health workers) increased screening rates and improved health status, healthy behaviours, completion rates of health promotion programs, health knowledge, appointment attendance and self-management.(81) • **Developing performance-measurement frameworks that identify high-performing care models** ○ *Quality improvement*: ▪ A medium-quality but older review found a positive effect for collaborative quality-improvement interventions on processes of care, patient care and organizational performance as a result of participation in a quality-improvement collaborative.(82) ▪ Another review that was conducted recently but was of low quality found clinician/patient-driven quality-improvement interventions were effective but that manager/policymaker-driven approaches were less effective.(83) ▪ The same review also found that the most effective quality-improvement strategies included clinician-directed audit and feedback, decision support systems and the use of small group discussions in continuing medical education.
Potential harms	• None of the identified reviews provided information about potential harms of the sub-elements
Costs and/or cost-effectiveness in relation to the status quo	• **Identifying promising models of coordinated/integrated care for each of these contexts or cohorts (e.g., pharmacist-led shared medical appointments, patient-centred team-based collaborative care management, and communities of practice), their key attributes (e.g., patient-centredness as a principle, email addresses for all patients as a basic infrastructure requirement), and the factors that might influence their adaptation and implementation** ○ *Comprehensive care models/patient-oriented interventions:* ▪ A recent medium-quality review of comprehensive care programs (i.e., those that are patient-centred and aim to structure and coordinate delivery of healthcare services) indicated that there was moderate evidence of a beneficial effect on inpatient healthcare utilization and healthcare costs.(79) ▪ One recent costing study from Australia found that a diabetes-management program for patients with Type 2 diabetes and related comorbidities led to a $463 admission cost reduction per patient,(93) and an older costing study from the United States found that patient-centred management led to reduced cost through patient education, coordination and support.(94) ○ *Multidisciplinary care:* A recent medium-quality review found that total health costs did not differ between collaborative chronic care models and other models of care.(88) • **Supporting the local (context- or cohort-specific) adaptation and implementation of care models, as well as the supportive conditions for such models (e.g., methods to identify patients with multimorbidity within providers' patient pools)** ○ *Adapting existing approaches to care*: A recent cost-effectiveness study found that a diagnosis of diabetes caused a decrease in the cost-effectiveness of colorectal screening, and concluded that screening for colorectal cancer should be individualized for patients based on the presence of comorbidities and life expectancy.(95)
Uncertainty regarding benefits and potential harms (so monitoring and evaluation could be	• Uncertainty because no systematic reviews were identified ○ Not applicable (reviews were identified for each sub-element) • Uncertainty because no studies were identified despite an exhaustive search as part of a systematic review ○ **Identifying the unique contexts in which (or cohorts for which) models of care are needed**

warranted if the option were pursued)	**(e.g., children, adults with mental health and addiction issues, adults in long-term care facilities, adults at the end of life)** ▪ *Groups affected by multimorbidity and their specific care needs:* None of the included studies in a recent medium-quality review examining the prevalence of mental-physical multimorbidity described the specific care needs of residents.(33) • No clear message from studies included in a systematic review o **Identifying the unique contexts in which (or cohorts for which) models of care are needed (e.g., children, adults with mental health and addiction issues, adults in long-term care facilities, adults at the end of life)** ▪ *Groups affected by multimorbidity and their specific care needs:* A recent low-quality review that examined prospective cohort studies of multimorbidity showed inconsistent findings of the impact of patients' income, sex, age and ethnicity on multimorbidity,(35) and another recent low-quality review concluded that there is insufficient evidence to support the provision of evidence-based care for patients with multimorbidity.(34) ▪ *Identifying contexts in which models of care are needed*: A recent medium-quality review that assessed risk-prediction models for hospital readmission found that medical comorbidities better predicted mortality than hospital readmission, concluded that readmission risk prediction has several limitations, and, as a result, better approaches are needed for assessing hospital performance with respect to discharging patients and for identifying patients at elevated risk for avoidable readmission.(96) o **Identifying promising models of coordinated/integrated care for each of these contexts or cohorts (e.g., pharmacist-led shared medical appointments, patient-centred team-based collaborative care management, and communities of practice), their key attributes (e.g., patient-centredness as a principle, email addresses for all patients as a basic infrastructure requirement), and the factors that might influence their adaptation and implementation** o *Comprehensive care models/patient-oriented interventions*: ▪ A recent high-quality review focused on interventions for patients with multimorbidity found that the effects of patient-oriented interventions on health outcomes were mixed and inconclusive, but also found limited and mixed effects on psychosocial and health services utilization outcomes.(13) ▪ A recent medium-quality review of comprehensive care programs (i.e., those that are patient-centred and aim to structure and coordinate delivery of healthcare services) indicated that while effects of programs appear comparable or more positive than usual care, that given the substantial variation across programs identified in the review, definite conclusions could not be made regarding which components were effective and under which circumstances these programs may be most effective.(79) ▪ The same review also specifically outlined that there was: moderate evidence of a beneficial effect on inpatient healthcare utilization and healthcare costs, health behaviour of patients, perceived quality of care, satisfaction of patients and caregivers; insufficient evidence of a beneficial effect of comprehensive care on health-related quality of life (in terms of mental functioning), medication use, outpatient healthcare utilization and healthcare costs; and no evidence of a beneficial effect of comprehensive care on cognitive functioning, depressive symptoms, functional status, mortality, quality of life (in terms of physical functioning), or caregiver burden.(79) o *Integrated care*: A recent low-quality review found inconsistent evidence that shared-care interventions across primary and speciality care improved physical health and supported recovery from depression for people with comorbid depression and diabetes.(97) o *Pharmaceutical care*: One recent low-quality review found a lack of strong evidence regarding the effects of interventions involving a clinical pharmacist on medication discrepancies.(98)
Key elements of the policy option if it was tried elsewhere	• **Identifying the unique contexts in which (or cohorts for which) models of care are needed (e.g., children, adults with mental health and addiction issues, adults in long-term care facilities, adults at the end of life)** o *Groups affected by multimorbidity and their specific care needs:* ▪ A recent medium-quality review found one small study suggests that physical-mental multimorbidity is common among long-term care residents, with other studies finding prevalence rates of comorbid physical and mental illnesses ranging from 0.5%-64.7%.(33) ▪ A recent low-quality review found that multimorbidity affects more than half of the elderly population, and that prevalence is higher among specific populations of older adults, including the very old, women and people with lower socioeconomic status.(34) ▪ Another recent low-quality review found that certain combinations of chronic conditions (e.g., chronic respiratory disease, congestive heart failure and diabetes) were found to present a greater risk for physical decline than others, whereas other combinations (e.g., chronic respiratory disease and osteoarthritis) resulted in higher patient consultation rates.(35) • **Developing performance-measurement frameworks that identify high-performing care models** o *Public reporting:*

	▪ An older low-quality review examined practices for using public reporting of performance as a way of improving healthcare quality, and suggested that for public reporting to be effective it should focus on information directly related to a program's objectives, audience, content, product, distribution and impacts.(99)
Stakeholders' views and experience	• **Identifying promising models of coordinated/integrated care for each of these contexts or cohorts (e.g., pharmacist-led shared medical appointments, patient-centred team-based collaborative care management, and communities of practice), their key attributes (e.g., patient-centredness as a principle, email addresses for all patients as a basic infrastructure requirement), and the factors that might influence their adaptation and implementation** o *Comprehensive care models/patient-oriented interventions:* ▪ A recent medium-quality review found that consumer-directed care did not affect clinical outcomes but did lead to increased satisfaction with care and community service use among older adults.(100)

Element 2 – Enable primary care, community care and other providers to identify and use guidelines (or care pathways) that meet the needs of patients with multimorbidity

Sub-elements of this element might include:

- undertake activities to ensure that guidelines meet the needs of patients with multimorbidity; and
- undertake activities that assist primary care, community care and other providers in identifying and using such guidelines (e.g., computerized decision support)

The only review we identified as being relevant to the first sub-element is one we recently conducted that, as part of one of the objectives, identified examples of sets of principles that have been developed for the creation of multimorbidity guidelines. This review was independently assessed for quality and deemed to be of high quality. The recommendations we identified from the literature include:

1. providing clear labelling and promotion of guidelines in clearinghouses that include information on people with multimorbidity;(101)
2. supporting collaborative guideline development to address the care of people with multimorbidity;(58)
3. including information on the most common multimorbidity disease clusters along with the main chronic condition, and on the management of risk factors to prevent the occurrence of additional chronic conditions;(42;58;101)
4. cross-referencing guidelines with each other when recommendations are synergistic or contradictory (43) or when patterns of multimorbidity are common;(102)
5. requiring chronic disease guidelines to include a section about multimorbidity that provides a summary of recommendations for diagnosis, severity assessments and treatments;(58)
6. developing and validating an instrument for assessing the applicability of guidelines to patients with multimorbidity (especially for older adults with multimorbidity);(44)
7. requiring guidelines to explicitly discuss the applicability of recommendations to patients with the most prevalent comorbid conditions, and discuss the quality of the evidence for these patients;(19;58)
8. developing a patient-centred approach (rather than one that is disease-oriented) to guideline development;(19;44;55;56;101;103;104)
9. considering health priorities, quality measurements, patient preferences, absolute risk reduction, life expectancy, and the marginal benefits and harms from polypharmacy or other treatments in patient-friendly materials;(42-44;56-58;102;105)
10. including patient vignettes for common comorbid conditions;(43)
11. considering the feasibility of implementation of guidelines for patients with multimorbidity to minimize the burden placed on the patient;(58;103)
12. including older adults and patients with comorbid conditions in randomized trials and including the results of these trials in the development of guidelines;(19;42;55;56;101;103)
13. supporting better use of research evidence available from trials, including economic modelling, time estimation models for benefits and harms, and structured expert elicitation methods for uncertainties in data, including tools such as the Beers criteria for medication therapy in older adults;(58;102;105)
14. managing and understanding/interpreting heterogeneity of treatment effects in clinical trials;(58;103) and
15. utilizing technologies such as web-based applications for cross-referencing of guidelines,(43) or electronic medical records (EMRs) for enhancing the use of guidelines in the care of people with multimorbidity, and/or the use of risk calculators in the development of individualized guidelines.(104)

For the second sub-element, we found several reviews that evaluated interventions to support the use of guidelines in general, and several specifically focused on chronic diseases. Several high-quality systematic reviews of interventions aimed at supporting the implementation of practice guidelines in general found beneficial effects for distribution of educational materials,(106) local opinion leaders,(107) educational outreach visits,(108) audit and feedback,(109) and multifaceted interventions (combining two or more of these interventions).(107;110) In addition, a recent overview of systematic reviews found that financial incentives were generally ineffective at improving compliance with guidelines.(111) Also, as noted earlier in the problem section, tying financial incentives to healthcare providers for guideline adherence for patients

with multimorbidity may increase the burden placed on the patient for their care, increase the risks of drug-drug or drug-disease interactions, and lead to unrealistic expectations of physicians' care.(42;56) For the implementation of guidelines for chronic disease, high-quality reviews found that multifaceted interventions are effective,(112) and computerized decision support improves processes of care and, to some extent, patient health outcomes in chronic care (113) and drug therapy management.(114) Lastly, a recent medium-quality review found that practice facilitation/educational outreach more than doubled the likelihood that primary care practices would adopt evidence guidelines.(115)

For those who want to know more about the systematic reviews contained in Table 3 (or obtain a citation for the reviews), a fuller description of the systematic reviews is provided in Appendix 2.

Table 3: Summary of key findings from systematic reviews relevant to Element 2 - Enable primary care, community care and other providers to identify and use guidelines (or care pathways) that meet the needs of patients with multimorbidity

Category of finding	Summary of key findings
Benefits	• **Undertake activities that assist primary care, community care and other providers in identifying and using such guidelines (e.g., computerized decision support)** o *Implementation of guidelines (general):* We identified high-quality systematic reviews outlining benefits for the following strategies to support the uptake of practice guidelines in general: ▪ distribution of educational materials (supported by a high-quality review);(106) ▪ educational outreach visits (supported by a high-quality review);(108) ▪ audit and feedback (supported by a high-quality review);(109) ▪ local opinion leaders (supported by a high-quality review);(107) ▪ financial incentives for supporting appropriate consultation or visit rates, processes of care, referrals and admissions, but not for improving compliance with guidelines (supported by an overview of systematic reviews);(111) and ▪ multifaceted interventions such as combining local opinion leaders and audit and feedback (supported by a high- and a medium-quality review).(107;110) o *Implementation of guidelines for treating chronic conditions*: In addition to the interventions outlined above, we identified a small number of systematic reviews that found benefits for interventions focused on care for people with chronic conditions: ▪ multifaceted interventions were found to be effective at supporting the implementation of clinical guidelines as compared to single interventions for chronic disease by one recent high-quality systematic review,(112) which was also supported by an older overview of systematic reviews;(116) ▪ computerized decision support was examined by two recent high-quality reviews: 1) the review focused on drug therapy management found improvements in processes of care, and some of the studies also showed improvements in outcomes;(114) and 2) the review focused on chronic care similarly found significant patient improvements in care processes with some improving patient health outcomes;(113) ▪ practice facilitation/educational outreach was found to more than double the likelihood that primary care practices would adopt evidence guidelines in a recent medium-quality review.(115)
Potential harms	• None of the identified reviews provided information about potential harms of the sub-elements
Costs and/or cost-effectiveness in relation to the status quo	• None of the identified reviews provided information about costs of the sub-elements and no economic evaluations were identified
Uncertainty regarding benefits and potential harms (so monitoring and evaluation could be warranted if the option were pursued)	• Uncertainty because no systematic reviews were identified o Not applicable (reviews were identified for each of the sub-elements) • Uncertainty because no studies were identified despite an exhaustive search as part of a systematic review o **Undertake activities to ensure that guidelines meet the needs of patients with multimorbidity** ▪ One recent high-quality review was identified that did not find studies evaluating the benefits, harms and costs related to this sub-element, but it did identify recommendations from the literature for developing multimorbidity guidelines (see the row below for key elements of the policy option if it were tried elsewhere).(1) • No clear message from studies included in a systematic review o **Undertake activities that assist primary care, community care and other providers in identifying and using such guidelines (e.g., computerized decision support)** ▪ *Educational meetings:*

	• One older medium-quality review of organizational strategies to improve the management of depression (117), another evaluating guideline dissemination and implementation strategies in general (110), and one evaluating strategies to improve the management of depression found educational meetings to be generally ineffective.(117) • However, one older medium-quality review of interprofessional education for improving care for patients with mental health issues found that educational meetings were generally effective.(118) ▪ *Competency-based education:* An older low-quality review found limited evidence supporting the effectiveness of competency-based education (i.e., outcomes-driven education).(119) ▪ *Financial incentives:* A recent overview of systematic reviews found that financial incentives were generally ineffective at improving compliance with guidelines.(111)
Key elements of the policy option if it was tried elsewhere	• **Undertake activities to ensure that guidelines meet the needs of patients with multimorbidity** o Recommendations (from the literature) for developing multimorbidity guidelines include: ▪ providing clear labelling and promotion of guidelines in clearinghouses that include information on people with multimorbidity;(101) ▪ supporting collaborative guideline development to address the care of people with multimorbidity;(58) ▪ including information on the most common multimorbidity disease clusters along with the main chronic condition, and on the management of risk factors to prevent the occurrence of additional chronic conditions;(42;58;101) ▪ cross-referencing guidelines with each other when recommendations are synergistic or contradictory (43) or when patterns of multimorbidity are common;(102) ▪ requiring chronic disease guidelines to include a section about multimorbidity that provides a summary of recommendations for diagnosis, severity assessments and treatments;(58) ▪ developing and validating an instrument for assessing the applicability of guidelines to patients with multimorbidity (especially for older adults with multimorbidity);(44) ▪ requiring guidelines to explicitly discuss the applicability of recommendations to patients with the most prevalent comorbid conditions, and discuss the quality of the evidence for these patients;(19;58) ▪ developing a patient-centred approach (rather than one that is disease-oriented) to guideline development;(19;44;55;56;101;103;104) ▪ considering health priorities, quality measurements, patient preferences, absolute risk reduction, life expectancy, and the marginal benefits and harms from polypharmacy or other treatments in patient-friendly language;(42-44;56-58;102;105) ▪ including patient vignettes for common comorbid conditions;(43) ▪ considering the feasibility of implementation of guidelines for patients with multimorbidity to minimize the burden placed on the patient;(58;103) ▪ including older adults and patients with comorbid conditions in randomized trials and including the results of these trials in the development of guidelines;(19;42;55;56;101;103) ▪ supporting better use of evidence available from trials, including economic modelling, time estimation models for benefits and harms, and structured expert elicitation methods for uncertainties in data including tools such as the Beers criteria for medication therapy in older adults;(58;102;105) ▪ managing and understanding/interpreting heterogeneity of treatment effects in clinical trials;(58;103) and ▪ utilizing technologies such as web-based applications for cross-referencing of guidelines,(43) or electronic medical records (EMRs)for enhancing the use of guidelines in the care of people with multimorbidity, and/or the use of risk calculators in the development of individualized guidelines.(104) • **Undertake activities that assist primary care, community care and other providers in identifying and using such guidelines (e.g., computerized decision support)** o The same overview found that at the patient level, the presence of comorbidity reduces the likelihood that a guideline will be followed or that the guideline will offer approaches that can be tailored to the unique needs of the patient.(116)
Stakeholders' views and experience	• **Undertake activities that assist primary care, community care and other providers in identifying and using such guidelines (e.g., computerized decision support)** o An older overview of systematic reviews found that characteristics of professionals (e.g., awareness of a guideline and familiarity with its content) may affect the likelihood of the guideline being used.(116)

Element 3 – Enable primary care, community care and other providers to efficiently support self-management by patients with multimorbidity

Sub-elements of this element might include:

- ensuring that self-management resources are sensitive to the needs of patients with multimorbidity; and
- providing supports for self-management in primary care and related settings.

A large number of systematic reviews address self-management interventions,(120) but almost all of the reviews we identified focused on self-management for single conditions (e.g., diabetes or cardiovascular disease), and none focused specifically on patients with multimorbidity. While reviews of self-management for single diseases are important, they do not address the complexity involved with self-management for patients with multimorbidity. Given this, we prioritized the inclusion of the small number of reviews that focused on chronic disease management more generally or on areas that seemed particularly salient to issues faced by patients with multimorbidity (e.g., supporting appropriate medicine use).

We identified two systematic reviews that assessed patient education and family interventions as possible approaches to helping patients with chronic disease use self-management resources. Patient education was identified by a recent medium-quality review as a way of supporting self-management for people with long-term conditions, and a range of positive outcomes from this approach were found, including increases in physical functioning, illness knowledge and self-efficacy.(121) Family interventions (i.e., relationship-focused interventions that have the aim of directly improving family functioning) were identified as a mechanism for ensuring that the needs of patients, as well as the needs of their family and caregivers, are met. Specifically, a high-quality review found that family-oriented interventions for adults with chronic diseases improved physical and mental health outcomes in both patients and caregivers.(122)

We identified reviews that outlined benefits for information and communication technology, home-based support and a range of interventions aimed at supporting appropriate medicine use by consumers. Specifically, a high-quality review found that home telehealth supported improved outcomes for people with diabetes and heart failure,(123) and similarly, another review found that multidisciplinary home-based interventions combined with telemonitoring for people with multiple chronic conditions improved the overall quality of disease management.(124) Two additional reviews also found e-health/information technology interventions in general had positive effects on supporting self-management.(125;126) Lastly, an overview of systematic reviews found that, in addition to self-management and self-monitoring in general, effective interventions for supporting appropriate medicine use by consumers included simplified dosing and interventions directly involving a pharmacist in medicine management.(127)

For those who want to know more about the systematic reviews contained in Table 4 (or obtain a citation for the reviews), a fuller description of the systematic reviews is provided in Appendix 3.

Table 4: Summary of key findings from systematic reviews relevant to Element 3 - Enable primary care, community care and other providers to efficiently support self-management by patients with multimorbidity

Category of finding	Summary of key findings
Benefits	• **Ensuring that self-management resources are sensitive to the needs of patients with multimorbidity** o *Patient education*: A recent medium-quality review evaluated patient education as a way of supporting self-management for people with long-term conditions who were over the age of 50, and found a range of positive outcomes, including increases in physical functioning, illness knowledge and self-efficacy.(121) o *Family interventions*: One older high-quality systematic review assessed family-oriented interventions for adults with chronic physical diseases and found that they are effective in improving physical and mental health outcomes in both patients and caregivers.(122)

	• **Providing supports for self-management in primary care and related settings** o *Information and communication technology:* Four reviews found benefits related to information technology: ▪ Home telehealth was found to be effective in a recent high-quality review at improving glycemic control for diabetic patients and at reducing mortality rates among patients with heart failure.(123) ▪ Two older low-quality reviews (125;126) found e-health/information technology interventions had positive effects on supporting self-management with one of the reviews (125) finding that results were consistent across chronic diseases (mental health, diabetes and cardiac conditions), type of intervention and type of e-health platform (i.e., web-based versus telephone-based). o *Home-based support:* An older medium-quality review found that multidisciplinary home-based interventions combined with telemonitoring for people with multiple chronic conditions improved the quality of disease management.(124) o *Supports for medicine use by consumers:* A recent overview of systematic reviews evaluated a range of interventions for healthcare consumers to promote appropriate medicine use and found that effective interventions included medicines self-management and self-monitoring, simplified dosing, and interventions directly involving the pharmacist in medicine management.(127)
Potential harms	• **Providing supports for self-management in primary care and related settings** o *Information and communication technology:* A recent high-quality review found a higher mortality rate among patients with chronic obstructive pulmonary disease who received home telehealth (although this finding was based on a few studies with small sample size).(123)
Costs and/or cost-effectiveness in relation to the status quo	• **Providing supports for self-management in primary care and related settings** o *Information and communication technology:* ▪ A recent high-quality review of home telehealth for the management of diabetes, heart failure and chronic obstructive pulmonary disease found it can reduce the use of health resources including reduced hospitalizations, re-hospitalization, emergency department visits and bed-days-of-care.(123) ▪ An older costing study conducted in the United States of whether integration of home telehealth with electronic medical records at health organizations reduces health costs found that such integrated approaches increased patient compliance, and reduced resource use, healthcare costs, bed-days-of-care, urgent visits and hospital rehabilitation stays (for telerehabilitation).(128)
Uncertainty regarding benefits and potential harms (so monitoring and evaluation could be warranted if the option were pursued)	• Uncertainty because no systematic reviews were identified o Not applicable (reviews were found for both sub-elements) • Uncertainty because no studies were identified despite an exhaustive search as part of a systematic review o Not applicable (no 'empty' reviews were identified) • No clear message from studies included in a systematic review o **Ensuring that self-management resources are sensitive to the needs of patients with multimorbidity** ▪ *Integrated approaches:* A recent low-quality systematic review of strategies for improving linkages between primary healthcare and chronic disease self-management programs for disadvantaged patients found insufficient evidence to determine which strategies increase linkages between programs.(129) o **Providing supports for self-management in primary care and related settings** ▪ *Information and communication technology:* An older low-quality review found inconclusive effects of telemonitoring for four types of chronic illnesses (pulmonary conditions, diabetes, hypertension and cardiovascular disease) on health outcomes.(130) ▪ *Education:* An older medium-quality review found that individualized patient education delivered by a pharmacist combined with behavioural strategies increased patient adherence in half of the included studies, but stated that given the inconsistency in findings, firm conclusions could not be made and the results had limited applicability to individuals with multiple comorbidities.(131)
Key elements of the policy option if it was tried elsewhere	• **Providing supports for self-management in primary care and related settings** o *Information and communication technology:* ▪ An older low-quality review noted that an integrated approach that includes interaction between the patient and care team is an important component for information technology to effectively support self-management performance.(126) ▪ The same review also noted the need to integrate information-technology-based self-management approaches with clinical information systems used by providers. ▪ A recent medium-quality review noted that there are difficulties in achieving behaviour change through the use of technology-based interventions, but that it might be practical for supporting people with long-term health conditions to self-manage their conditions.(132) o *Integrated approaches* ▪ Another older medium-quality review suggested that self-management support might be enhanced by integrating it into health plans and by linking general practices with self-management through community health, multicultural health, and Aboriginal health services.(133)

Stakeholders' views and experience	• **Providing supports for self-management in primary care and related settings** o *Information and communication technology:* An older low-quality review found that while the effects of telemonitoring on patient conditions and health outcomes were inconclusive, patients were receptive towards it and this led to increased satisfaction and treatment compliance.(130) o *Home-based supports:* An older medium-quality review found that in addition to home-based support interventions helping patients overcome barriers to self-management for chronic diseases, patients with multiple comorbidities preferred using home care services.(124)

Additional equity-related observations about the three elements

Several of the systematic reviews that addressed one or more components of the three elements outlined findings relevant to older adults, or to people with mental health and addiction issues as one of their conditions (the two groups prioritized for equity considerations in the issue brief). For people with mental health and addiction issues as one of their conditions, findings from reviews related to models of care (element 1) indicated that dual-diagnosis programs have been shown to be beneficial (particularly for those who are homeless or do not respond to treatment).(84) In addition, one review found that chronic care programs improve coordination of care in general for people with mental health and addiction issues with a comorbid condition,(88) and another similarly found that collaborative chronic care models improve mental and physical outcomes for people with mental health conditions.(88)

Several reviews relevant to models of care (element 1) and self-management (element 3) provided findings specific to older adults. For example, one review found that hospital-wide interventions (as an example of integrated care approaches) improved physical and mental health outcomes and patient mortality, and reduced length of stay, readmissions and complications for older adults.(89) In addition, two reviews found that particular forms of pharmaceutical care are beneficial for older adults. Specifically, one review found that "complex and multifaceted pharmaceutical care" (e.g., outreach interventions by pharmacists, screening of automated drug alerts by consultant pharmacists visiting nursing homes, and clinical pharmacist interventions in various settings) reduced inappropriate medication use and adverse drug events.(80) Another review focused on geriatric care by pharmacists in healthcare teams found a positive effect of pharmacist care on therapeutic, safety, hospitalization and adherence outcomes.(90) With respect to self-management, patient education to support self-management was found by one review to result in increases in physical functioning, illness knowledge and self-efficacy.(121) Lastly, several reviews noted benefits of information and communication technology and home-based supports on capacity for self-management, health outcomes and disease management, which is made more salient for older adults, given that the vast majority of older Canadian adults live independently in the community and want to remain there.(134)

Related to supporting appropriate guideline development and use (element 2), two recommendations of the 15 that were outlined for developing multimorbidity guidelines appear particularly relevant to older adults and people with mental health and addiction issues as one of their conditions. First, there is a need to develop and validate an instrument for assessing the applicability of guidelines to patients with multimorbidity.(44) Given the significant burden of multimorbidity in older adults and the prevalence of mental health and addiction issues as one of the conditions in people with multimorbidity, such an instrument would likely need to explicitly take into account the unique needs of each of these groups. The second recommendation was to include older adults and patients with comorbid conditions in randomized trials, and include the results of these trials in the development of guidelines. While the literature from which this recommendation was drawn specifically focused on older adults, it seems appropriate that it would also apply to people with mental health and addiction issues.(79)

IMPLEMENTATION CONSIDERATIONS

Potential barriers to designing integrated approaches to support people with multimorbidity in Ontario can be identified at the level of individuals (e.g., the possible perception from patients that a focus on self-management means that their providers are abandoning them), providers (e.g., resisting models that involve shared or delegated accountability), organizations (e.g., lack of interest in moving to models that don't yield the specific outcomes that are being rewarded), and systems (e.g., lack of political will to move beyond pilot programs and scale up promising models). A list of potential barriers to implementing the three elements is provided in Table 5.

Table 5: Potential barriers to implementing the options

Levels	Element 1 – Support primary care, community care and other providers to adapt and implement models of care for patients with multimorbidity that improve the patient experience, improve health and keep per capita costs manageable	Element 2 - Enable primary care, community care and other providers to identify and use guidelines (or care pathways) that meet the needs of patients with multimorbidity	Element 3 – Enable primary care, community care and other providers to efficiently support self-management by patients with multimorbidity
Patient/individual	Patients may resist models of care that disrupt their personal relationships with primary and community care providers	Patients are unlikely to be aware of such a change	Patients may perceive that a focus on self-management means that their providers are abandoning them
Service provider	Primary-care providers may resist models that involve shared or delegated accountability and/or require them to spend more time to coordinate care (particularly if no incentives are provided for them to do so)	Acute-care providers, who tend to dominate guideline production, may resist efforts to move beyond a single disease focus	Providers may resist the use of self-management supports that are not appropriately remunerated
Organization	Acute care and long-term care facilities may resist models that don't yield the specific outcomes that are being rewarded by new funding models	Disease-based charities and guideline-producing organizations may resist efforts to move beyond a single disease focus	Disease-based charities may resist efforts to move beyond a single disease focus in their self-management supports
System	Policymakers may lack the political will to move beyond pilots and scale up the use of promising models	Policymakers may not have levers to encourage guideline groups to develop appropriate guidelines for this population, and may lack the resources to support activities that assist providers in using guidelines (e.g., computerized decision-support systems)	Policymakers may lack the resources to support self-management, and may need to foster and support groups that could develop resources that meet the needs of this population

In addition to considering barriers to implementation, it is important to also consider potential opportunities or 'windows of opportunity' for implementing the elements, which we outline in Table 6.

Table 6: Potential windows of opportunity for implementing the elements

Type	**Element 1 – Support primary care, community care and other providers to adapt and implement models of care that improve the patient experience, improve health and keep per capita costs manageable for patients with multimorbidity**	**Element 2 - Enable primary care, community care and other providers to identify and use guidelines (or care pathways) that meet the needs of patients with multimorbidity**	**Element 3 – Enable primary care, community care and other providers to efficiently support self-management by patients with multimorbidity**
General	The difficult fiscal situation (i.e., large deficit and debt and limited economic growth), and its carry-over effects to the hospital and physician payment pools, can be conducive to embracing new ways of doing things that protect achievements, address unfinished agendas, and confront new challenges		
Option-specific	The primary care sector has been the focus of investments for the last decade and many primary-care providers are now practicing in alternative delivery models	Guideline producers and others are increasingly aware of multimorbidity as a challenge that they need to address	Many patients are keen to participate actively in the management of their conditions

Efforts to implement one or more of the elements of a comprehensive approach for designing integrated approaches to support people with multimorbidity in Ontario could consider how existing infrastructure and investments may be drawn on. For example, implementing one or more components of the first element (models of care) and third element (supporting self-management) could draw on the investments that have been made in Health Links in Ontario. Given that many of the Health Links are currently identifying both the types of activities they need to engage in and how to operationalize these activities for people with complex conditions in their local communities (and additional Health Links will be created in future), implementation efforts could target these processes. For the second element, collaboration with existing groups with expertise in research synthesis, guideline development and knowledge translation, such as KT Canada (135), may also be a fruitful approach for initiating a strong start towards helping providers identify and use guidelines for patients with multimorbidity.

Models being experimented with and used outside of Canada may also offer helpful insights into how to implement components of some of the elements. For example, Accountable Care Organizations (ACOs) are rapidly emerging as a model of coordinating care in the United States. In general, ACOs are being implemented as a mechanism for avoiding duplication of services and preventing medical errors with the overall goal of reducing unnecessary spending.(136) They function as networks of providers and hospitals that have shared responsibility for providing coordinated care to patients, and especially for those with chronic diseases.(136) For supporting self-management, Patient.co.uk provides evidence-based information related to a broad range of medical and health topics to patients and health professionals.(137) In addition, it makes available a range of resources to support self-management such as 'patient access', which allows patients to manage appointments and prescriptions, and send messages to their primary care providers through an online system (both desktop and mobile access is supported).(138)

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APPENDICES

The following tables provide detailed information about the systematic reviews and economic evaluations or costing studies identified for each element. Each row in a table corresponds to a particular document and the documents are organized by element (first column). The focus of the document is described in the second column. Key findings from the document that relate to the element are listed in the third column, while the fourth column records the last year the literature was searched as part of the review (or the year that the economic evaluation or costing study was published).

The fifth column presents a rating of the overall quality of any systematic review (no such 'scoring' system exists for economic evaluations and costing studies). The quality of each review has been assessed using AMSTAR (A MeaSurement Tool to Assess Reviews), which rates overall quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality. It is important to note that the AMSTAR tool was developed to assess reviews focused on clinical interventions, so not all criteria apply to systematic reviews pertaining to delivery, financial, or governance arrangements within health systems. Where the denominator is not 11, an aspect of the tool was considered not relevant by the raters. In comparing ratings, it is therefore important to keep both parts of the score (i.e., the numerator and denominator) in mind. For example, a review that scores 8/8 is generally of comparable quality to a review scoring 11/11; both ratings are considered "high scores." A high score signals that readers of the review can have a high level of confidence in its findings. A low score, on the other hand, does not mean that the review should be discarded, merely that less confidence can be placed in its findings and that the review needs to be examined closely to identify its limitations. (Lewin S, Oxman AD, Lavis JN, Fretheim A. SUPPORT Tools for evidence-informed health Policymaking (STP): 8. Deciding how much confidence to place in a systematic review. *Health Research Policy and Systems* 2009; 7 (Suppl1):S8.

The last three columns convey information about the utility of the document in terms of local applicability, applicability concerning prioritized groups, and issue applicability. For each review, the third-from-last column notes the proportion of studies that were conducted in Canada, while the second-from-last column shows the proportion of studies included in the review that deal explicitly with one of the prioritized groups. The last column indicates the review's issue applicability in terms of the proportion of studies focused on multimorbidity. Similarly, for each economic evaluation and costing study, the last three columns note whether the country focus is Canada, if it deals explicitly with one of the prioritized groups and if it focuses on multimorbidity.

All of the information provided in the appendix tables was taken into account by the evidence brief's authors in compiling Tables 2-4 in the main text of the brief.

Appendix 1: Systematic reviews relevant to Element 1 - Support primary care, community care and other providers to adapt and implement models of care for patients with multimorbidity that improve the patient experience, improve health and keep per capita costs manageable

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
Identify the unique contexts in which (or cohorts for which) models of care are needed (e.g., children, adults with mental health and addiction issues, adults in long-term care facilities, adults at the end of life)	Examining the prevalence of mental–physical multimorbidity in middle-aged and elderly long-term care residents without dementia, the characteristics and care needs of these residents, and the determinants of mental disorders in physical disorders or vice versa.(33)	The review found only one small study describing multimorbidity of a wide range of chronic psychiatric and somatic conditions in long-term care residents. Findings from this study suggest that physical–mental multimorbidity is common among long-term care residents. The remaining studies included in the review show prevalence rates of comorbid physical and mental illnesses (ranging from 0.5%–64.7%) which appear consistent with prevalence rates reported in other studies on community-dwelling older people. Long-term care residents with mental–physical multimorbidity were younger than other longer-term care residents and had more cognitive impairment and problem behaviours, but no dementia. No included study described the care needs of these residents.	2011	6/11 (AMSTAR rating from Program in Policy Decision-making)	0/17	17/17	17/17
	Occurrences, causes and consequences of multimorbidity in the elderly, and models and quality of care for people with multimorbidity.(34)	The review found that multimorbidity affects more than half of the elderly population and that the prevalence increases in very old persons, women and people from lower social classes. Very little is known about the risk factors for multimorbidity. No study evaluating genetic background, biological causes (e.g., cholesterol, blood pressure, obesity), lifestyles (e.g., smoking, drinking, nutrition, physical activity), or environmental factors (air pollution, social environment) in relation to the	2010	2/9 (AMSTAR rating from Program in Policy Decision-making)	4/41	41/41	41/41

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		development of multimorbidity were found. The review identified functional impairment, poor quality of life and high healthcare utilization and costs as major consequences of multimorbidity. A large social network seemed to play a protective role for the occurrence of multimorbidity. The review concluded that there is insufficient evidence to provide evidence-based care of patients affected by multimorbidity.					
	Assessment of prospective cohort studies of multimorbidity in primary care to determine their nature, scope and key findings, as well as the methodologies used.(35)	The review identified a series of risk factors for multimorbidity, including the type of disease and psychosocial characteristics of the patients (e.g., negative life events, an external health locus of control, and a social network of less than five people), which may be most important in conditions that lack a common pathophysiological origin. Certain combinations of chronic conditions (e.g., chronic respiratory disease, congestive heart failure and diabetes) were found to present a greater risk for physical decline than others. Some combinations (e.g., chronic respiratory disease and osteoarthritis) resulted in higher patient consultation rates. The review found that patients with multimorbidity have higher healthcare utilization than those with only a single condition. Increasing multimorbidity	2010	2/9 (AMSTAR rating from Program in Policy Decision-making)	0/5	1/5	5/5

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		predicted higher healthcare charges in an outpatient setting and an increased likelihood of inpatient admission or death. No study focused on the impact of health inequalities or socioeconomic status. The review found inconsistent findings of the impact of patients' income, sex, age and ethnicity on multimorbidity.					
	Exploring validated readmission risk prediction models, describing their performance, and assessing their suitability for clinical or administrative use.(96)	In this review, 26 readmission risk prediction models were identified, and patient level factors, such as medical comorbidities, were found to better predict mortality than readmission risk. Broader social, environmental, and medical factors contribute to readmission risk in some models, but their utility has not been widely studied. Additional research is needed to assess the true preventability of readmissions in the U.S. health systems. The review concluded that readmission risk prediction has many limitations and better approaches are needed to assess hospital performance in discharging patients, as well as to identify patients at a greater risk of avoidable readmission.	2011	7/10 (AMSTAR rating from Program in Policy Decision-making)	1/30	22/30	24/30
Identify promising models of coordinated/integrated care for each of these contexts or cohorts (e.g., pharmacist-led shared medical appointments, patient-centred team-based collaborative care	Effectiveness of interventions for improving outcomes in patients with multimorbidity in primary care and community settings.(13)	All studies in this review involved complex and multifaceted interventions, most predominantly a change to the organization of care delivery (i.e., case management or enhanced multidisciplinary team work) or patient-oriented interventions (i.e., patient education or support for self-	2011	9/10 (AMSTAR rating from Program in Policy Decision-making)	2/10	6/10	10/10

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
management, and communities of practice), their key attributes (e.g., patient-centredness as a principle, email addresses for all patients as a basic infrastructure requirement), and the factors that might influence their adaptation and implementation		management). The review found that these interventions have mixed effects, with a tendency to improve prescribing and medication adherence. More specifically, organizational interventions that have a broader focus (e.g., case management or changes in care delivery) appear less effective. Similarly, patient-oriented interventions that are not linked to healthcare delivery appear less effective, with the exception of one study that examined interventions targeting functional difficulty and fall prevention which found significantly reduced mortality. The results showed that improving outcomes in patients with multimorbidity is difficult, but interventions focusing on particular risk factors or functional difficulties might be more effective.					
	Effectiveness of comprehensive care programs for patients with multimorbidity and their impact on patients, informal caregivers and professional caregivers.(79)	The review included programs that varied greatly in terms of target patient groups, implementation settings, number of interventions, and the number of chronic care model components. The review found moderate evidence of a beneficial effect of comprehensive care on inpatient healthcare utilization and healthcare costs, health behaviour of patients, perceived quality of care, and satisfaction of patients and caregivers. The review found insufficient evidence	2011	5/9 (AMSTAR rating from Program in Policy Decision-making)	4/42	33/42	42/42

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		of a beneficial effect of comprehensive care on health-related quality of life in terms of mental functioning, medication use, and outpatient healthcare utilization and healthcare costs. The review found no evidence of a beneficial effect of comprehensive care on cognitive functioning, depressive symptoms, functional status, mortality, quality of life in terms of physical functioning, or caregiver burden.					
	Effectiveness of interventions in improving the appropriate use of polypharmacy and reducing medication-related problems in older people.(80)	Among the 10 studies included in the review, one was a computerized decision support and nine were complex and multifaceted pharmaceutical care provided in a variety of settings. No included study explored the effectiveness of professional, financial or regulatory interventions. The review found that these interventions demonstrated a reduction in inappropriate medication use. The number of adverse drug events also reduced significantly (35%) post-intervention in three studies. Thus, such interventions can be beneficial in reducing inappropriate prescribing and medication-related problems. However, the review found inconsistent evidence of the effectiveness of these interventions on hospital admissions and whether these resulted in clinically significant improvements.	2009	11/11 (AMSTAR rating from Program in Policy Decision-making)	2/10		10/10
	The role of pharmacists in caring for patients with chronic kidney disease who have multiple	The studies included in the review were conducted in different health care settings, including patients aged between	2010	5/9 (AMSTAR rating from	1/37	4/37	8/37

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
	comorbidities, and assessing the impact of pharmacists' interventions in these patients.(91)	31.4-65.9 years on average. Pharmacist intervention contributed to significantly reducing all-cause hospitalizations. In a two-year prospective cohort with Type 2 diabetic nephropathy patients, risk reduction for end-stage renal disease is 55%, with 78% risk reduction of all-cause death. The review concluded that the evidence of pharmacists' interventions in patients with chronic kidney disease is sparse and of variable quality, but may have a positive impact on outcomes of patients with chronic kidney disease.		Program in Policy Decision-making)			
	Effectiveness of the case management model in the frequent emergency department user patient population.(86)	The review included 12 studies, 11 of which reported emergency department use as the primary outcome. Of these, eight reported reduction, two reported no significant reduction, and one reported an increase in ED use. There was heterogeneity across all studies, the majority of evidence illustrated benefits of case-management interventions, namely reduced ED visitation and ED costs. The most common complaints reported by the frequent ED users included mental health and drug/alcohol abuse disorders, and two studies reported pain as the primary complaint. Further investigation is required to determine which aspects of case management are the most cost effective. The review concluded that case-management interventions benefitted	2010	5/10 (AMSTAR rating from Program in Policy Decision-making)	1/12	10/12	0/12

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		frequent ED users through both social and clinical outcomes.					
	Geriatric patient care by U.S. pharmacists in healthcare teams.(90)	The review found nine studies focused on multiple diseases and conditions pertaining to pharmacist interventions for geriatric patients. Findings from the studies suggest a positive effect of pharmacists on therapeutic, safety, hospitalization and adherence outcomes. The review noted that the most important finding was that pharmacist care produced significant benefit in comparison to conventional care in all four patient-oriented outcomes. There is variation within the studies attributed to the socioeconomic status of patients and the access to pharmacist care. The review recommends that a pharmacist member should be included in team-based care serving older patients in order to improve care and outcomes.	2012	8/11 (AMSTAR rating from Program in Policy Decision-making)	0/20	20/20	9/20
	Assessing the comparative effectiveness of collaborative chronic care models for mental health conditions across disorders and treatment settings.(88)	The review found that total health costs did not differ between collaborative chronic care models and comparison models across conditions and outcome domains. The meta-analysis showed significant small to medium effects of collaborative chronic care models while net healthcare cost remained the same across multiple disorders. The review also showed that trials for chronic conditions showed a more	2011	6/11 (AMSTAR rating from Program in Policy Decision-making)	0/55	55/55	12/55

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		variable effect due to the presence of multiple comorbidities accompanying these disorders. The model needs to be further developed to include or remove certain components in deploying the collaborative chronic care model for the greatest benefit to public health. The review concluded that individuals with mental health conditions can see improvements in their mental and physical outcomes through collaborative chronic care models, which can be extended to patients with chronic or comorbid disorders.					
	Interventions which aim to improve the management of co-existing chronic conditions in order to improve health outcomes.(92)	The review found that there were large gaps in the intervention research on medication adherence, and the lack of consistent methodology led to a difficulty in interpreting and comparing results across the studies. The review found that baseline adherence rates were higher than the cited mean of 50% across the eight included randomized controlled trials that tested an intervention delivered by pharmacists to adults with three or more chronic conditions. The review concluded that the evidence supporting interventions aimed at improving medication adherence was minimal and weak. Further research-tested strategies are needed to improve medication adherence and the subsequent health outcomes.	2007	6/11 (AMSTAR rating from www.rxforchange.ca)	0/8	7/8	2/8

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
	Approaches to healthcare for comorbid depression and diabetes for future development in health care delivery.(97)	The review found that shared-care interventions in primary-specialty care did not lead to consistent improvements in physical health outcomes, but may improve proportion of patients recovering from depression. In order to implement disease management, major changes are needed as well as developing lay-approaches to self-management of chronic illnesses. The review determined that due to the cost and burden of chronic conditions such as depression and diabetes, policymakers need to intervene at a health systems level. The review concluded that more practice-based evidence is required to implement the best practice into routine health care. Future research should include the testing of collaboration models between primary and specialty care.	2011	2/9 (AMSTAR rating from Program in Policy Decision-making)	Not reported	Not reported	Not reported
	Effectiveness of nurse care management in improving health outcomes for patients living either with diabetes, chronic obstructive pulmonary disease, or coronary heart disease.(87)	This review found that nurses working in a specialized care coordinating role are effective in improving long-term condition care. None of the studies assessed in the review reported a reduction in quality of life measures due to the interventions. The nurses' role in monitoring and case management can have a significant impact on disease progression. The review reported that the greatest financial savings were reported for heart	Not reported	2/9 (AMSTAR rating from Program in Policy Decision-making)	0/18	0/18	0/18

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		failure patients, and that patients are more responsive to treatment regimes when nurses work closely with patients. The review concluded that nurse care managers have a positive impact on quality of life, patient satisfaction, treatment adherence, self-care and service use, and objective clinical measures.					
	Outcomes of case managed, integrated or consumer-directed community and home care services for older persons.(100)	The review found that case management can benefit patients' function and medication management, reduce admission to nursing homes, and increase use of community services. Integrated care was found not to improve clinical outcomes, despite the programs being associated with a greater use of community and hospital services. The review also found that consumer-directed care did not affect clinical outcomes, but led to increased satisfaction with care and community service use. However, there are inconsistencies in the results between the reviewed studies, with variability in their inclusion criteria, design, sample and methods of delivery. The review concluded that each of the three models has different outcomes, and they need to be combined to maximize outcome benefits.	2009	5/10 (AMSTAR rating from Program in Policy Decision-making)	3/34	31/34	0/34
	Effects of medication reconciliation interventions in patients transferred to and from	The review indicated that strong evidence was not provided for interventions in reduction of medication	2010	3/10 (AMSTAR rating from	0/7	7/7	1/7

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
	long-term care settings.(98)	discrepancies in studies conducted in the U.S. Studies conducted in Sweden, Australia, and Belgium indicated that a pharmacist being involved in the intervention was beneficial and there is a potential for improved patient outcomes. However, there are difficulties pertaining to the feasibility of collaborative approaches which require long-term test settings with more medically complex patients. The review concluded that interventions involving a clinical pharmacist can improve outcomes, and more research is required on medication reconciliation during these transitions.		Program in Policy Decision-making)			
	Hospital-wide interventions for older patients.(89)	The review found that interventions led to increased positive physical and mental health outcomes, positive significant results on patient mortality, reduced length of stay and costs, and fewer readmissions, and did not affect patient complications. Heterogeneous effects were present in the methodology used within studies. It was determined that no single practice can be labelled as the best intervention to improve quality of care, safety and effectiveness. The review concluded that comprehensive interventions geared towards all frail older patients are needed. Alternative approaches and	2009	6/10 (AMSTAR rating from Program in Policy Decision-making)	3/20	20/20	4/20

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		setting-adjusted scientific standards are required to gain this improvement.					
	Effectiveness of residential programs, important program elements, methods to improve engagement into and retention in residential programs, and the clients that benefit from this service.(84)	The review reported that 50% of individuals with co-occurring disorders do not respond well to integrated outpatient services. Many of the studies for individuals with dual disorder utilize a therapeutic community model to facilitate the integration of treatment programs. The review found that short-term dual-diagnosis programs led to higher rates of program completion, lower substance abuse relapse, but with no change in substance use outcomes. Long-term residential programs showed better abstinence rates and treatment retention, and retained more clients, but showed no significant differences in substance abuse outcomes during the treatment when compared to therapeutic communities. The conclusion identified substance abuse as a comorbidity with mental illness, and dual-diagnosis programs have benefits for clients who are homeless or do not respond to treatment.	2004	3/10 (AMSTAR rating from Program in Policy Decision-making)	0/11	11/11	11/11
	Interventions aimed at improving general medical care in patients with mental and addictive disorders.(85)	The review indicated that chronic care programs improve coordination for those with comorbid conditions. The integrated medical program was shown to be particularly cost-effective and beneficial for those with comorbid conditions due to the large gap between medical needs and treatment availability. The review concluded that interventions on individuals with comorbid conditions	2005	5/10 (AMSTAR rating from Program in Policy Decision-making)	0/6	6/6	1/6

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		could lead to improved abstinence rates, and the programs were found to be cost-neutral from a health plan perspective.					
	Intensive patient-centred management on service utilization and survival.(94) *Note that this is an economic evaluation/costing study	The study showed that patient-centred management contributes to patient satisfaction without causing any adverse effects on survival. Patient education also led to greater adherence to treatment plans and led to different choices being made. Outbound call frequency from nurses to patients also allowed the health care professionals to identify any lapses in care. The review concluded that patient-centred management led to a reduced cost through patient education, coordination, and support.	2004	Not available for economic evaluations and costing studies	United States	Not applicable	Not applicable
	Effects of a diabetes-management program for patients with Type 2 diabetes and related comorbidities on acute healthcare utilization and costs.(93) *Note that this is an economic evaluation/costing study	The review found that the program's service delivery led to a $463.00 admission cost reduction per patient. However, in comorbid patients with diagnosed cardiovascular disease, no reduction in this disease was seen a year following program completion. It was suggested that a longer term follow-up of patients in the program would be a better indicator of its effects on the cardiovascular comorbidity. The review concluded that the short-term diabetes management program may reduce hospital utilization for diabetes, but not for cardiovascular disease.	2012	Not available for economic evaluations and costing studies	Study conducted in Australia	Not applicable	Not applicable
Support the local (context- or cohort-specific)	Impact of diagnosis of diabetes mellitus, a highly prevalent	The review found that the diagnosis of diabetes caused a decrease in the cost-	2012	Not available for economic	Study conducted in	Not applicable	Not applicable

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
adaptation and implementation of care models, as well as the supportive conditions for such models (e.g., methods to identify patients with multimorbidity within providers' patient pools)	comorbidity in U.S. adults aged 50 and older, on health and economic outcomes of colorectal cancer screening through a cost-effectiveness analysis.(95) *Note that this is an economic evaluation/costing study	effectiveness of CRC screening. Individuals with diabetes at age 50 have less benefit from CRC screening than those without, in the U.S. Medical costs of other diseases in the analysis were also considered in the review, which also accounted for demographic variables, biomarkers, risk factors and healthcare processes. The review recommended more consideration of comorbidity to improve screening rates based on patient age and life expectancy. The review concluded that screening for colorectal cancer should be individualized for patients based on the presence of comorbidities and life expectancy.		evaluations and costing studies	the United States		
	Culturally appropriate interventions to manage or prevent chronic disease in culturally and linguistically diverse (CALD) communities.(81)	The review found that the interventions led to positive outcomes, including an increased screening rate, improved health status, improved health behaviour, completion of health promoting program, improved health knowledge, and improved appointment keeping. For patients with chronic conditions, an intervention caused improved self-management. The use of multimedia also led to increased knowledge. The review concluded that the bilingual community health worker model has positive impacts on the CALD communities. However, the presence of comorbidities was not discussed, and more research on the effective	2009	6/9 (AMSTAR rating from Program in Policy Decision-making)	1/24	0/24	0/24

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		implementation of the model is needed.					
Developing performance-measurement frameworks that identify high-performing care models	Effectiveness of various quality-improvement strategies for enhancing healthcare.(83)	Research evidence suggests clinician/patient-driven quality-improvement strategies are more effective compared to manager/ policymaker-driven approaches. The most effective quality-improvement strategies included clinician-directed audit and feedback, decision support systems and the use of small-group discussions in continuing professional education.	2008	2/11 (AMSTAR rating from Program in Policy Decision-making)	Not Reported	Not Reported	Not Reported
	Effectiveness of quality-improvement collaboratives in enhancing the quality of care.(82)	Systematic review of nine controlled trials found a positive effect of quality-improvement collaboratives on processes of care and patient outcomes. Review additionally examined the findings of 60 uncontrolled reports of which 53 trials indicated specific improvements in patient care and organizational performance due to participation in a quality-improvement collaborative.	2006	4/11 (AMSTAR rating from www.rxforchange.ca)	Not Reported	Not Reported	1/72
	Promising practices for effective public reporting on healthcare quality.(99)	Review suggests for public reporting to be effective, attention must be focused on the reporting program's objectives, audience, content, product, distribution and impacts. Review also indicates public reporting should be part of broader efforts to develop and nurture a relationship with the report's intended audience, in order to increase accountability and quality within the healthcare system.	Not reported	2/9 (AMSTAR rating from Program in Policy Decision-making)	1/13	Not Reported	0/13

Appendix 2: Systematic reviews relevant to Element 2 – Enable primary care, community care and other providers to identify and use guidelines (or care pathways) that meet the needs of patients with multimorbidity

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
Undertake activities to ensure that guidelines meet the needs of patients with multimorbidity	Optimal treatment approaches for people with multimorbidity.(1)	*Understanding health risks for people with multimorbidity* From the three systematic reviews and five observational studies we identified, the main consequences of multimorbidity were functional impairment, poor quality of life, high healthcare utilization, high out-of-pocket costs and increased burden on the patient for their care. There was inconsistent evidence regarding whether multimorbidity disproportionately increases the risk of mortality. One recent medium-quality systematic review revealed that mental–physical multimorbidity is common in long-term care residents. Another systematic review found that certain combinations of chronic conditions (e.g., chronic respiratory disease, congestive health failure and diabetes) present a greater risk for physical decline than other combinations. A third systematic review found a large social network to be a protective factor for the consequences of multimorbidity. *Characterizing programs and models for treating people with multimorbidity* A recent high-quality review found that	2012	8/11 (AMSTAR rating from Program in Policy Decision-Making)	2/24 *note that this number only reflects the primary studies included, but the focus of the synthesis was on identifying systematic reviews	8/24 (two addressed mental health and addiction issues and six addressed older adults) *note that this number only reflects the primary studies included, but the focus of the synthesis was on identifying systematic reviews)	24/24 *note that this number only reflects the primary studies included, but the focus of the synthesis was on identifying systematic reviews

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		interventions focusing on specific risk factors or impairments might be more effective than organizational and patient-oriented interventions which had mixed effects on health outcomes. Another recent medium-quality review found inconsistent evidence for the effectiveness of comprehensive care programs based on components of the Chronic Care Model, but their effects appeared comparable to or more positive than those of usual care. A third recent and high-quality review found that both computerized decision support and pharmaceutical care interventions reduced inappropriate medication use. Several primary studies identified a range of promising interventions including nurse-led interventions, pharmacist-led shared medical appointments, guided care teams, and patient-centred, team-based collaborative care management. *Identifying promising guidelines for treating people with multimorbidity and models for developing such guidelines* The knowledge synthesis identified several overviews of the applicability of existing guidelines to multimorbidity (each found few or no guidelines addressing treatment for multimorbidity), a small number of guidelines that provide implications or recommendations for treatment (but none that focused exclusively on multimorbidity), examples of sets of					

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		principles that had been developed for the creation of multimorbidity guidelines (e.g., for older adults with multimorbidity) and examples of recent initiatives that suggest a strong interest in the development of guidelines for treating multimorbidity.					
Undertake activities that assist primary care, community care and other providers in identifying and using such guidelines (e.g., computerized decision support)	Effectiveness of strategies aimed at implementing clinical guidelines for chronic disease management in primary care in EU Member States.(112)	The review found that the intervention only showed fully successful results in 19% of the studies, was partially effective in 38%, and was not effective in 43%. Overall, multifaceted strategies were more effective at supporting the implementation of clinical guidelines as compared to single interventions. However, the effects of multifaceted strategies were mixed with most of the included studies either finding no effects or moderate effects on the implementation of guidelines.	2011	8/10 (AMSTAR rating from Program in Policy Decision-making)	0/27	?/27	2/27
	Factors influencing the implementation of clinical guidelines for health care professionals.(116) *Note that this is an overview of systematic reviews)	Most of the included reviews indicate that effective strategies for supporting the implementation of guidelines often have multiple components, and that the use of one single strategy (e.g., reminders only or an educational intervention) is less effective. The characteristics of guidelines themselves affect actual use with those that are easy to understand, easily pilot tested, and that require few specific resources, having a greater chance of implementation. Characteristics of professionals such as awareness of a guideline and familiarity	2006	No rating tool available for this type of document (overview of systematic reviews)	Not applicable (includes systematic reviews as the primary source of data and not single studies)	Not applicable (includes systematic reviews as the primary source of data and not single studies)	Not applicable (includes systematic reviews as the primary source of data and not single studies)

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		with its content, may affect the likelihood of the guideline being used. At the patient level, the presence of comorbidity reduces the likelihood that a guideline will be followed and/or that guidelines offer approaches that can be tailored to the complex care needs of such patients. The review concluded that the implementation of multiple strategies rather than a single strategy is more effective.					
	Effectiveness of competency-based education (CBE) in equipping general practice workers to deliver optimal chronic disease outcomes in Australia.(119)	The review identified the following policy options: incorporating clear statements on education and training, research and evaluation in documents targeting chronic disease, and provision of funding to enhance general practice teaching facilities. The review indicated that there is little evidence supporting the effectiveness of CBE interventions in influencing chronic disease outcome measures in general practice settings. It was also stated that policy support garnered for chronic disease education should not favour certain chronic diseases over others, or be at the expense of research examining service delivery to those with multiple chronic diseases. The review concluded that there is limited evidence regarding the role of CBE in improving chronic disease management, and conflicting intrests/perspectives must be taken into	2005	3/9 (AMSTAR rating from Program in Policy Decision-making)	Not yet available	Not reported in detail	Not reported in detail

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		account by CBE program designers.					
	Effects of computerized clinical decision support systems (CCDSSs) for drug therapy management on process of care and patient outcomes.(114)	The review found that 57% of all studies examined showed that CCDDSSs improved the process of care performance, while 21% of trials assessing patients (9% of all trials) showed improvements. Specific evidence regarding patients with coexisting chronic conditions was not provided in this review. The review concluded that CCDSSs did not consistently improve process of care measures or patient outcomes, and that CCDSSs should be precluded from drug therapy management.	2010	8/10 (AMSTAR rating from Program in Policy Decision-making)	3/65	7/65	?/65
	Determining if CCDSSs improve the processes of chronic care and associated patient outcomes.(113)	The review found that 52% of the included trials had a significant impact on care processes. Five trials included in the review focused on providing recommendations for diabetes in conjuction with other conditions such as obesity, heart failure and hypertension. It was found that improvements on diabetes could not be isolated, and 80% of the trials found positive effects on process of care. The review concluded that just over 50% of the CCDSSs improved the process of care in chronic disease management, with some improving patient health outcomes.	2010	8/10 (AMSTAR rating from Program in Policy Decision-making)	?/55	5/55	5/55
	To determine the overall effect size of practice facilitation and possible moderating factors.(115)	The review found that practice facilitation has potential to address the challenges faced when translating evidence into practice. Based on the	2010	6/11 (AMSTAR rating from Program in	3/22	0/22	?/22

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		review, primary care practices are 2.76 times more likely to employ evidence guidelines when using practice facilitation. It has not yet been determined whether facilitation can be applied in areas requiring direct physician uptake. Specific impact on patients with comorbid conditions was not discussed at length in this review. The review concluded that practice facilitation has a moderately robust effect on evidence-based guideline adoption within primary care.		Policy Decision-making)			
	Organizational and educational strategies to improve the management of depression.(117)	Multifaceted interventions had mixed effects for appropriate care outcomes. Educational meetings were found to be generally ineffective for appropriate care. Insufficient evidence was found for reminders (computerized decision support vs. reminders) on appropriate care.	2003	6/11 (AMSTAR rating from www.rxforchange.ca)	Not Reported in detail - Description states: USA	Not Reported	2/36
	Whether different factors influence the effectiveness of educational outreach visits (EOVs), and whether adding another intervention to EOVs such as the use of patient-mediated interventions or using manuals or computerized reminders to prompt clinicians to perform clinical actions, alters their effectiveness.(108)	Multifaceted interventions that included educational outreach and distribution of educational materials and/or other intervention compared to a control group, compared to audit and feedback, and compared to educational materials, were all found to be generally effective for improving appropriate care. Educational-outreach interventions used alone compared to a control group, and compared to educational materials were	2007	8/11 (AMSTAR rating from www.rxforchange.ca)	1/69	2/69	6/69

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		found to be generally effective. There was insufficient evidence for comparisons of multifaceted versus educational meetings, educational outreach visits versus continuity of care, and multifaceted versus reminders.					
	Effects of different types of educational materials (manuals, bulletins, guidelines, quick reference guides, newsletters, consensus statements), distribution audiences (targeted or general audiences), format (colourful vs. black and white) and frequency of distribution.(106)	Distribution of educational materials was found to be generally effective for appropriate care outcomes. There was insufficient evidence found comparing the effectiveness of educational meetings with distribution of educational materials for appropriate care outcomes.	2011	8/11 (AMSTAR rating from www.rxforchange.ca)	12/45	1/45	11/45
	Effects of providing interprofessional education to different health professionals in order to improve care for patients with mental health problems.(118)	Educational meetings were found to be generally effective for appropriate care.	1998	4/11 (AMSTAR rating from www.rxforchange.ca)	0/19	19/19	0/19
	Guideline dissemination and implementation strategies.(110)	Single interventions compared with no intervention: Reminders, audit and feedback, patient-mediated, and the distribution of educational materials were found to be effective for improving appropriate care with medium effect sizes. Time series data were reported for the distribution of educational materials, and half of the studies showed an immediate effect or effect over time. Insufficient evidence exists for educational meetings, other professional interventions (interviewing physicians about outpatient referrals, and a rapid rule-out protocol), continuity of care,	1998	7/11 (AMSTAR rating from www.rxforchange.ca)	15/235	Not Reported	1/235

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		and revision of pharmacy-related professional roles. Single interventions compared with another intervention - Insufficient evidence exists on three comparisons: physicians responding to reminders compared with reminders, educational materials compared with reminders, and reminders compared with patient-mediated interventions. Multifaceted interventions compared with no intervention were found to be effective for improving appropriate care with medium effect sizes. Time series data show that these interventions also have immediate effects, most of which are sustained over time. Multifaceted interventions compared with intervention controls were found to be effective for improving appropriate care with small effect sizes.					
	To assess the effects of audit and feedback on professional practice and healthcare outcomes.(109)	In all comparisons - audit and feedback alone compared to no other interventions, audit and feedback with educational meetings compared to no intervention, audit and feedback as part of a multifaceted intervention compared to no intervention, audit and feedback combined with complementary interventions compared to audit and feedback alone, and audit and feedback compared to other interventions - audit and feedback was found to be generally effective.	2010	8/11 (AMSTAR rating from www.rxforchange.ca)	11/140	1/140	Not Reported
	To assess the effects of local opinion leaders on professional	Local opinion leaders alone and local opinion leaders with audit and feedback	2009	10/10 (AMSTAR	6/18	2/18	Not Reported

Option element	Focus of systematic review	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
	practice and healthcare outcomes.(107)	were found to be generally effective for improving appropriate care behaviour (based on 40 and five RCT comparisons respectively). Multifaceted interventions that included the use of opinion leaders in addition to one or more interventions had mixed results for improving appropriate care behaviour (based on 10 RCT comparisons).		rating from Program in Policy Decision-making)			
	Effectiveness of financial incentives in changing healthcare professional behaviours and patient outcomes.(111)	Payment for working for a specified time period was generally ineffective, improving 3/11 outcomes from one study reported in one review. Payment for: each service, episode or visit; providing care for a patient or specific population; and providing a pre-specified level or providing a change in activity or quality of care, were all generally effective. Mixed and other systems were of mixed effectiveness. Assessing the effect of financial incentives overall across categories of outcomes, they were: of mixed effectiveness on consultation or visit rates; generally effective in improving processes of care; generally effective in improving referrals and admissions; generally ineffective in improving compliance with guidelines outcomes; and generally effective in improving prescribing costs outcomes.	2010	No rating tool available for this type of document (overview of systematic reviews)	n/a (included systematic reviews as the unit of analysis)	n/a (included systematic reviews as the unit of analysis)	n/a (included systematic reviews as the unit of analysis)

Appendix 3: Systematic reviews relevant to Element 3 - Enable primary care, community care and other providers to efficiently support self-management by patients with multimorbidity

Option element	Focus of systematic review/cost-effectiveness study	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
Ensuring that self-management resources are sensitive to the needs of patients with multimorbidity	Self-care support interventions in people with long-term conditions aged 50 years and over.(121)	The studies in the review focused primarily on patient education to promote exercise, psychological support and pain management in order to assess the impact of self-care support. Positive outcomes were reported for the majority of interventions such as increase in physical functioning, increased illness knowledge and self-efficacy for older participants. There is some evidence to suggest greater effectiveness of the intervention through an increase of planned contacts and home visits, and in result, the reduction of hospital length of stays. Overall, there is little awareness on the potential of self-care. The authors note more research is required to understand the effects of the intervention for patients over 75 and for caregivers. The review also indicates there is a lack of strategic direction.	2008	5/9 (AMSTAR rating from Program in Policy Decision-making)	0/18	8/18 (Studies with participants' mean age of 60)	0/18
	Clinical interventions targeting families of chronically ill patients.(139)	There is a lack of evidence about the effects of these interventions on the caregivers of chronically-ill patients. Given the lack of evidence available and the limited quality of the available evidence, firm conclusions could not be made.	2007	4/9 (AMSTAR rating from Program in Policy Decision-making)	0/32	12/32	0/32
	Self-management for Type 2 diabetes.(140)	Conceptual themes are included in the review such as self-management in context, gender and self-management,	2009	3/9 (AMSTAR rating from	Not reported in detail.	6/38	0/38

Option element	Focus of systematic review/cost-effectiveness study	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		self under attack and intervention and regulation of self. Studies included more than one conceptual theme. The review indicates qualitative research can be useful to decipher assumptions underlying illness accounts and may be able to acknowledge the social and political conditions in diabetes-related experience.		Program in Policy Decision-making)			
	Family-oriented interventions for adults with chronic physical diseases.(122)	The review found that family interventions led to improved mental health across 12 assessed studies. Relationship-focused interventions led to a significant overall effect, while psycho-educational methods did not lead to similar outcomes. Family members of cancer patients benefitted from family-oriented interventions, while family members of patients with cardiovascular diseases did not have the same effect. The review concluded that family-based interventions are effective in improving physical and mental health outcomes in both patients and caregivers (when compared to commonly used treatments).	2007	9/11 (AMSTAR rating from Program in Policy Decision-making)	Not reported in detail.	34/52 Mental health and addiction issues were not a medical problem addressed in studies, but mental well-being was seen in outcomes measured.	0/52
	Strategies used to improve linkages between primary health care (PHC) and chronic disease self-management programs (with special attention to disadvantaged patients).(129)	The review found that chronic disease self-management (CDSM) programs are independently implemented from primary health care (PHC) providers. The identified studies did not directly link outcomes to the linkage strategies	2009	1/9 (AMSTAR rating from Program in Policy Decision-making)	0/16	Participants' ages not reported in detail. Studies did not focus on mental health.	0/16

Option element	Focus of systematic review/cost-effectiveness study	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		implemented, and only 4/16 studies evaluated the impact on health service use. Presence of comorbidities in patients was not directly discussed in the review. The review concluded that the evidence provided was not sufficient in determining which strategies increase linkages between PHC and CDSM programs.					
Providing supports for self-management in primary care and related settings	Effects of interventions on health care consumers promoting evidence-based prescribing for and medicine use by consumers.(127) *Note that this is an overview of systematic reviews.	The review found that no single strategy improved medicine use outcomes across all tested diseases. The overview sought to assess support for behaviour change, promotion of communication and informed decision-making, risk minimization, skills acquisition and education/information provision. Effective interventions included medicines self-monitoring and self-management, simplified dosing, and interventions directly involving the pharmacist in medicine management. The overview noted that specific research is needed to assess outcomes in those with multiple co-existent conditions. The presence of co-morbidity led to the view that interventions must focus on the patient context and healthcare system.	2008	No rating tool available for this type of document	Not typically presented in an overview of systematic reviews.	12/37	9/37 (multimorbidity was not the focus, but these reviews included studies where individuals with multiple co-existent conditions were not excluded)
	Feasibility and benefits of home-based information and communications technology enabled interventions for chronic	The review found that for individuals with multiple chronic conditions, home-based support interventions could overcome most of the perceived barriers	2007	4/9 (AMSTAR Rating from Program in	1/27	4/27	4/27

Option element	Focus of systematic review/cost-effectiveness study	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
	disease management.(124)	for self-management, and patients with multiple comorbidities would prefer using home care services. Telehomecare was found to improve patient self-management, medication adherence, health outcomes, and reduce rehospitalization rates and length of hospital stay, and was found to be advantageous when used along with usual care for specific chronic conditions. The review showed that telemonitoring and multidisciplinary home-based interventions were beneficial to patients, providers, and healthcare organizations as well. The review concluded that targeting home-based interventions at patients who have multiple chronic conditions can improve the quality of disease management.		Policy Decision-making)			
	Effects of behavioural, educational, and provider-focused strategies for improving medication adherence in elderly patients.(131)	The review found that interventions using individualized patient education from a pharmacist and behavioural strategies led to increased patient adherence in four out of eight studies. The review found that the inconsistency in methodology and findings in the included studies did not lead to a firm conclusion regarding any particular interventions. It was also noted that the results had limited applicability to individuals with multiple co-morbidities.	2006	4/9 (AMSTAR rating from Program in Policy Decision-making)	1/8	8/8	0/8 (8/8 study descriptions indicated that patients were using multiple medications, however it was not made clear if such patients had co-existent conditions as well)
	E-health interventions for	The review found that overall, e-	2007	1/10	2/71	11/71	Not available

Option element	Focus of systematic review/cost-effectiveness study	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
	individuals with chronic illnesses.(125)	interventions yielded positive results and improvements. This pattern was consistent across the mental health interventions, both web-based and telephone-based, as well as for diabetes, cardiac conditions, and RCTs assessing interventions in a range of different conditions.		(AMSTAR rating from Program in Policy Decision-making)		(Mental health interventions only)	from abstract and article summary
	Use of technology in achieving behaviour change in chronic illness.(132)	The review targeted behaviours including physical activity, dietary management, maladaptive cognitions, obsessive rituals, smoking, and alcohol consumption. A significant number of interventions made use of technological innovations, particularly for physical activity and diet management. However, a number of studies demonstrated difficulties with attrition, high dropout and non-completion rates. The efficacy of the interventions was not assessed in this study. The review concluded that although there may be difficulties in achieving behaviour change through technological interventions, individuals with long-term health conditions may find this method practical for self-management of their condition.	2008	4/10 (AMSTAR rating from Program in Policy Decision-making)	Not reported in detail (69% of the studies conducted in North America)	15/45 (18/45 if "disordered eating" falls under the category of mental health)	0/45
	Disease management interventions for health problems in a primary care setting, and to identify policy options for implementing then in Australian primary care.(133)	The review found that interventions in support of patient self-management in the Australian health care system were associated with improvement in patient and process outcomes. Enhancing self-management support could be accomplished through its integration into health plans, and linking	2006	4/10 (AMSTAR rating from Program in Policy Decision-making)	Not reported in detail	Not reported in detail	Not reported in detail

Option element	Focus of systematic review/cost-effectiveness study	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		general practices with self-management through community health, multicultural health, and Aboriginal health services. Multidisciplinary team care also can improve patient outcomes, facilitated by team care arrangement for individuals for complex and chronic diseases. The review also found that if incentives for patient registers were implemented for chronic diseases, GPs would be able to take a holistic approach to their patients. Increased collaboration would also promote multidisciplinary team care. The conclusion stated that the implications from the conducted review can provide direction to improve quality of care and patient outcomes in chronic disease.					
	Effects of applying information technology (IT) to support self-management in patient health outcomes and self-management performance.(126)	The review found that patient-centred health IT has positive effects on self-management performance. It was noted that an integrated approach, involving interaction between the patient and care team, is an important factor in improving patient adherence. One of the challenges noted in studies was attrition of the participants, as well as the lack of integration of IT-based self-management tools with clinical information systems used by providers. The review concluded that extending IT infrastructure to support self-management activities of patients with chronic conditions is an important	2007	2/9 (AMSTAR rating from Program in Policy Decision-making)	Not reported in detail	0/28 (Age of participants in studies not reported extensively)	0/28 (Two studies targeted multiple, specific diseases)

Option element	Focus of systematic review/cost-effectiveness study	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
		development.					
	Cost-effectiveness of home telehealth against usual or no care for the management of diabetes, heart failure, and chronic obstructive pulmonary disease (COPD), as well as examining the clinical benefits.(123)	The review indicated that the intervention was effective in improving glycemic control for diabetic patients, and reducing mortality rates among patients with heart failure, but a higher mortality rate among patients with COPD (which was based on only a few studies in small sample size). Telehealth also was seen to lead to decreased hospitalizations, re-hospitalization, ED visits, and bed days of care. Most reviews indicated that home telehealth is an effective intervention for chronic disease management. For individuals with single and mixed chronic diseases, quality of life, patient satisfaction, adherence, and compliance were similar or favourable to usual terms of care. However, the outcomes of mixed chronic disease studies were not pooled due to diverse patient populations. The review concluded that, overall, home telehealth can reduce the use of health resources and is an effective addition to healthcare delivery.	2008	9/10 (AMSTAR rating from Program in Policy Decision-making)	5/72	52/72 (Focused on older adults)	8/72
	Assessment of whether integration of home telehealth with a health facility's electronic medical record system reduces health costs and improves quality of life outcomes.(128) *Note that this is an economic	The review noted that presence of comorbidities in elderly patients was correlated with healthcare costs. Telehealth in patients with comorbidities led to a significant reduction in bed-days-of-care and urgent visits after six months.	2004	Not available for economic evaluations and costing studies	Study conducted in the U.S.	N/A	N/A

Option element	Focus of systematic review/cost-effectiveness study	Key findings	Year of last search	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada	Proportion of studies that deal explicitly with one of the prioritized groups	Proportion of studies that focused on multimorbidity
	evaluation or costing study.	The review concluded that the project increased patient compliance, reduced resource use, and decreased health care costs. Telerehabilitation was also found to reduce hospital rehabilitation stays and prevents signs of instability.					
	Telemonitoring for four types of chronic illnesses: pulmonary conditions, diabetes, hypertension, and cardiovascular disease.(130)	The review found that telemonitoring led to inconclusive effects on patient conditions and health outcomes. However, the review indicated that telemonitoring did not affect patient compliance with treatment. Cost-effectiveness of telemonitoring was not assessed in detail in the review. Positive effects of telemonitoring were seen in patient conditions in several included studies, although when looking at the number of complications, the evidence remained inconsistent. Patients were receptive towards telemonitoring, which led to increased satisfaction and compliance. Patients with pulmonary conditions and cardiac disease had fewer hospital visits but the findings were inconsistent in patients with diabetes.	2006	1/9 (AMSTAR rating from Program in Policy Decision-making)	3/65	0/65 Participants' ages not reported in detail. Studies did not focus on mental health.	0/65

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