

Optimizing Chronic Disease Management in the Community (Outpatient) Setting (OCDM): An Evidentiary Framework

OHTAC OCDM Collaborative

September 2013

About Health Quality Ontario

Health Quality Ontario (HQO) is an arms-length agency of the Ontario government. It is a partner and leader in transforming Ontario's health care system so that it can deliver a better experience of care, better outcomes for Ontarians and better value for money.

Health Quality Ontario strives to promote health care that is supported by the best available scientific evidence. HQO works with clinical experts, scientific collaborators and field evaluation partners to develop and publish research that evaluates the effectiveness and cost-effectiveness of health technologies and services in Ontario.

Based on the research conducted by HQO and its partners, the Ontario Health Technology Advisory Committee (OHTAC) — a standing advisory sub-committee of the HQO Board — makes recommendations about the uptake, diffusion, distribution or removal of health interventions to Ontario's Ministry of Health and Long-Term Care, clinicians, health system leaders and policy-makers.

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Optimizing chronic disease management in the community (outpatient) setting (OCDM): an evidentiary framework

Ontario Health Technology Advisory Committee (OHTAC) OCDM Collaborative

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List of Abbreviations

ADL	Activity of daily living
AF	Atrial fibrillation
ARAT	Action research arm test
ARI	Acute respiratory illness
BP	Blood pressure
CAD	Coronary artery disease
CAP	Community-acquired pneumonia
CBT	Cognitive behavioural therapy
CCAC	Community Care Access Centre
CD	Chronic disease
CDSMP	Chronic Disease Self-Management Program
CHD	Coronary heart disease
CI	Confidence interval
CIMT	Constraint-induced movement therapy
COPD	Chronic obstructive pulmonary disease
CVD	Cardiovascular disease
DBP	Diastolic blood pressure
DEMS	Diabetes electronic management system
EBA	Evidence-based analysis
ECG	Electrocardiogram
ED	Emergency department
EDI	Electronic data interchange
EHR	Electronic health record
eTool	Electronic tool
FMA	Fugl-Meyer motor assessment
GP	General practitioner
HbA1c	Hemoglobin A1c
HF	Heart failure
HQO	Health Quality Ontario
HR	Hazard ratio
HRQOL	Health-related quality of life
IADL	Instrumental activity of daily living
ICD	Implantable cardioverter defibrillator
ICER	Incremental cost-effectiveness ratio
IMV	Invasive mechanical ventilation

LOS	Length of stay
LTC	Long-term care
LVEF	Left ventricular ejection fraction
MCS	Mental component summary
MD	Mean difference
MI	Myocardial infarction
NCA	Nurse continence advisor
NNT	Number needed to treat
NP	Nurse practitioner
NPPV	Noninvasive positive pressure ventilation
NPWT	Negative pressure wound therapy
NR	Not reported
NRT	Nicotine replacement therapy
OCDM	Optimizing Chronic Disease Management
OHTAC	Ontario Health Technology Advisory Committee
OR	Odds ratio
OT	Occupational therapist
PCI	Percutaneous coronary intervention
PCS	Physical component summary
PFMT	Pelvic floor muscle training
PSW	Personal support worker
PT	Physiotherapist
PVP	Photoselective vaporization of the prostate
QALY	Quality-adjusted life-year
QOL	Quality of life
RCT	Randomized controlled trial
RR	Relative risk
RT	Recreational therapist
SBP	Systolic blood pressure
SCBC	Specialized community-based care
SF-36	Short Form (36) Health Survey
TIA	Transient ischemic attack
TURP	Transurethral resection of the prostate
WMD	Weighted mean difference

Background

In July 2011, the Evidence Development and Standards (EDS) branch of Health Quality Ontario (HQO) began developing an evidentiary framework for avoidable hospitalizations. The focus was on adults with at least 1 of the following high-burden chronic conditions: chronic obstructive pulmonary disease (COPD), coronary artery disease (CAD), atrial fibrillation, heart failure, stroke, diabetes, and chronic wounds. This project emerged from a request by the Ministry of Health and Long-Term Care for an evidentiary platform on strategies to reduce avoidable hospitalizations.

After an initial review of research on chronic disease management and hospitalization rates, consultation with experts, and presentation to the Ontario Health Technology Advisory Committee (OHTAC), the review was refocused on optimizing chronic disease management in the outpatient (community) setting to reflect the reality that much of chronic disease management occurs in the community. Inadequate or ineffective care in the outpatient setting is an important factor in adverse outcomes (including hospitalizations) for these populations. While this did not substantially alter the scope or topics for the review, it did focus the reviews on outpatient care. HQO identified the following topics for analysis: discharge planning, in-home care, continuity of care, advanced access scheduling, screening for depression/anxiety, self-management support interventions, specialized nursing practice, and electronic tools for health information exchange. Evidence-based analyses were prepared for each of these topics. In addition, this synthesis incorporates previous EDS work, including *Aging in the Community* (2008) and a review of recent (within the previous 5 years) EDS health technology assessments, to identify technologies that can improve chronic disease management.

HQO partnered with the Programs for Assessment of Technology in Health (PATH) Research Institute and the Toronto Health Economics and Technology Assessment (THETA) Collaborative to evaluate the cost-effectiveness of the selected interventions in Ontario populations with at least 1 of the identified chronic conditions. The economic models used administrative data to identify disease cohorts, incorporate the effect of each intervention, and estimate costs and savings where costing data were available and estimates of effect were significant. For more information on the economic analysis, please contact either Murray Krahn at murray.krahn@theta.utoronto.ca or Ron Goeree at goereer@mcmaster.ca.

HQO also partnered with the Centre for Health Economics and Policy Analysis (CHEPA) to conduct a series of reviews of the qualitative literature on “patient centredness” and “vulnerability” as these concepts relate to the included chronic conditions and interventions under review. For more information on the qualitative reviews, please contact Mita Giacomini at giacomini@mcmaster.ca.

The Optimizing Chronic Disease Management in the Outpatient (Community) Setting mega-analysis series is made up of the following reports, which can be publicly accessed at <http://www.hqontario.ca/evidence/publications-and-ohtac-recommendations/ohtas-reports-and-ohtac-recommendations>.

- Optimizing Chronic Disease Management in the Outpatient (Community) Setting: An Evidentiary Framework
- Discharge Planning in Chronic Conditions: An Evidence-Based Analysis
- In-Home Care for Optimizing Chronic Disease Management in the Community: An Evidence-Based Analysis
- Continuity of Care: An Evidence-Based Analysis
- Advanced (Open) Access Scheduling for Patients With Chronic Diseases: An Evidence-Based Analysis
- Screening and Management of Depression for Adults With Chronic Diseases: An Evidence-Based Analysis
- Self-Management Support Interventions for Persons With Chronic Diseases: An Evidence-Based Analysis
- Specialized Nursing Practice for Chronic Disease Management in the Primary Care Setting: An Evidence-Based Analysis
- Electronic Tools for Health Information Exchange: An Evidence-Based Analysis
- Health Technologies for the Improvement of Chronic Disease Management: A Review of the Medical Advisory Secretariat Evidence-Based Analyses Between 2006 and 2011
- Optimizing Chronic Disease Management Mega-Analysis: Economic Evaluation
- How Diet Modification Challenges Are Magnified in Vulnerable or Marginalized People With Diabetes and Heart Disease: A Systematic Review and Qualitative Meta-Synthesis
- Chronic Disease Patients’ Experiences With Accessing Health Care in Rural and Remote Areas: A Systematic Review and Qualitative Meta-Synthesis
- Patient Experiences of Depression and Anxiety With Chronic Disease: A Systematic Review and Qualitative Meta-Synthesis
- Experiences of Patient-Centredness With Specialized Community-Based Care: A Systematic Review and Qualitative Meta-Synthesis

Rationale and Objective

Chronic diseases represent an increasing burden for both individuals and the health care system. In 2005, 62% of women and 55% of men in Ontario self-reported having at least 1 chronic disease, and 29% of Ontario adults aged 25 and older reported having 2 or more chronic diseases. (1) According to the POWER Study, chronic disease prevalence (including multimorbidity) varies by sex, age, and socioeconomic status. (1)

The Canadian health care system was designed for acute care needs and is focused on episodic care, but given the increasing prevalence of common chronic diseases (e.g., diabetes, chronic obstructive pulmonary disease [COPD], circulatory diseases) and the costs of their management, the focus of care needs to shift at least partially towards effective and efficient chronic disease management. Effective management in the outpatient setting can improve patients' quality of life (QOL) and functional status, reduce rates of ambulatory care-sensitive admissions, and delay or prevent disease-specific adverse outcomes and mortality. It may also reduce the costs of health care delivery by ensuring more efficient and appropriate use of care.

This mega-analysis is the first attempt by any jurisdiction to develop a broad-based evidentiary platform to inform public policy on community-based health care services. The objective was to compile a clinical evidence base and economic analysis to guide investment in interventions that can optimize chronic disease management (diabetes, COPD, coronary artery disease [CAD], heart failure, stroke, atrial fibrillation, chronic wounds) in the outpatient setting by improving patient outcomes and promoting system efficiencies. This work will contribute to provincial programs and strategies to improve chronic disease management and reduce rates of avoidable acute health service utilization.

Clinical Need and Target Population

Diabetes

Diabetes is a disorder of the metabolism; either the pancreas produces little or no insulin, or the body's cells do not respond appropriately to the insulin that is produced. The latter form, type 2 diabetes, is the most common, accounting for more than 90% of the disease burden. (2) Type 2 diabetes is associated with older age, ethnicity, and family history, but its prevalence is also increasing with rising rates of obesity; more than 75% of Canadians with type 2 diabetes are overweight or obese. (2) Diabetes is associated with long-term complications that affect almost every part of the body and include blindness, cardiovascular disease (CVD), stroke, kidney damage/failure, nerve damage, and amputations. Adults with diabetes are at high risk for CVD; people with diabetes are 2 to 4 times more likely to develop CVD than those without diabetes. (2)

Prevalence and Impact

The number of people with diabetes has increased dramatically over the last 20 years, making it 1 of the most costly and burdensome chronic diseases of our time. (3;4) In 2008/2009, almost 2.4 million Canadians were living with diabetes. (2) Prevalence has increased dramatically over the last decade in Ontario; age- and sex-adjusted diabetes prevalence has risen by 69%, from 5.2% in 1995 to 8.8% in 2005, and has already surpassed the global prevalence predicted by the World Health Organization for 2030. (5) In the 2006/2007 fiscal year, 9.4% of Ontario adults aged 20 and older had diabetes, based on a validated administrative data algorithm. (6)

The personal costs of diabetes may include reduced QOL and the increased likelihood of complications. (7) The financial burden of diabetes is substantial; it is one of the most commonly encountered conditions in primary practice, (8) accounting for nearly 7 million visits to family physicians each year in Ontario alone. (9) It is estimated that by the year 2020, diabetes will cost the Canadian health care system \$16.9 billion (Cdn) per year. (7)

Chronic Obstructive Pulmonary Disease

COPD is a disease state characterized by airflow limitation that is progressive, chronic, and not fully reversible. The rate of disease progression varies, but typically patients fluctuate between stable disease and acute exacerbations, which become more frequent as the disease advances. Common symptoms include chronic and progressive breathlessness, cough, sputum production, wheezing, and chest congestion. Systemic effects include weight loss, nutritional abnormalities/malnutrition, and skeletal and muscle dysfunction. Patients may also experience a variety of other symptoms, such as worsening exercise tolerance, fatigue, malaise, and decreased oxygen saturation. Common comorbidities are ischemic heart disease, osteoporosis, respiratory infection, bone fractures, depression and anxiety, diabetes, sleep disorders, anemia, glaucoma and cataracts, and cancer. (10)

Prevalence and Impact

According to the Canadian Community Health Survey, in 2007 about 4.4% of Canadians reported being diagnosed with COPD by a health care provider. (11) However, based on a validated algorithm using Ontario administrative health data sets, Gershon et al (12) estimated the 2007 age- and sex-standardized prevalence of COPD in Ontario to be 9.5%, an increase from 7.8% in 1996. This 23% rise in prevalence corresponded to an increase of 64.8% in the number of adults with COPD. (12) Prevalence estimates of COPD are believed to underestimate the true prevalence because of underdiagnosis and limited diagnoses of mild cases; individuals often do not seek out health care services until they reach the moderate to severe stages of the disease.

COPD is expected to be the third leading cause of death in Canada by 2020 (currently it is fourth). The 2007 age- and sex-standardized mortality rate in Ontario was 4.3%, translating to 32,156 deaths. (13) As well, aside from mortality, COPD has a considerable impact on the individual; based on the 1998/1999 National Population Health Survey, 51% of Canadians with COPD reported that their disease restricted their activity at home, work, or elsewhere. (14) In addition, people with moderate to severe COPD typically experience 1 or more acute exacerbations per year. Exacerbations affect health-related quality of life (HRQOL) and lung function; may lead to hospitalization and invasive treatment, such as invasive mechanical ventilation; and increase the risk of mortality.

COPD also has a substantial effect on the health system; it is a leading cause of health care utilization, both in Canada and around the world. In 2001, there were 632 hospitalizations per 100,000 population aged 55 and older due to COPD in Ontario. (15) As of 2007, COPD accounted for the highest hospitalization rate of major chronic diseases in Canada. (15) Flare-ups and acute exacerbations are the most frequent cause of medical visits, emergency department (ED) visits, hospitalizations, and death among patients with COPD. (16)

Coronary Artery Disease/Cardiovascular Disease

CAD or CVD is a narrowing of the small blood vessels that supply blood and oxygen to the heart. Plaque builds up inside the coronary arteries and hardened plaque narrows the vessels, reducing the flow of oxygen-rich blood to the heart. Chest pain is the most common symptom of CAD, but other symptoms include shortness of breath and fatigue with exertion. Some of the potential complications of CAD include angina or myocardial infarction (MI). Canadians run a high risk of developing

CAD: 9 out of 10 individuals have at least 1 risk factor (smoking, physical inactivity, being overweight, high blood pressure, high cholesterol, or diabetes), and 4 in 10 have 3 or more risk factors. (17) Still, CAD and its associated secondary events are largely preventable with risk factor modification; among individuals with CAD, risk factor modification and chronic disease management can improve health, functional status, and QOL.

Prevalence and Impact

About 1.3 million Canadians self-reported CAD, including 23% of those aged 75 and older. (17) CAD remains a leading cause of death and disability among Canadian women and men, accounting for 32% of all deaths in 2004. (17) The number of people living with CAD is expected to rise over the next 25 years due to an aging population, changes in health behaviours, improved diagnostic testing, and treatment options that extend the lives of people with CAD. However, rising rates of obesity and diabetes are likely to result in increasing CAD prevalence and threaten to reverse declining mortality rates. (18)

In 2000, the cost of CAD in Canada amounted to \$22.2 billion (Cdn): \$7.6 billion (Cdn) for health care costs (direct costs) and \$14.6 billion (Cdn) for lost economic productivity due to disability or death (indirect costs). (19) According to the Public Health Agency of Canada, 16.9% of all hospitalizations in Canada in 2005/2006 could be attributed to CAD. (17) The proportion doubled when hospitalizations with CAD as a related condition were included. CAD also accounted for the highest proportion of days in hospital compared to other health problems (17% of all days). (17)

Heart Failure

Heart failure includes a complex set of symptoms indicating that the heart muscle is weakened and the heart as a pump is impaired; it is caused by structural or functional abnormalities and is the leading cause of hospitalization in elderly Ontarians. (20) Heart failure occurs after the heart muscle has been damaged (e.g., by high blood pressure, CAD, or certain infections); the heart becomes too weak to pump enough blood to meet the needs of the body. There has been a progressive increase in the proportion of people aged 65 and older with heart failure, partially due to improved survival after coronary and cerebrovascular events; survivors are at increased risk for developing heart failure.

Prevalence and Impact

Based on data from the Canadian Community Health Survey, the prevalence of heart failure in Canada (among those aged 12 and older) is approximately 1%. (21) Prevalence sharply rises after age 45; rates in this age group range from 2.2% (22) to 12%. (23) The wide range is due to the different criteria used to identify heart failure patients and differences in disease severity (from mild to severe) that affect the identification of patients. (24) Extrapolating the national prevalence of heart failure to the Ontario population, an estimated 98,000 residents in Ontario have heart failure, (21) and about 5% of those have end-stage disease. (25)

Between 1997 and 2007, there were 419,552 cases of heart failure in Ontario. (20) Slightly more women (51%) than men had heart failure, and 80% of the overall cohort was aged 65 or older. (20) The prognosis for patients is poor; 5-year mortality associated with heart failure is estimated to be as high as 60%; (26) the major causes of death among patients with heart failure are sudden death and death from worsening disease. (27)

Stroke

A stroke is a sudden loss of brain function caused by the interruption of blood flow to the brain (ischemic stroke) or the rupture of blood vessels in the brain (hemorrhagic stroke). The longer the brain goes without the oxygen and nutrients supplied by the blood, the greater the risk of permanent brain damage. About 80% of strokes are ischemic, and 20% are hemorrhagic. Transient ischemic attacks (TIAs) are caused by a temporary interruption of blood flow to the brain. TIA symptoms are similar to those of an ischemic stroke, but will go away within hours or even minutes (transient). TIAs are important warning signs that indicate increased risk of ischemic stroke.

Prevalence and Impact

There are over 50,000 strokes in Canada each year; after age 55, the risk of stroke doubles about every 10 years. (17) Stroke is the leading cause of adult disability in Canada and the third leading cause of death. (28) Six percent of all deaths in Canada—about 14,000—are due to stroke. (29)

Despite a decline in hospitalization rates for acute stroke in the past 10 years, Canada's aging population (along with increasing prevalence of risk factors) is expected to lead to an overall rise in the absolute number of strokes over the next 20 years. (19) Stroke costs the Canadian economy about \$3.6 billion (Cdn) per year, including physician services, hospital costs, lost wages, and decreased productivity. (19)

Atrial Fibrillation

Atrial fibrillation is characterized by an irregular (usually rapid) heart rate. During atrial fibrillation, electrical charges are generated from areas of the heart other than the synovial node and cause rapid and irregular contractions of the atria, so that blood is ineffectively pumped through the body. Atrial fibrillation can be a primary diagnosis or it may be associated with other diseases, such as high blood pressure, abnormal heart muscle function, chronic lung diseases, and CAD. The most common symptom of atrial fibrillation is palpitations. Symptoms caused by decreased blood flow include dizziness, fatigue, and shortness of breath, but some patients with atrial fibrillation experience no symptoms.

Strokes are a complication associated with atrial fibrillation. Rapid contractions or quivering of the atria can cause blood to stagnate and form blood clots, which, if dislodged, can cause strokes. (30) The risk of stroke increases further in the presence of other risk factors, including age, previous history of stroke, reduced left ventricular ejection fraction, and valvular heart disease. Patients with atrial fibrillation may have a 5-fold increased risk of stroke compared to age-matched controls. (31)

Prevalence and Impact

According to data from the United States, (31) the incidence of atrial fibrillation increases with age, with a prevalence of 1 per 200 people aged 50 to 60 years, and 1 per 10 people over 80 years of age. In Ontario, the prevalence of atrial fibrillation is about 1.1% of the population aged 20 and older, and this rate is expected to rise as the population ages. (32) In 2004, the Institute for Clinical Evaluative Sciences estimated that the rate of hospitalization for atrial fibrillation in Canada was 582.7 per 100,000 population; (33) they also reported that of patients who were discharged alive, 2.7% were readmitted within 1 year for stroke. (33) In a previous Health Quality Ontario (HQP) report, the prevalence of atrial fibrillation in Ontario was estimated to be 98,758 for residents 20 and older, based on extrapolations from the findings of a United States prevalence study. (34)

Chronic Wounds

Chronic wounds have various etiologies, including pressure, diabetes, venous pathology, and surgery. Without adequate management, chronic wounds pose a significant risk to patient safety and can result in infection, limb loss, sepsis, and even death. A pressure ulcer is defined as a localized injury to the skin/and or underlying tissue, occurring most often over a bony prominence and caused by pressure, shear, or friction, either alone or in combination. Those at risk for pressure ulcers include the elderly and critically ill, those with neurological impairments, and others with conditions associated with immobility. Up to three-fifths of leg ulcers have a venous etiology. Chronic leg ulcers are associated with decreased QOL, restricted mobility, anxiety, and depression; severe or continuous pain is reported by up to 65% of people with chronic wounds. (35)

Prevalence and Impact

The prevalence of pressure ulcers in Canadian health care facilities is estimated to be 25% in acute care; 29.9% in nonacute care; 22.1% in mixed health care settings; and 15.1% in community care. (36)

The estimated cost of caring for a pressure ulcer in the community is \$27,000 (Cdn).

Approximately 15% of patients with diabetes will develop foot ulcers in their lifetime, and 14% to 24% of those will require amputation. (37) The average total cost per amputation in Ontario ranges from \$40,000 to \$74,000 (Cdn). (37) The prevalence of venous leg ulcers ranges from 0.8% to 1.3%, and 2% in those over 65 years of age. The recurrence rate is approximately 70% if effective prevention strategies are not put in place post-healing. (37)

Methods

This section briefly describes the methods used to define the scope of the mega-analysis; conduct the systematic reviews of the clinical literature, the economic analysis, and the syntheses of the qualitative literature; and to contextualize the evidence.

A. Mega-Analysis

Scoping

The scoping phase involved searches for interventions that could optimize chronic disease management in the outpatient setting and reduce acute health care utilization (urgent care visits, ED visits, and hospitalizations) for patients with at least 1 of the following conditions: diabetes, COPD, CAD/CVD, heart failure, stroke, atrial fibrillation, and chronic wounds. The scoping process involved identifying and reviewing individual studies, meta-analyses, systematic reviews, and narrative reviews of interventions intended to improve chronic disease management and reduce avoidable hospitalizations. The search was conducted using keyword searches on MEDLINE and several health technology assessment and systematic review websites (the Wiley Cochrane Library, the Centre for Reviews and Dissemination/International Agency for Health Technology Assessment, and the National Institute for Health and Clinical Excellence), as well as other relevant websites, such as the Commonwealth Fund and the Agency for Healthcare Research and Quality.

Ontario experts in health systems, primary care, or chronic disease management—as well as members of the Ontario Health Technology Advisory Committee (OHTAC)—provided input on the project scope and recommended topics to include in the analysis.

Disaggregation of Technologies

After determining the scope of the project and the interventions to be included in the review, each topic was systematically reviewed using published literature. Patient/clinical and health system outcomes of interest were determined a priori so that, where possible, outcomes common to the 7 conditions could be compared across technologies. The following common outcomes were examined:

- health care utilization
- hospitalization
- readmissions to hospital
- ED admissions
- urgent care visits
- hospital length of stay (LOS)
- mortality
- disease-specific measures
- patient-specific measures
- QOL
- functional status
- patient satisfaction

Reaggregation

Evidence of effectiveness was combined with evidence of cost-effectiveness, feasibility of implementation, and societal and ethical considerations. Qualitative meta-syntheses were also conducted to provide additional context about the impact of selected interventions on patients with chronic diseases.

B. Evidence-Based Analyses of Clinical Effectiveness and Safety

Research Methods

Literature Search

For each of the systematic reviews, a literature search was performed using OVID MEDLINE, OVID MEDLINE In-Process and Other Non-Indexed Citations, OVID EMBASE, EBSCO Cumulative Index to Nursing and Allied Health Literature (CINAHL), the Wiley Cochrane Library, and the Centre for Reviews and Dissemination database to identify potential studies. The publication search dates varied by review, but typically ranged over 5 to 10 years of literature (specific details are available in the individual reports). Abstracts were reviewed by a single reviewer and, for those studies meeting the eligibility criteria, full-text articles were obtained. Reference lists were also examined for any additional relevant studies not identified through the search.

The inclusion and exclusion criteria listed below were used for all analyses. Some analyses used additional criteria specific to the topic of interest, which are detailed in the individual reports.

Inclusion Criteria

- English-language full-text reports
- health technology assessments, systematic reviews, meta-analyses, randomized controlled trials (RCTs), and observational studies
- studies that included patients in 1 of the relevant disease cohorts (type 2 diabetes, COPD, CAD, heart failure, stroke, atrial fibrillation, chronic wounds) or in a general chronic disease or multimorbid population

Exclusion Criteria

- < 18 years of age
- animal studies
- duplicate publications
- grey literature

Statistical Analysis

When possible, results were pooled using Review Manager Version 5.1. (38) Continuous data were pooled to calculate relative risks (RRs) using the Mantel-Haenszel test and a random effects model. Dichotomous data were pooled to calculate weighted mean differences using the inverse variance method and a random effects model. When data could not be pooled, results were summarized descriptively. *P* values < 0.05 were considered statistically significant. For a complete description of search strategies, review methods, and statistical analyses, please see the individual reports.

Quality of Evidence

The quality of the body of evidence for each outcome was examined according to the GRADE Working Group criteria. (39) The overall quality was determined to be very low, low, moderate, or high using a step-wise, structural methodology.

Study design was the first consideration; the starting assumption was that randomized controlled trials are high quality, whereas observational studies are low quality. Five additional factors—risk of bias, inconsistency, indirectness, imprecision, and publication bias—were then taken into account. Limitations in these areas resulted in downgrading the quality of evidence. Finally, 3 main factors that may raise the quality of evidence were considered: large magnitude of effect, dose response gradient, and accounting for all residual confounding factors. (39) For more detailed information, please refer to the latest series of GRADE articles. (39)

As stated by the GRADE Working Group, the final quality score can be interpreted using the following definitions:

High	Very confident that the true effect lies close to the estimate of the effect
Moderate	Moderately confident in the effect estimate—the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low	Confidence in the effect estimate is limited—the true effect may be substantially different from the estimate of the effect
Very Low	Very little confidence in the effect estimate—the true effect is likely to be substantially different from the estimate of effect

C. Economic Modelling

Models were constructed by condition. Cost-utility analyses were conducted to evaluate health care resource costs and outcomes in each chronic disease cohort. For health outcomes that could be modelled, the costs and effects of interventions that were clinically effective (based on evidence of statistical significance) were included. Specifically, interventions were included only if:

- the clinical review demonstrated a statistically significant difference in health outcomes
- the outcomes had implications for resource utilization and/or health outcomes
- the studies were conducted in a chronic disease population

The analysis was conducted from the perspective of the Ontario Ministry of Health and Long Term Care. An annual discount rate of 5% was applied to both costs and quality-adjusted life-years. A 5-year time horizon was used in all analyses.

For a full description of the methods and results of the economic analysis, please see *Optimizing Chronic Disease Management Mega-Analysis: Economic Evaluation* in the report series.

D. Qualitative Meta-Synthesis

A search strategy similar to the one used for the clinical reviews was used to search the qualitative literature. Published qualitative research was analyzed using integrative qualitative meta-synthesis. Qualitative meta-synthesis, also known as qualitative research integration, is an integrative technique that summarizes research over a number of studies with the intent of combining findings from multiple papers. Qualitative meta-synthesis has 2 objectives: first, the aggregate of a result should reflect the range of findings while retaining the original meaning; second, by comparing and contrasting findings across studies, a new integrative interpretation should be produced.

Predefined topic and research questions guided research collection, data extraction, and analysis. Topics were defined in stages as available relevant literature was identified and corresponding evidence-based analyses (EBAs) proceeded. All qualitative research relevant to the conditions under analysis was retrieved. In consultation with HQO, a theoretical sensitivity to patient centeredness and vulnerability was used to further refine the dataset. Finally, specific research questions were chosen and a final search performed to retrieve papers relevant to these questions.

For a full description of the methods and results of the qualitative meta-syntheses, please see the qualitative reviews in the report series.

E. Contextualization of the Evidence

An expert panel was convened by OHTAC to assist in contextualizing the results of the EBAs and economic analyses. The roles of the panel were as follows:

- to provide direction on the scope of the project, including relevant background knowledge, grey literature, and relevant subgroup analyses for the evidence reviews
- to provide direction on the selection of interventions for inclusion
- to review the EBAs of the included interventions, comment on the accuracy of the interpretation of evidence, and identify any omissions of evidence
- to identify any health system, societal, ethical, or economic issues that were relevant to evaluating the effectiveness of the included interventions

Project Scope

After an initial scoping of reports and reviews, a list of drivers and interventions was developed. Based on the results of the scoping, the research team developed a health system trajectory to identify points of intervention (Figure 1). The expert panel validated the trajectory as representative of the system.

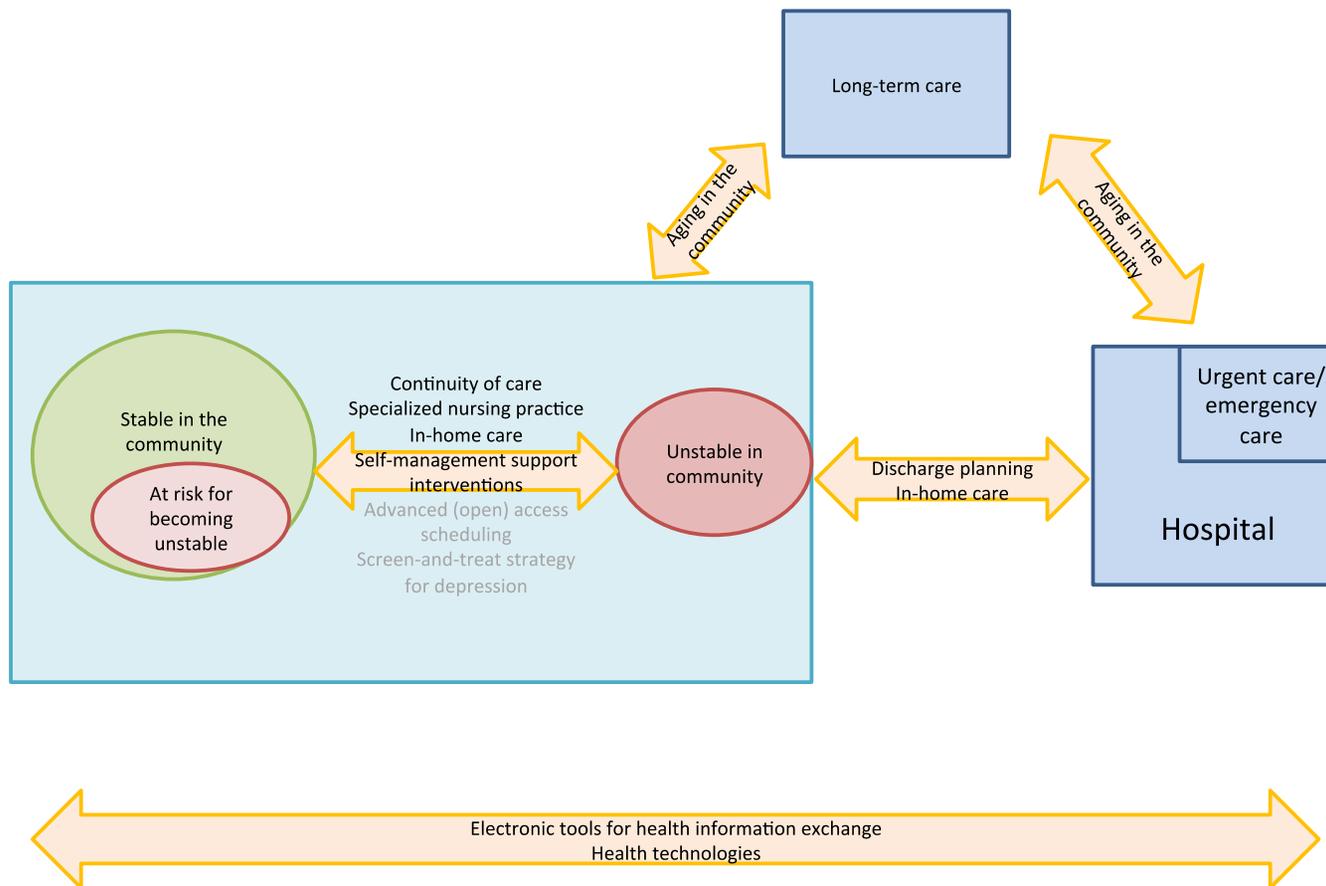


Figure 1: Health Care System Trajectory for Adults With Chronic Diseases

Note: Greyed out text refers to interventions that did not have a significant clinical effect

The interventions and research questions included in the final mega-analysis were as follows:

- **Discharge planning:** What is the effectiveness of discharge planning bundles at reducing health resource utilization and improving patient outcomes compared to usual care alone?
- **In-home care:** What is the effectiveness of care delivered in the home (i.e., in-home care) compared to no home care or usual care/care received outside of the home (e.g., a health care setting)?
- **Continuity of care:** Is higher continuity of care effective at reducing health resource utilization and improving patient outcomes?
- **Advanced (open) access scheduling:** What is the effectiveness and cost-effectiveness of advanced access scheduling compared to traditional scheduling for the management of chronic diseases in Ontario adults?
- **Screening and management of depression:** In a chronic disease population, is a screen-and-treat strategy for depression associated with an improvement in chronic disease outcomes?
- **Self-management support interventions:** What is the effectiveness of self-management support interventions for persons with chronic disease compared to usual care?
- **Specialized nursing practice:** What is the effectiveness of specialized nursing practice in comparison to usual care in improving patient outcomes and health system efficiencies for chronic disease management in the primary health care setting?
- **Electronic tools for health information exchange:** What is the impact of electronic tools (eTools) for health information exchange on patient outcomes and health services utilization when used to improve the care coordination of adults with chronic disease? What specifications of eTools contribute to their effectiveness?
- **Health technologies:** What Medical Advisory Secretariat (now Evidence Development and Standards, HQO)–reviewed health technologies are effective and cost-effective in optimizing chronic disease management in the outpatient setting (i.e., in the community)?

A review of cardiac rehabilitation was initially included in the scope of work, but because of the complex nature of the intervention—including variations in programs by subpopulation and cardiac condition—it was not included in the final analysis.

Interventions that were not prioritized for review due to resource constraints included the following:

- care coordination/case management
- primary care team composition and team member scope of practice
- chronic disease management models
- electronic medical records (e.g., alerts, pop-ups, electronically generated standardized order sets)
- respite care
- palliative care
- telehealth/telemonitoring
- accountable care models

Results of Evidence-Based Analyses

This section provides a summary of the findings from each of the individual EBAs, categorized according to where the intervention would fit on the trajectory (Figure 1). For complete descriptions of methods and results, please refer to the individual reports in the series; full reviews are available at <http://www.hqontario.ca/evidence/publications-and-ohtac-recommendations/ohtas-reports-and-ohtac-recommendations>. For a summary of included studies, effect estimates, and GRADE levels of evidence, please see Appendix 1.

1. Discharge Planning

Objective of Analysis

The objective of this analysis was to determine if discharge planning bundles (e.g., support services, follow-up activities, and other interventions that span prehospital discharge to the home setting) are effective at reducing health resource utilization and improving patient outcomes compared with usual care alone.

Intervention

The few definitions of hospital discharge planning indicate that this is a process that takes place between hospital admission and the discharge event. (40) Prehospital discharge and communication is important as a start to the discharge planning process; it provides an opportunity to summarize the visit, teach patients how to safely care for themselves at home, and address any remaining questions or concerns. Discharge planning helps patients communicate with caregivers and primary care providers about how best to manage their chronic needs after leaving the hospital. Variations in the implementation of discharge planning and differences between guidelines and programs make it difficult to interpret data on the effectiveness of discharge planning. This review looked at 2 groups of interventions that addressed the transition from hospital to the community setting:

- individualized predischarge planning
- individualized predischarge planning plus postdischarge support

Both groups included varying combinations of interventions, making it more difficult to identify which elements were effective. It was also not possible to compare the 2 groups to each other; each was compared to usual care, and there were no head-to-head comparisons.

Research Questions

What is the effectiveness of discharge planning bundles at reducing health resource utilization and improving patient outcomes compared to usual care alone?

Included Studies

A literature search was performed on December 13, 2011, that included studies published between January 1, 2004, and December 13, 2011. A meta-analysis of discharge planning for patients with heart failure was published in 2004; this work built on that review. The search was limited to RCTs, systematic reviews, and meta-analyses. One reviewer screened the database (2,707 citations, with duplicates removed); 11 studies (7 systematic reviews and 4 RCTs) were included in the final analysis.

Results

Table 1: Individualized Predischarge Planning (Versus Usual Care)

Outcome	Population	Measure	Studies	Result	GRADE
Health service utilization	Population admitted to hospital	Readmission	2 systematic reviews	Significant reduction	Moderate
		LOS	1 systematic review	Significant reduction	Moderate
Mortality		Mortality	1 systematic review	No difference	Moderate
Clinical measures	Not reported				
QOL/functional status	Population admitted to hospital	HRQOL	1 systematic review	Significant improvement	Very low
Nonclinical patient outcomes		Patient satisfaction	1 systematic review	Significant improvement	Very low

Abbreviations: HRQOL, health-related quality of life; LOS, length of stay; QOL, quality of life.

Table 2: Individualized Predischarge Planning Plus Postdischarge Support (Versus Usual Care)

Outcome	Population	Measure	Studies	Result	GRADE
Health service utilization	Population admitted to hospital	Readmission ^a	2 systematic reviews and 4 RCTs	Significant reduction	Low
		LOS ^a	1 systematic review	No difference	Low
Mortality		Mortality ^a	1 systematic review and 1 RCT	No difference	Low
Clinical measures	Not reported				
QOL/functional status	Population admitted to hospital	HRQOL ^a	1 systematic review and 2 RCTs	Significant improvement	Very low
Nonclinical patient outcomes		Patient satisfaction	1 RCT	Significant improvement	Very low

Abbreviations: HRQOL, health-related quality of life; LOS, length of stay; QOL, quality of life; RCT, randomized controlled trial.

^aThe study by Phillips et al (41) was specific to a population with heart failure.

Cost-Effectiveness

The review of individualized predischarge planning plus postdischarge support found significant clinical effectiveness for congestive heart failure patients. An evaluation of cost-effectiveness in a congestive heart failure cohort found that individualized predischarge planning plus postdischarge support was dominant compared to usual care.

Conclusions

Individualized Predischarge Planning Compared With Usual Care

- Based on moderate quality evidence, individualized predischarge planning was more effective than usual care at reducing readmissions and initial hospital LOS.
- Based on moderate quality evidence, individualized predischarge planning was not more effective than usual care at reducing mortality.
- Based on very low quality evidence, individualized predischarge planning was more effective than usual care at improving HRQOL and patient satisfaction.

Individualized Predischarge Planning Plus Postdischarge Support Compared With Usual Care

- Based on low quality evidence, individualized predischarge planning plus postdischarge support was more effective than usual care at reducing readmissions.
- Based on low quality evidence, individualized predischarge planning plus postdischarge support was not more effective than usual care at reducing hospital LOS or mortality.
- Based on very low quality evidence, individualized predischarge planning plus postdischarge support was more effective than usual care at improving HRQOL and patient satisfaction.

2. In-Home Care

Objective of Analysis

The objective of this analysis was to determine the effectiveness of in-home care in optimizing chronic disease management in the community.

Intervention

In-home and continuing care include health services delivered in the home and in the community to recovering, disabled, chronically ill, or terminally ill individuals. By offering a variety of health services (including nursing, personal care, physiotherapy, occupational therapy, speech therapy, social work, dietician services, homemaking, respite care, and other services such as day programs for Alzheimer's disease, Meals on Wheels, and friendly visitor programs), in-home and community care can maintain or improve the health status of individuals in need. {Health Canada, 2010 1876 /id}

For the purposes of this EBA, in-home care was defined as care predominantly in the patient's home, including ongoing in-home assessment, case management, and coordination of a range of services provided in the home or in the community that are curative, preventive, or supportive in nature and that aim to enable clients to live at home, preventing or delaying the need for long-term care (LTC) or acute care. {Health Canada, 2010 1876 /id}

In Ontario, formal home care services are either government- or privately funded. Community Care Access Centres (CCACs) administer the former; there are 14 CCACs (1 per Local Health Integration Network) in communities across Ontario. CCAC advice and services are covered by the Ontario Health Insurance Plan. (43) Among Ontario adults aged 65 and older, 8% of women and 6% of men receive government-funded services. (44)

Research Question

What is the effectiveness of care delivered in the home (i.e., in-home care) compared to no home care or usual care/care received outside of the home (e.g., a health care setting)?

Included Studies

A literature search was performed on January 25, 2012, for studies published between January 1, 2006, and January 25, 2012. The start date for the literature search was selected based on scoping of the literature and identification of a number of systematic reviews that had already been completed at that time. The search was limited to RCTs, systematic reviews, meta-analyses, and health technology assessments. It was also limited to interventions that included at least 1 in-home care visit. Studies that used telemonitoring or telemedicine to deliver care were excluded. One reviewer screened the database (1,277 citations, with duplicates removed); 17 studies (1 health technology assessment, 4 systematic reviews, and 12 RCTs) were included in the final analysis.

Results

Table 3: In-Home Care Interventions (Versus Usual Care)

Outcome	Population	Measure	Studies	Result	GRADE
Health service utilization	HF population	Mean unplanned admissions/readmissions	1 RCT	Significant reduction	Moderate
		HF-specific admissions	2 RCTs	No difference	Moderate
		Mean number of HF-specific admissions	2 RCTs	No difference	Moderate
		Mean number of ED visits	1 RCT	Significant reduction	Moderate
		Mean LOS	2 RCTs	No difference	Moderate
Mortality	Chronically ill multimorbid population	All-cause mortality	1 RCT	No difference	High
	HF population	Combined all-cause mortality and hospitalization	3 RCTs	Significant reduction	Moderate
		All-cause mortality	5 RCTs	No difference	Moderate
		CVD-specific mortality	2 RCTs	No difference	Moderate
Clinical measures	Diabetes population	HbA1c, BP, lipid levels	1 RCT	Significant benefit for HbA1c, no difference for BP or lipid levels	Low
	Stroke population	BP, lipids	1 RCT	No difference	Low
QOL/functional status	HF population	SF-36, PCS	1 RCT	Significant improvement	Low
		SF-36, MCS	1 RCT	No difference	Low
		HF-specific well-being (nurse-led intervention)	2 RCTs	Significant improvement	Low
		HF-specific well-being (pharmacist-led intervention)	1 RCT	No difference	Low
	COPD population	St. George's Respiratory Questionnaire	1 RCT	No difference	Indeterminate
	Chronic disease population	ADLs	1 RCT	Significant improvement	Moderate
		IADLs	1 RCT	No difference	Moderate
		Mobility	1 RCT	No difference	Moderate
Nonclinical patient outcomes	Not reported				

Abbreviations: ADL, activity of daily living; BP, blood pressure; COPD, chronic obstructive pulmonary disease; CVD, cardiovascular disease; ED, emergency department; HbA1c, hemoglobin A1c; HF, heart failure; IADL, instrumental activity of daily living; LOS, length of stay; MCS, mental component summary; PCS, physical component summary; QOL, quality of life; RCT, randomized controlled trial; SF-36, Short Form (36) Health Survey.

While all results were suggestive of a protective effect of home care, few were statistically significant.

Cost-Effectiveness

The review of in-home care interventions found significant clinical effectiveness in heart failure patients. An evaluation of cost-effectiveness in a heart failure cohort found that in-home care was dominant compared to usual care.

Conclusions

- Based on moderate quality evidence, there was a significant beneficial effect of in-home care on unplanned hospitalizations and ED visits in heart failure patients. However, also based on moderate quality evidence, there was no difference between in-home care and usual care for rates of heart failure–specific hospitalizations or hospital LOS in heart failure patients.
- Based on high to moderate quality evidence, there was no difference between in-home care and usual care for all-cause mortality in multimorbid chronic disease patients (high quality) and for all-cause mortality or CVD-specific mortality in heart failure patients (moderate quality). However, based on moderate quality evidence, there was a significant beneficial effect of in-home care on the combined events of all-cause mortality and hospitalizations in heart failure patients.
- Based on low quality evidence, there was a significant beneficial effect of in-home care on blood glucose control (hemoglobin A1c [HbA1c]) in diabetes patients. There was no difference between in-home care and usual care for blood pressure or lipid levels in diabetes and stroke patients.
- Based on low quality evidence, there was a significant beneficial effect of in-home care on HRQOL as assessed by the physical component summary of the Short Form (36) Health Survey (SF-36), but no difference between groups on the mental health component summary.
- Based on low quality evidence, there was a beneficial effect of nurse-led in-home care on heart failure–specific HRQOL in heart failure patients. There was no difference between pharmacist-led in-home care and usual care for heart failure–specific HRQOL.
- Based on moderate quality evidence, there was a significant beneficial effect of in-home care on activities of daily living in multimorbid chronic disease patients, but no difference in measures of mobility or instrumental activities of daily living.

3. Continuity of Care

Objective of Analysis

The objective of this analysis was to determine if continuity of care is associated with health resource utilization and patient outcomes.

Intervention

Continuity of care is not an intervention per se, but rather a quality of the relationship between the patient and the provider. Most of the research focuses on continuity of care with a primary care or main provider. There are 3 defined areas of continuity of care: informational, management, and relational or interpersonal. This EBA addressed management and relational continuity, but not informational continuity.

- *Informational continuity* is continuity whereby previous patient information is available (usually through a patient chart or an electronic medical record) and used to provide patient-appropriate care. Ideally the patient information is available to multiple health care professionals in different settings.
- *Management continuity* involves the use of standards and protocols to ensure that care is provided in an orderly, coherent, complementary, and timely fashion. Often this applies when care is being provided by multiple providers. This also includes accessibility (availability of appointments, medical tests), flexibility to adapt to care needs, and consistency of care and transitions of care (e.g., the coordination of home care by a family physician).
- *Relational continuity (interpersonal)* refers to the ongoing relationship between the care provider and the patient. It refers to the duration of the relationship as well as the quality of the relationship, which is affected by the attentiveness, inspiration of confidence, and the medical knowledge of the health professional.

Research Question

Is higher continuity of care effective at reducing health resource utilization and improving patient outcomes?

Included Studies

A literature search was performed on December 8, 2011 (updated January 27, 2012), that included studies published between January 1, 2002, and January 27, 2012. A 10-year timeframe was chosen because a comprehensive systematic review by Cabana and Jee was published in 2004 that included studies up until 2002; this work built on that review. One reviewer screened the database (6,462 citations, with duplicates removed); 23 studies (8 systematic reviews, 15 observational studies) were included in the final analysis.

Results

Table 4: Higher Continuity of Care (Versus Lower Continuity of Care)

Outcome	Population	Measure	Studies	Result ^a	GRADE
Health service utilization	General population	Hospitalizations	3 observational studies ^b	Significant reduction (all 3 studies)	Low
		ED visits	3 observational studies	Significant reduction (all 3 studies)	Low
	Diabetes population	Hospitalizations	5 observational studies	Significant reduction (4 of 5 studies); 1 study showed reduced hospitalizations, but the result was not statistically significant	Low
		ED visits	3 observational studies	Significant reduction (all 3 studies)	Low
	COPD population	Hospitalizations	1 observational study	Significant reduction	Low
		ED visits	1 observational study	Significant reduction	Low
Mortality	Diabetes population	Mortality	1 observational study	Mortality was lower for those with high continuity vs. those with low continuity	NR
Clinical measures	Diabetes population	HbA1c	2 observational studies	Both studies reported significant improvements in HbA1c for patients with higher continuity	Low
	Diabetes population	BP, lipids	1 observational study	No effect of continuity on clinical measures	NR
	CAD population	LDL-C	1 observational study ^c	No benefit of increased connectedness with a physician over a practice	Very low
QOL/functional status	Not reported				
Nonclinical patient outcomes	Multiple populations	Patient satisfaction	3 systematic reviews	Increased satisfaction	Low

Abbreviations: BP, blood pressure; CAD, coronary artery disease; COPD, chronic obstructive pulmonary disease; ED, emergency department; HbA1c, hemoglobin A1c; LDL-C, low-density lipoprotein cholesterol; NR, not reported; QOL, quality of life.

^aAssociation with increased continuity.

^bOne study was limited to adults aged 65 and older.

^cStudy compared continuity with a physician to continuity in a practice.

Cost-Effectiveness

The review of continuity of care found increased continuity to be associated with a significant benefit for patients with COPD or diabetes. Because continuity of care itself is not an intervention, it was not possible to estimate its costs. However, a sensitivity analysis of the costs and benefits of interventions to increase continuity of care for patients in these cohorts found that interventions would be cost-effective or dominant across most combinations of cost and incremental improvements.

Conclusions

- Despite heterogeneity in how continuity is measured, based on low quality evidence, higher continuity of care decreased health service utilization (hospitalizations and ED visits).
- There was insufficient evidence to comment on the relationship of continuity of care with disease-specific outcomes.
- Based on low quality evidence, higher continuity of care was associated with improved control of blood glucose (lower HbA1c levels) in patients with diabetes.
- Based on low quality evidence, there appeared to be a positive association between high continuity of care and increased patient satisfaction, particularly among patients with chronic disease.

4. Advanced (Open) Access Scheduling

Objective of Analysis

The objective of this analysis was to evaluate whether implementation of an advanced access scheduling system—intended to ensure that patients have access to same-day appointments with a physician (primary care or specialty care)—reduced other types of health service utilization (hospital, ED, acute care LOS) and/or affected clinical measures and patient satisfaction among adults with chronic diseases.

Intervention

Advanced access scheduling (also known as *open access* or *same-day access* scheduling) was developed by Mark Murray, Catherine Tantau, and Donald Berwick. The authors applied queuing theory and principles of industrial engineering adapted to clinical settings, and posited that access delays could be reduced substantially without employing additional resources. Advanced access is premised on the idea that demand for appointments is predictable and, by balancing supply and demand and working through an existing appointment backlog, it is possible to implement an appointment system that allows patients to see a physician within 24 hours of requesting an appointment.

Some appointments—such as follow-up appointments scheduled by the physician or appointments booked on the day of a patient’s choosing rather than on the day of calling—are consistent with advanced access scheduling, but the volume of these appointment types should be taken into consideration when measuring demand and assigning open supply. “[T]he anchor metric for advanced access [success] is delays, measured as the time in days to the third next available routine appointment.” (45)

The Advanced Access and Efficiency for Primary Care initiative was implemented in Ontario in 2008 by the Quality Improvement and Innovation Partnership and continues to be implemented through HQO. The aim of the program is to realize improvements in access to primary care and efficiency in the delivery of primary care within 6 months of initiating the program. The core objective is to ensure that patients calling to schedule a physician visit are offered an appointment with their primary care provider on the same day or a day of their choosing. As such, the program stresses the importance of continuity, as well as same-day access to care. Measures of successful implementation include time to the third next available appointment (less than 1 day) and that 85% of patients from multiprovider practices see their own provider at each visit.

Research Question

What is the effectiveness and cost-effectiveness of advanced access scheduling compared to traditional scheduling for the management of chronic diseases in Ontario adults?

Included Studies

A literature search was performed on January 29, 2012, that included studies published to January 29, 2012. While no date cut-off was used to limit the search, advanced access was developed in the late 1990s and more widely applied in the early 2000s; no literature exists on this intervention prior to that time. One reviewer screened the database (3,075 citations, with duplicates removed); 6 papers (1 systematic review, 1 observational study with concurrent controls, and 4 observational studies with historical controls) were included in the final analysis.

Results

Table 5: Advanced (Open) Access Scheduling (Versus Traditional Scheduling)

Outcome	Population	Measure	Studies	Result ^a	GRADE
Health service utilization	Diabetes population	Hospitalizations	1 observational study and 1 quasi-experimental study	No difference	Low
		ED visits	1 observational study	No difference	Very low
		ED/urgent care visits	1 observational study and 1 quasi-experimental study	Inconsistent findings: 1 study reported a significant reduction, while the other reported no difference	Very low
		LOS (% of patients admitted for > 3 days)	1 observational study	Significant reduction	Very low
	CHD population	Hospitalizations	1 observational study	Significant reduction	Very low
		ED visits	1 observational study	No difference	Very low
		LOS (% of patients admitted for > 3 days)	1 observational study	Significant reduction	Very low
Mortality	Not reported				
Clinical measures	Diabetes population	HbA1c, LDL-C, BP	2 observational studies and 1 quasi-experimental study	Inconsistent findings: 1 study reported inconsistent results across measures, 1 study reported significant improvements, 1 study reported no differences	Very low
	CHD population	HbA1c, LDL-C, BP	1 observational study	Inconsistent results across measures	Very low
QOL/functional status	Not reported				
Nonclinical patient outcomes	Geriatric population	Preference for advanced access scheduling over traditional scheduling	1 observational study	Slight preference for advanced access scheduling; no statistical results reported	Very low

Abbreviations: BP, blood pressure; CHD, coronary heart disease; ED, emergency department; HbA1c, hemoglobin A1c; LDL-C, low-density lipoprotein cholesterol; LOS, length of stay; QOL, quality of life.

^aAssociation with advanced access.

Cost-Effectiveness

An economic evaluation of advanced access scheduling was not conducted, because no significant clinical benefit was noted for the outcomes of interest.

Conclusions

- Based on low quality evidence, implementation of advanced access scheduling was not associated with significant changes in hospitalization rates for patients with diabetes. However, based on very low quality evidence, advanced access scheduling was associated with a significant reduction in hospitalization rates for patients with coronary heart disease (CHD).
- Based on very low quality evidence, implementation of advanced access scheduling was not associated with significant changes in ED visit rates for patients with diabetes or patients with CHD.
- Based on very low quality evidence, implementation of advanced access scheduling was associated with a significant reduction in the proportion of patients with diabetes or CHD admitted to hospital whose LOS was greater than 3 days.
- There was inconsistent evidence of changes in chronic disease clinical measures (HbA1c, LDL-C, systolic blood pressure) for patients with diabetes or patients with CAD/CHD after advanced access implementation; the quality of the evidence was very low.

5. Screening and Management of Depression

Objective of Analysis

The initial objective of this review was to systematically review the literature regarding the effectiveness of screening for depression and /or anxiety in adults with chronic diseases in the community setting. However, there were no published studies that evaluated this question. As a result, a secondary, non-systematic, post-hoc analysis was conducted to evaluate whether a screen-and-treat strategy for depression was associated with an improvement in chronic disease outcomes.

Intervention

Depression is recognized by the World Health Organization as the leading cause of disability and the fourth leading contributor to the global burden of disease. (46) Projections suggest that by 2020, depression will be second only to CVD as a public health concern. (47) Despite this, depression continues to be under-recognized and undertreated. (47)

In a large prospective Canadian community-based study, (48) Patten and colleagues found an increased risk of major depression in subjects with chronic medical disorders compared to those without such disorders. The 2005 Canadian Community Health Survey, cycle 3.1, (49) measured the prevalence of comorbid mood disorders among individuals with various chronic physical conditions in Ontario. The highest prevalence was seen among those who had had a stroke (15.5%), followed by those with CVD (9.8%) and diabetes mellitus (9.3%). (49)

Screening for depression identifies patients with this condition, allowing them to access care earlier in the course of their illness. Given the higher prevalence of depression among adults with chronic diseases, a number of clinical groups have developed recommendations for screening practices, for both the general population and disease-specific groups: diabetes, COPD, stroke, and CAD.

Research Question

In a chronic disease population, is a screen-and-treat strategy for depression associated with an improvement in chronic disease outcomes?

Included Studies

A literature search was performed on January 29, 2012, that included studies published between January 1, 2007, and January 29, 2012. A 5-year interval was chosen because of recent developments and enhancements in screening tools for depression, and because of the substantial body of literature on depression management. The search was limited to RCTs, systematic reviews, and meta-analyses. Additionally, studies were limited to those that used a validated screening tool to identify patients with depression and where patients were not currently receiving treatment for depression. One reviewer screened the database (1,588 citations, with duplicates removed); 9 studies (1 systematic review, 8 RCTs) were included in the final analysis.

Results

Table 6: Interventions to Screen and Treat for Depression in Chronic Disease Populations (Versus Placebo or Usual Care)

Outcome	Population	Measure	Studies	Result ^a	GRADE
Health service utilization	Not reported				
Mortality	HF population	Mortality rate	1 RCT	No significant difference	Moderate
	CAD population	Mortality rate	2 RCTs	No significant difference	Moderate
Clinical measures	Diabetes population	HbA1c	1 RCT	No significant difference	Low
	HF population	Cardiopulmonary performance	1 RCT	No significant difference	Low
		Cardiac event rate	1 RCT	No significant difference	Moderate
	CAD population	Change in LVEF	1 RCT	No significant difference	Moderate
		ECG findings	2 RCTs	No significant difference	Low
		MI rate	3 RCTs	No significant difference	Moderate
Functional status ^b	Not reported				
Nonclinical patient outcomes	Not reported				

Abbreviations: CAD, coronary artery disease; ECG, electrocardiogram; HbA1c, hemoglobin A1c; HF, heart failure; LVEF, left ventricular ejection fraction; MI, myocardial infarction; RCT, randomized controlled trial.

^aAssociation with treatment arm.

^bQuality of life outcomes were not included in this review, as quality of life could be directly affected by treatment for depression.

Cost-Effectiveness

An economic evaluation of the screening and management of depression was not conducted, because no significant clinical benefit was noted for the outcomes of interest.

Conclusions

- Based on low quality evidence, screening and medication management of mild depression in patients with diabetes did not significantly improve blood glucose control (HbA1c).
- Based on low to moderate quality evidence, screening and medication management of depression in patients with heart failure did not significantly affect (improve or worsen) cardiac event rates or mortality (moderate quality) and did not significantly change electrocardiogram (ECG) findings (low quality).
- Based on low to moderate quality evidence, screening and medication management of depression in patients with CAD did not significantly reduce the proportion of those with reduced left ventricular ejection fraction (moderate quality) and did not significantly change ECG findings (low quality).
- Based on moderate quality evidence, screening and medication management of depression in patients with CAD appeared to have a potentially protective effect on MI rates and mortality, but the difference was not statistically significant.

6. Self-Management Support Interventions

Objective of Analysis

The objective of this analysis was to systematically assess the clinical effectiveness of self-management support interventions for persons with chronic diseases.

Intervention

In simplest terms, *self-management* describes what a person does to manage his/her disease, and *self-management support* describes what health care professionals, health care practices, and the health care system provide to assist patients in their self-management. For the purpose of this review, *self-management support* is defined in accordance with the Institute of Medicine as “the systematic provision of education and supportive interventions by health care staff to increase patients’ skills and confidence in managing their health problems, including regular assessment of progress and problems, goal setting, and problem-solving support.” (50)

Self-management support is more than education. One of the goals of these programs is changes in self-efficacy (i.e., an individual’s confidence in managing his/her condition); changes in health care behaviour are secondary. It is believed that changes in self-efficacy directly influence health status, which in turn affects health care utilization. (51)

The Stanford Chronic Disease Self-Management Program

The Stanford Chronic Disease Self-Management Program (CDSMP) is a community-based self-management support program first described by Lorig. (51) It is based on Bandura’s self-efficacy theory, a social cognitive theory that states that successful behaviour change requires confidence in one’s ability to carry out an action (i.e., self-efficacy) and the expectation that a specific goal will be achieved (i.e., outcome expectancy). The CDSMP incorporates strategies suggested by Bandura to enhance self-efficacy.

The exact methodology of the CDSMP differs depending on how it is implemented, but the program typically consists of 6 weekly sessions of 2.5 hours each. Sessions involve groups of 10 to 15 participants and are often conducted in community settings such as churches, senior’s centres, libraries, or hospitals. Sessions are led by 2 trained volunteer laypersons (typically with chronic diseases themselves) who act more as facilitators rather than as lecturers. Rather than prescribing specific behaviour changes, leaders assist participants in making their own disease management choices to reach self-selected goals. (51)

Topics covered in the CDSMP include exercise; use of cognitive symptom management (cognitive stress/pain-reduction techniques such as positive thinking or progressive muscle relaxation); use of community resources; use of medications; dealing with emotions of fear, anger, and depression; communication with others, including health professionals; problem-solving; and decision-making. (51) Exact content, however, may vary depending on how the CDSMP is implemented or adapted. Licensing and training are required in order for external organizations to implement the CDSMP.

Research Question

What is the effectiveness of self-management support interventions for persons with chronic disease compared to usual care?

Included Studies

A literature search was performed on January 15, 2012, that included studies published between January 1, 2000, and January 15, 2012. A January 1, 2000, start date was used because the concept of non-disease-specific/general chronic disease self-management was refined and first published only in 1999. The search was limited to RCTs, systematic reviews, and meta-analyses. Additionally, because of the wide range of literature on disease-specific self-management programs, this review was limited to the general chronic disease population and patients with multiple chronic conditions (assessed subjectively). One reviewer screened the database (6,147 citations, with duplicates removed); 20 studies (1 systematic review, 10 primary RCTs, and 9 secondary analyses of RCTs) were included in the final analysis.

Results

Table 7: Interventions to Improve Self-Management (Versus Usual Care)

Outcome	Population	Measure	Studies	Result ^a	GRADE
Health service utilization	General chronic disease population	Hospitalizations	2 RCTs	Nonsignificant reduction	Very low
		ED visits	4 RCTs	Nonsignificant reduction	Very low
		Days in hospital	5 RCTs	Nonsignificant reduction	Very low
		GP visits	6 RCTs	Nonsignificant reduction	Very low
Mortality		Not reported			
Clinical measures		Pain, disability, fatigue, depression, health distress, self-rated health	4–6 RCTs (depending on outcome)	Significant improvements	Low
		Dyspnea	4 (RCTs)	Nonsignificant reduction	Very low
QOL/functional status		HRQOL	2 RCTs	Significant improvement	Moderate
Nonclinical patient outcomes		Self-efficacy	6 RCTs	Significant improvement	Low
		Health behaviours	3–6 RCTs (depending on outcome)	Significant improvements in exercise tolerance, cognitive symptom management, and communication with health professionals	Low

Abbreviations: ED, emergency department; GP, general practitioner; HRQOL, health-related quality of life; QOL, quality of life; RCT, randomized controlled trial.

^aAssociation with treatment arm.

Cost-Effectiveness

An economic evaluation of self-management support interventions was not conducted, because the intervention was evaluated in a multimorbid population and not in 1 of the cohorts for which economic models were developed.

Conclusions

- Based on low quality evidence, the Stanford CDSMP led to statistically significant, albeit clinically minimal, short-term (median 6 months) improvements across a number of health status measures, in healthy behaviours, and self-efficacy compared to usual care.
- Based on very low quality evidence, there was no significant difference between the CDSMP and usual care in short-term (median 6 months) health care utilization and across some HRQOL scales.
- Based on moderate quality evidence, the Stanford CDSMP led to statistically significant, albeit clinically minimal, short-term (median 6 months) improvement in EQ-5D score compared to usual care.
- More research is needed to explore the long-term (12 months and greater) effect of self-management support interventions across outcomes and to explore the impact of self-management support interventions on clinical outcomes.
- Exploratory evidence suggests that some subgroups of persons with chronic conditions may respond better to the CDSMP; however, there is considerable uncertainty, and more research is needed to better identify responders and nonresponders.

7. Specialized Nursing Practice

Objective of Analysis

The objective of this review was to determine the effectiveness of specialized nurses who have a clinical role in patient care in optimizing chronic disease management among adults in the primary health care setting.

Intervention

There is considerable variation between and within countries regarding the specific job title, education, and experience of nurses. For the purposes of this review, *specialized nursing practice* is used to define nurses with enhanced training, experience, and/or scope of clinical practice, or nurses with a primary clinical role in the care of patients with chronic disease. This includes advanced practice nurses, nurse diabetes educators, respiratory nurse specialists, cardiac nurse specialists, or geriatric nurse specialists.

In Ontario, registered nurses receive training at the baccalaureate level. (52) The Canadian Nursing Association defines specialization in nursing as “a focus on 1 field of nursing practice or health care that encompasses a level of knowledge and skill in a particular aspect of nursing greater than that acquired during basic nursing education.” (53) Additionally, there are 2 types of advanced practice nurses—clinical nurse specialists and nurse practitioners—who have an advanced level of clinical nursing practice based on graduate education preparation, as well as in-depth knowledge and expertise in meeting the health care needs of individuals, families, groups, communities, and populations. (54) Clinical nurse specialists are registered nurses who receive additional training with a Master’s in a clinical nursing speciality. Nurse practitioners are defined as “registered nurses with additional educational preparation and experience who possess and demonstrate the competencies to autonomously diagnose, order and interpret diagnostic tests, prescribe pharmaceuticals, and perform specific procedures within their legislated scope of practice.”

Specialized nurses can supplement or substitute aspects of care provided by physicians in the primary health care setting. When substituting care, specialized nurses provide the same services as physicians, with the intent of reducing physician workload and improving health care efficiency. Supplementation refers to specialized nurses providing services that may extend or complement care provided by the physicians, thereby improving patient quality of care and outcomes.

This review of specialized nursing looked at 2 models of nursing care. Model 1 compared the effectiveness of specialized nurses working independently (alone) versus primary care physicians. This model was evaluated based on comparable outcomes between nurses and physicians (usual care); it aims to improve efficiency by directly substituting a specialized nurse in the role of the physician. In Model 2, specialized nurses worked in teams with physicians compared to physicians alone or usual care. This model was evaluated based on increased effectiveness or improved health care efficiency with the addition of specialized nurses to the primary care team.

Research Question

What is the effectiveness of specialized nursing practice in comparison to usual care in improving patient outcomes and health system efficiencies for chronic disease management in the primary health care setting?

Included Studies

A literature search was performed on May 3, 2012, that included studies published up to May 3, 2012. The search was limited to RCTs and systematic reviews. Additionally, studies were limited to those that evaluated specialized nurses performing a clinical role in patient care in community-based primary care settings. One reviewer screened the database (3,252 citations, with duplicates removed); 8 studies (7 RCTs and 1 sub-group analysis of an RCT) were included in the final analysis.

Results

Table 8: Specialized Nursing Care, Model 1 (Versus Physician Care)

Outcome	Population	Measure	Studies	Result	GRADE
Health service utilization	General population	Hospitalizations, ED visits, specialist visits, primary care visits	1 RCT	No significant differences between arms	Moderate
	Diabetes population (subgroup of above study)	Hospitalizations, ED visits, specialist visits, primary care visits	1 RCT (subgroup)	No significant differences between arms	Very low
Mortality	Not reported				
Clinical measures	General population	BP, peak flow (oxygen)	1 RCT	No significant difference in peak flow or SBP; significant reduction in DBP	Very low
	Diabetes population (subgroup of above study)	HbA1c	1 RCT (subgroup)	No significant difference between arms	Very low
QOL/functional status	General population	SF-36	1 RCT	No significant difference between arms	Moderate
	Diabetes population (subgroup of above study)	SF-36	1 RCT (subgroup)	No significant difference between arms	Very low
Nonclinical patient outcomes	Not reported				

Abbreviations: BP, blood pressure; DBP, diastolic blood pressure; ED, emergency department; HbA1c, hemoglobin A1c; QOL, quality of life; RCT, randomized controlled trial; SBP, systolic blood pressure; SF-36, Short-Form (36) Health Survey.

Table 9: Specialized Nursing Care Plus Physician Care, Model 2 (Versus Physician Care Alone or Usual Care)

Outcome	Population	Measure	Studies	Result ^a	GRADE
Health service utilization	Diabetes population	Number of visits	1 RCT	Significant increase	Low
	CAD population	Hospitalizations (all-cause)	1 RCT	Significant decrease	Low
		LOS	1 RCT	No difference	Low
Mortality	Not reported				
Clinical measures	Diabetes population	HbA1c	1 RCT	Significant decrease	Moderate
		% of patients below target (HbA1c, BP, cholesterol)	2 RCTs	No difference	Low
	CAD population	% of patients below target (BP, cholesterol)	1 RCT	Significant increase	Moderate
		% of patients with improved lifestyle control (physical activity, low-fat diet)	1 RCT	Significant increase	Low
		% of patients who stopped smoking	1 RCT	No difference	Low
QOL/functional status	Diabetes population	HRQOL	2 RCTs	Inconclusive; inconsistent findings across studies	Low
	CAD population	HRQOL	2 RCTs	Inconclusive; inconsistent findings across studies, but significant improvement in a number of subscales	Moderate
Nonclinical patient outcomes	Diabetes population	Patient satisfaction	1 RCT	Significant increase	Moderate

Abbreviations: BP, blood pressure; CAD, coronary artery disease; HbA1c, hemoglobin A1c; HRQOL, health-related quality of life; LOS, length of stay; QOL, quality of life; RCT, randomized controlled trial.

^aAssociation with nursing arm.

The report also included a summary of the effect of specialized nursing care (Models 1 and 2) on processes of care; there was little to no impact (positive or negative) on efficiency.

Cost-Effectiveness

The review of specialized nursing alone (Model 1) found the intervention to be associated with significant clinical benefit in patients with diabetes. An evaluation of the cost-effectiveness of the intervention in a diabetes cohort found that specialized nursing alone (Model 1) for chronic disease management was dominant compared to usual care.

The review of specialized nursing plus physicians (Model 2) found the intervention to be associated with significant clinical benefit in patients with diabetes and CAD. An evaluation of the cost-effectiveness of the intervention found that specialized nursing plus physicians (Model 2) for chronic disease management was dominant compared to usual care.

Conclusions

Model 1: Specialized Nursing Care Versus Physician Care

- Based on moderate quality evidence, there was no significant difference among patients receiving primary health care from nurse practitioners (NPs) in comparison to physicians alone for health resource utilization, including hospitalizations, ED or urgent care visits, specialist visits, or primary care visits.
- Based on moderate quality evidence, there was no significant difference among patients receiving primary health care from NPs in comparison to physicians alone for HRQOL (SF-36) or patient satisfaction.
- Based on very low quality evidence, there was no significant difference among diabetes patients receiving primary health care from NPs in comparison to physicians alone for health resource utilization, including hospitalizations, ED or urgent care visits, specialist visits, or primary care visits.
- Based on very low quality evidence, there was no significant difference among diabetes patients receiving primary health care from NPs in comparison to physicians alone for blood glucose control (HbA1c).
- Results from the EBA found specialized nurses providing autonomous patient care to a primary health care population oversampled with chronic disease demonstrated comparable outcomes to physician care alone. Outcomes were similarly comparable among the subgroup of patients with diabetes. Specialized nurses in this model most closely resemble NPs in the Ontario context.

Model 2: Specialized Nursing Care Plus Physician Care Versus Physician Care Alone

- Based on low quality evidence in a diabetes population, specialized nurses plus physicians in comparison to usual care were associated with a significant increase in the number of visits to primary health care.
- Based on low quality evidence in a CAD population, specialized nurses plus physicians in comparison to usual care were associated with a significant reduction in all-cause hospitalizations, but no difference in length of hospital stay.
- Based on moderate quality evidence, specialized nurses plus physicians in comparison to usual care were associated with a significantly higher proportion of patients achieving threshold blood pressure and/or cholesterol levels (CAD/CVD population) and significantly lower HbA1c (diabetes population).
- Based on moderate quality evidence in a CAD or congestive heart failure population, specialized nurses plus physicians in comparison to usual care were associated with a significantly higher proportion of patients with appropriate blood pressure and/or cholesterol management as well as a significant increase in the number of clinical examinations for blood pressure, body mass index and smoking status, but no difference in cholesterol examinations. There was also a significant increase in the number of echocardiography assessments for confirmation of heart failure among unconfirmed cases and a significant increase in the number of MI patients who were prescribed beta blockers but no difference in the number of prescriptions for angiotensin-converting enzyme inhibitors.
- Based on low quality evidence, CAD patients receiving care in Model 2 versus usual care were also significantly more likely to achieve lifestyle control related to physical activity and a low-fat diet, but there was no difference between the intervention and control arms in the proportion of patients who were nonsmokers.
- Based on moderate quality evidence in a diabetes population, specialized nurses plus physicians in comparison to usual care were associated with a significantly higher proportion of patients

receiving foot examinations and intensification of drug therapy among patients with uncontrolled HbA1c or uncontrolled blood pressure, but no difference in intensification of therapy for patients with uncontrolled cholesterol levels.

- Based on moderate quality evidence in a diabetes population, specialized nurses plus physicians in comparison to usual care were associated with significantly greater patient satisfaction.
- Based on low quality evidence, there was no difference between specialized nurses plus physicians and usual care for number of physician consultations or objective and subjective physician workload.
- Based on moderate to low quality evidence, for most QOL measures and populations, the findings were inconsistent or indeterminate when comparing specialized nurses plus physicians and usual care.

8. Electronic Tools for Health Information Exchange

Objective of Analysis

The objective of this analysis was to examine the impact of eTools for health information exchange in the context of care coordination for individuals with chronic disease in the community.

Intervention

Care coordination is increasingly being conducted using computer-based programs to facilitate information transfer and shared care. (55) There are a number of perceived potential benefits to this approach, including improved provider communication and coordination as a result of standardized documentation, and speed of availability. (56;57) However, some health care providers are hesitant to adopt computer-assisted management; reasons for concern include security and privacy issues, depersonalization of care, and the up-front costs of incorporating an electronic system. (58)

The use of eTools for health information exchange ranges from a single point of information exchange between 2 health care providers to real-time complete sharing of patient electronic medical records between everyone involved in a patient's care. The benefit of this kind of use of eTools is that it allows for information to be shared in an accurate and timely manner with laboratories, pharmacies, and health care providers as patients transition between providers and care settings. Electronic tools can improve informational continuity and facilitate care coordination.

The adoption of electronic medical and health records has been steadily on the rise. One study of use in general practices across 10 countries (8 European nations, Australia, and New Zealand) found that nearly all physicians in these countries had computers (90% to 100%). Overall, the most common application was medication prescribing and monitoring, whether or not it was a mandated component of government regulations. (59)

Research Questions

What is the impact of eTools for health information exchange on patient outcomes and health services utilization when used to improve the care coordination of adults with chronic disease? What specifications of eTools contribute to their effectiveness?

Included Studies

A literature search was performed on April 26, 2012, that included studies published before this date. The search excluded studies where eTools facilitated communication between providers and patients or patient self-monitoring devices and studies that focused on eTools to facilitate improved management of care within a single-provider practice. One reviewer screened the database (2,723 citations, with duplicates removed); 11 studies (4 RCTs and 7 observational studies) were included in the final analysis.

Results

Table 10: eTools to Improve Health Information Exchange (Versus Usual Care)

Outcome	Population	Measure	Studies	Result	GRADE
Health service utilization	Diabetes population	Hospitalizations	1 RCT	Significant reduction	Moderate
		ED visits	1 RCT	Significant reduction	Moderate
		LOS, days	1 RCT	Significant reduction	Moderate
	General population (discharged from hospital)	Rate of readmission	1 RCT	No difference	High
Mortality	Not reported				
Clinical measures	Diabetes population	Change in HbA1c	1 RCT, 1 observational study	No difference	Low to very low
		BP	1 RCT	No difference	Low
		Lipid levels	2 RCTs	No difference	Low
	General population (discharged from hospital)	Adverse event rate	1 RCT	No difference	High
QOL/functional status	Not reported				
Nonclinical patient outcomes	Not reported				

Abbreviations: BP, blood pressure; ED, emergency department; eTool, electronic tool; HbA1c, hemoglobin A1c; LOS, length of stay; QOL, quality of life; RCT, randomized controlled trial.

All process-of-care measures reported were related to the frequency with which certain tests or examinations were conducted (or recorded). Results for this group of outcomes were inconclusive, and in general the quality of the evidence was very low. Additionally, there was no observed trend of an impact based on the disease-specific groupings of patients, the care coordination aspect targeted, or the technology applied.

With respect to measures of efficiency, there was evidence that electronic discharge summaries were received in as timely a manner as paper-based discharge summaries (i.e., electronic communication did not affect the time to receipt). While there were some significant increases in time spent with patients and communication from consultants to general practitioners, the interpretation of these effects was unclear. Overall, the evidence did not demonstrate improved efficiency; generally the quality of evidence was very low, although a few outcomes were associated with moderate to high quality evidence.

Cost-Effectiveness

The review of electronic tools for health information exchange found the intervention to be associated with significant clinical benefit in patients with diabetes. An evaluation of the cost-effectiveness of the intervention in a diabetes cohort found it to be dominant compared to usual care.

Conclusions

- Based on moderate quality evidence, when an automated laboratory results report with clinical alerts mapped to guidelines was shared with primary care, there was evidence of a significant reduction in hospitalization rates, ED visits, and hospital LOS.
- Based on high to very low quality evidence, the implementation of eTools for health information exchange did not result in improvements in clinical measures, including adverse event rates (high quality evidence), blood pressure levels (low quality evidence), lipid levels (low quality evidence), or HbA1c levels (very low quality evidence). The evidence was inconclusive about the impact of eTools on achievement of threshold levels for clinical measures such as body mass index, lipids, HbA1c, and smoking status.
- Based on low to very low quality evidence, eTools for health information exchange had a variable impact on process-of-care measures. There was no trend for any specific disease, technology, or care coordination aspect examined.
 - There was low to very low quality evidence of a significant improvement in number of foot examinations, fructosamine tests, weight and height measurements, blood pressure examinations, vaccinations and immunizations, eye examinations, and medication management of beta-blockers.
 - There was moderate to very low quality evidence of no difference in changes in statin prescriptions, blood glucose tests, lipid tests, or medication management of a variety of cardiac drugs.
 - There was inconclusive evidence (low to very low quality) of an impact on kidney management, behavioural interventions, and composite outcomes of processes of care.
- Based on high to very low quality evidence, there was no improved efficiency for care providers following the implementation of eTools for health information exchange, including no difference in the proportion of primary care physicians receiving discharge summaries using electronic transfer versus paper transfer (high quality evidence) and no evidence of increased efficiencies related to time or communication (moderate to very low quality evidence).
- The findings from this EBA call into question the ability of eTools to independently improve the quality of outpatient care coordination. Although automation is intended to facilitate consistency in application and measurement, eTools may not be able to overcome underlying process inefficiencies.

9. Health Technologies

Objective of Analysis

The purpose of this review was to identify health technologies evaluated by the Medical Advisory Secretariat between 2006 and 2011 that can effectively improve the management of chronic disease in the community.

Selection of Evidence-Based Analyses

Inclusion Criteria

A review was conducted of *Ontario Health Technology Assessment Series* reports published between January 1, 2006, and December 31, 2011. (60) Field evaluations conducted by the Programs for Assessment of Technologies in Health and the Toronto Health Economics and Technology Assessment Collaborative were also reviewed. (61;61) EBAs were independently reviewed to identify health technologies that aligned with the objective of improving chronic disease management, with a focus on those in the 7 areas of interest (type 2 diabetes, CAD, atrial fibrillation, COPD, congestive heart failure, stroke, and chronic wounds).

EBAs were initially selected based on information in the title and executive summary. The full texts of potentially relevant analyses were then reviewed. Analyses of technologies that led to statistically or clinically significant improvement on chronic disease management (with moderate to high quality evidence for at least 1 of the primary outcomes based on the reported GRADE), or that were cost-effective, were included.

Exclusion Criteria

Analyses related to the screening or monitoring of disease were excluded. Analyses related to multidisciplinary care, rehabilitation programs, and self-management were excluded, because they are discussed as part of the Optimizing Chronic Disease Management in the Community (Outpatient) Setting mega-analysis or other recently completed mega-analyses (specialized community-based care and COPD).

Included Studies

The search yielded 97 publications completed between January 1, 2006, and December 31, 2011. A total of 9 health technologies were identified for review. Additionally, 1 health technology assessment evaluating photoselective vaporization of the prostate was included based on the results of an ongoing field evaluation, which demonstrated a significant reduction in hospitalizations and associated cost savings. As well, 1 EBA evaluating implantable cardioverter defibrillators from 2005 was included due to ongoing data collection resulting from an OHTAC recommendation.

Results

The review of previous EBAs identified a number of technologies that can be incorporated into chronic disease management to prevent, cure, and treat chronic diseases (see Table 11).

Table 11: Summary of Results from Evidence-Based Analyses

Disease	Health Technology	Mortality	Hospital Utilization		Health Quality	Disease-Specific Measures	Economic Evaluation ^a
			LOS	Hospitalizations			
Technologies for the Cure of Disease							
Diabetes	Bariatric surgery for people with diabetes and morbid obesity	—	—	—	—	Resolution of diabetes (76.8%; 95% CI 70.7–82.9) <i>GRADE: Moderate</i> Clinically significant reduction in HbA1c (–2.7%; range –5.0 to –0.70) <i>GRADE: Moderate</i>	ICER: \$15,697/QALY <i>Complications avoided</i> Heart disease: 2,757 MI: 13,839 HF: 31,137 Stroke: 8,957 Amputation: 2,997 Blindness: 4,179 Renal failure: 17
Atrial Fibrillation	First-line treatment of ablation for AF of flutter (vs. drug therapy)	—	—	—	Significant improvement <i>GRADE: NR</i>	Significant freedom from arrhythmia (RR 0.24; 95% CI 0.09–0.59) <i>GRADE: Moderate</i>	Annual cost savings per patient starting from 4.5 years post-ablation forward
	Ablation for drug-refractory AF when no other heart surgery required (vs. drug therapy)	—	—	—	Significant improvement ($P < 0.05$) <i>GRADE: NR</i>	Significant freedom from arrhythmia (RR 0.32; 95% CI 0.21–0.43) <i>GRADE: Moderate</i>	—
	Ablation for drug-refractory AF when additional heart surgery required (vs. heart surgery alone)	—	—	—	No difference <i>GRADE: NR</i>	Significant freedom from arrhythmia (range RR 0.13–0.53) <i>GRADE: Moderate–High</i>	—
Technologies for the Prevention of Disease							
Chronic Wounds	Alternative foam mattresses (vs. standard mattresses)	—	—	—	—	Significant prevention of pressure ulcers (RR 0.31; 95% CI 0.21–0.46) <i>GRADE: Moderate</i>	ICER: \$6,328/QALY (in LTC) Annual pressure ulcer-related cost savings: \$17.3 million Pressure ulcer cases averted: 2,984
	Repositioning every 4 hours plus a alternative foam mattress (vs. 2–3 h)	—	—	—	—	Significant prevention of pressure ulcers (RR 0.70; 95% CI 0.52–0.93) <i>GRADE: Low</i>	ICER: \$5,234/QALY (in LTC) (Dominant when also assuming a reduction in personal support worker time) Annual pressure ulcer-related cost savings: \$19.7 million Pressure ulcer cases averted: 3,381 Projected 47% reduction in pressure ulcer-related deaths over 5 years

Disease	Health Technology	Mortality	Hospital Utilization		Health Quality	Disease-Specific Measures	Economic Evaluation ^a
			LOS	Hospitalizations			
	Dry vesico-elastic polymer pad (gel pad) (vs. standard mattress)	—	—	—	—	Significant prevention of pressure ulcers for surgeries > 90 minutes (RR 0.53; 95% CI 0.33–0.85) <i>GRADE: Low</i>	ICER: Dominant (in operating room) Annual pressure ulcer-related cost savings: \$26 million–\$29 million Pressure ulcer cases avoided: 4,233-4,868 Projected no change in absolute life expectancy
Technologies for the Management of Disease							
Coronary Artery Disease	Primary PCI (vs. in-hospital thrombolysis)	No difference (OR 0.87; 95% CI 0.61–1.24) <i>GRADE: Moderate</i>	—	—	—	Significant reduction in composite outcome of mortality, reinfarction, and stroke (OR 0.56; 95% CI 0.42–0.75) <i>GRADE: Moderate</i>	Cost savings per capita: \$2,820–\$5,259
	Routine early PCI (vs. thrombolysis and rescue PCI as needed)	No difference (OR 0.73; 95% CI 0.47–1.14) <i>GRADE: Moderate</i>	—	—	—	Significant reduction in composite outcome of mortality, reinfarction, and stroke (OR 0.64; 95% CI 0.49–0.83) <i>GRADE: Moderate</i>	—
Chronic Obstructive Pulmonary Disease	Influenza vaccination ^b (vs. no vaccination)	—	—	No difference (RR 0.41; 95% CI 0.08–2.02) <i>GRADE: Low</i>	—	Significant reduction in ARI (RR 0.2; 95% CI 0.06–0.70) <i>GRADE: High</i> No difference in mechanical ventilation (RR 0.15; 95% CI 0.01–2.75) <i>GRADE: Low</i>	—
	Pneumococcal vaccination ^b (vs. no vaccination)	No difference <i>GRADE: NR</i>	No difference (P = 0.16) <i>GRADE: NR</i>	No difference (P = 0.59) <i>GRADE: Low</i>	—	Significant 1.7% reduction in pneumococcal pneumonia (P = 0.025) <i>GRADE: High</i> Significant reduction in CAP among < 65 years (RR 0.24; 95% CI 0.07–0.80) <i>GRADE: NR</i>	—
	Smoking cessation ^b strategies, including a combination of counselling, NRT, and antidepressants (vs. usual care or placebo)	—	—	—	—	Significant improvement in prolonged smoking abstinence (range RR 2.01–7.70, depending on intervention) <i>GRADE: Moderate</i>	ICER: Dominant for all cessation strategies modelled Budget impact for Ontario to fund NRT: \$10.4 million

Disease	Health Technology	Mortality	Hospital Utilization		Health Quality	Disease-Specific Measures	Economic Evaluation ^a
			LOS	Hospitalizations			
	NPPV + usual care (vs. usual care)	Significant reduction (RR 0.53; 95% CI 0.35–0.81) GRADE: Moderate	Significant reduction (WMD –2.68; 95% CI –4.41 to –0.94) GRADE: Moderate	—	No significant difference in quality of sleep and general well-being GRADE: NR	Significant reduction in endotracheal intubation (RR 0.38 (95% CI 0.28–0.50) GRADE: Moderate Fewer complications GRADE: Low	ICER: Dominant Cost savings to Ontario from hospital perspective: \$42 million
	Weaning from IMV using NPPV (vs. IMV)	Significant reduction (RR 0.47; 95% CI 0.23–0.97) GRADE: Moderate	No difference (WMD –5.21; 95% CI –11.60 to 1.18) GRADE: Low	—	Poor sleep quality in NPPV group GRADE: NR	No difference in duration of mechanical ventilation (WMD –3.55; 95% CI –8.55 to 1.44) GRADE: Low Significant reduction in weaning failure GRADE: Moderate Significant reduction in nosocomial pneumonia (RR 0.14; 95% CI 0.03–0.71) GRADE: Moderate	ICER: Dominant Cost savings to Ontario from hospital perspective: \$12 million
Congestive Heart Failure	ICD (vs. conventional therapy)	Significant reduction (range HR 0.46–0.77) GRADE: Low–Moderate	—	—	—	—	ICER: \$34,000/QALY–\$70,200/QALY (US) Total cost: \$156 million–\$770 million
Stroke	CIMT (vs. usual care)	—	—	—	No difference in HRQOL GRADE: Very low No difference in functional status GRADE: Low Significantly improved perceived arm motor function, quality of use (MD 0.97; 95% CI 0.7–1.3) and amount of use (MD 1.1; 95% CI 0.6–1.7) GRADE: Low	Significant improvement in measured arm motor function (ARAT MD 13.6; 95% CI 8.7–18.6) and decreased impairment (FMA MD 6.5; 95% CI 2.3–10.7) GRADE: Low–Moderate	Average annual implementation cost: \$0.46 million–\$0.97 million
Chronic Wounds	NPWT (vs. usual care)	—	Significant reduction of 3.5 days among patients with a skin graft (P = 0.01) GRADE: NR	—	First week: lower (P = 0.031) End of study: no difference GRADE: NR	Significantly greater proportion of complete wound closure (P < 0.05) GRADE: Moderate Significantly greater graft survival (P = 0.01) and less graft loss (P < 0.001) GRADE: NR	Annual cost savings: \$1,571 (US) —\$12,852 (US), per patient

Disease	Health Technology	Mortality	Hospital Utilization		Health Quality	Disease-Specific Measures	Economic Evaluation ^a
			LOS	Hospitalizations			
Benign Prostatic Hyperplasia	PVP (vs. TURP)	—	Significant reduction (PVP 2 days, TURP 2.5 days)	Significant reduction (PVP 7.1%, TURP 100%)	No difference	No difference	ICER: dominant Annual cost savings: \$6 million Hospitalizations avoided: 4,644 hospital admissions, 11,790 bed days

Abbreviations: AF, atrial fibrillation; ARAT, action research arm test; ARI, acute respiratory illness; CAP, community-acquired pneumonia; CI, confidence interval; CIMT, constraint-induced movement therapy; COPD, chronic obstructive pulmonary disease; FMA, Fugl-Meyer motor assessment; HR, hazard ratio; HbA1c, hemoglobin A1c; HF, heart failure; HRQOL, health-related quality of life; ICD, implantable cardioverter defibrillator; ICER, incremental cost-effectiveness ratio; IMV, invasive mechanical ventilation; LOS, length of stay; LTC, long-term care; MD, mean difference; MI, myocardial infarction; NPPV, noninvasive positive pressure ventilation; NPWT, negative pressure wound therapy; NR, not reported; NRT, nicotine replacement therapy; OR, odds ratio; PCI, percutaneous coronary intervention; PVP, photoselective vaporization of the prostate; QALY, quality-adjusted life-year; RR, relative risk; TURP, transurethral resection of the prostate; WMD, weighted mean difference.

^aAll costs in Canadian dollars unless otherwise stated.

^bManages COPD by preventing potentially complex adverse events.

Conclusions

- The impact of new health technologies used in chronic disease management to optimize patient outcomes and hospitalization rates is often overlooked. Based on high to moderate quality evidence, this analysis demonstrates that health technologies can:
 - reduce the burden of illness and improve patient outcomes
 - reduce resource utilization intensity, and are often cost-effective
 - be a viable contributing factor to chronic disease management in the community

10. Aging in the Community

Early on, a gap in the evidence reviews was identified: the lack of evidence for interventions that could reduce admissions to LTC facilities. The Medical Advisory Secretariat completed a review in 2008 titled *Aging in the Community* that addressed this gap. (62)

Objective of the Review

To identify interventions (e.g., devices and programs) that are effective at enabling seniors to live healthfully and independently in the community.

Research Questions

What are the main *modifiable* predictors of admission to an LTC home in Ontario? What interventions (e.g., devices and programs) are effective at targeting these predictors, and thus potentially delaying the transition from community-based living to LTC home admission?

Methods

Based on a literature review of the predictors of LTC admission as well as consultations with experts, 4 key predictors were identified for further research:

- falls and fall-related injuries
- urinary incontinence
- dementia
- social isolation

Interventions to address each predictor were evaluated to identify effective means of addressing these factors. Table 12 provides a summary of the results and the GRADE quality of evidence.

Table 12: Summary of Results from Aging in the Community Review

Intervention	Target Population ^a (Ontario)	Risk Estimate (95% CI)	Staffing Requirement	GRADE
Falls and fall-related injuries Community exercise programs—untargeted, long duration	Mobile seniors N = 476,992	RR = 0.76 (0.64–0.91)	PT	Moderate
Social isolation Community exercise and education programs	Mobile seniors N = 476,992	Mean loneliness score change = 0.3 ($P < 0.01$) Activity change score = 2.0 ($P < 0.01$)	RT, OT, or PT	Moderate
Urinary incontinence Patient-directed behavioural techniques (PFMT only) (home and clinic)	Seniors with urinary incontinence N = 196,011	Number of incontinent episodes per week: WMD = 10.50 (4.30–16.70)	PT	Moderate
Dementia Patient-directed exercise program (in-home visit)	Seniors with mild/moderate dementia N = 38,696	Effect size = 0.62 (0.55–0.70)	OT, PT, PSW, or RT	Moderate
Falls and fall-related injuries Environmental modifications (high-risk elderly)	High-risk elderly N = 271,980	RR = 0.66 (0.54–0.81)	OT	High
Falls and fall-related injuries Vitamin D + calcium supplementation	Women at risk for osteopenia N = 477,662	RR = 0.83 (0.73–0.95)	None	Moderate
Urinary incontinence Patient-directed multicomponent behavioural techniques ^b	Mobile, motivated seniors with urinary incontinence N = 196,011	Number of incontinent episodes per week: WMD = 3.63 (2.07–5.19)	NCA	Moderate
Dementia Caregiver-directed behavioural techniques	Caregivers of seniors with dementia N = 56,629	Not estimable	OT or nurse	Moderate
Dementia Caregiver- and patient-directed behavioural techniques	Seniors with dementia and their caregivers N = 56,629	Caregiver burden: NNT = 2.5 (2.3–2.7) Patient (motor/process skills): NNT = 1.3 (1.2–1.4) Patient (deterioration in ADLs): NNT = 1.5 (1.4–1.6)	OT or nurse	Moderate

Abbreviations: ADL, activity of daily living; OT, occupational therapist; PT, physiotherapist; NCA, nurse continence advisor; NNT, number needed to treat; PFMT, pelvic floor muscle training; PSW, personal support worker; RR, relative risk; RT, recreational therapist; WMD, weighted mean difference.
^aPopulation adjusted for percentage willing to participate as derived in individual systematic reviews.
^bIncludes a combination of bladder training techniques, pelvic floor muscle training (\pm biofeedback), education on bladder control strategies, self-monitoring.

Conclusions

- Based on moderate to high quality evidence, interventions that treat or reduce the risk of falls, urinary incontinence, dementia, or social isolation can improve health outcomes in the community-dwelling elderly.
- Based on moderate to high quality evidence, regular exercise can significantly improve health outcomes in the community-dwelling elderly through the primary or secondary prevention of falls, urinary incontinence (using pelvic floor muscle training), dementia, and social isolation.

OHTAC Recommendations

General Recommendations

Exercise Interventions

- The province should engage in high-profile health promotion activities to encourage regular exercise for the community-dwelling elderly.
- The province should build on existing strategies and adopt new innovative strategies that promote ease of access to exercise/exercise programs for the community-dwelling elderly.

Caregiver-Directed Programs

- Given the key role that caregivers play in sustaining elderly living in the community, education, support, and relief programs for caregivers should be a priority.

Falls and Fall-Related Injuries

- In addition to exercise, the following interventions should be made available to or promoted for use by the community-dwelling elderly:
 - environmental modifications in high-risk populations
 - vitamin D + calcium supplementation in women
 - use of gait-stabilizing devices outdoors in the mobile elderly

Urinary Incontinence

- The province should consider increasing access to nurse continence advisors, possibly through multimodal community-based clinics that offer multicomponent (including pelvic floor muscle training) behavioural interventions.

Dementia

In addition to exercise for the primary and secondary prevention of dementia, the following interventions should be made available for community-dwelling elderly and their caregivers:

- behavioural management interventions: interventions designed to help the caregiver manage the behavioural and psychological symptoms of dementia (i.e., agitation, depression, anxiety, sleep disorders)
- multicomponent interventions: interventions encompassing ≥ 2 supportive interventions that address the complex needs of caregivers (i.e., education + counselling + behavioural management)

Social Isolation

- Community-based exercise programs combined with informal opportunities to share information should be made available for the community-dwelling elderly.

Qualitative Meta-Syntheses

Four qualitative reports focused on patient-centredness and vulnerability provided additional context to the reviews and synthesis. This section provides a summary of the findings for each report. For complete descriptions of methods and results, please refer to the individual reports.

How Diet Modification Challenges Are Magnified in Vulnerable or Marginalized People With Diabetes and Heart Disease

This report synthesized the qualitative evidence on the diet modification challenges faced by patients with diabetes and/or heart disease. It also compared the challenges faced by patients who are members of vulnerable and nonvulnerable groups. The review included 65 primary qualitative studies.

Five challenges were identified that are common to all patients making dietary modifications: self-discipline, knowledge, coping with every day stress, negotiating with family members, and managing the social significance of food. In vulnerable populations (e.g., ethnic minorities, those who do not speak English as a first language, those with less educational attainment or lower incomes, and patients from underserved or rural areas), such challenges are often magnified by other issues, such as difficulty reading or understanding labelling, limited access to healthy foods, or cultural expectations related to food.

This review has implications for the analysis of self-management support interventions and the implementation of self-management programs. It suggests that for programs to be effective, they should take into consideration the challenges faced by specific subpopulations and offer flexible solutions for these groups.

Chronic Disease Patients' Experiences With Accessing Health Care in Rural and Remote Areas

This report synthesized qualitative research on the advantages and disadvantage rural patients with chronic diseases face when accessing both rural and distant health care. The review included 12 primary qualitative studies.

Three major themes emerged: geography, availability of health care providers, and rural culture. Geography was associated with barriers to access such as distance, isolation, weather, and transportation. The studies suggest that rurally located services can mitigate these issues and improve access to health care professionals. A lack of access to locally situated primary and specialty services can leave patients feeling powerless. Additional cultural or educational barriers can exacerbate these feelings; for patients who have to travel for care, the attitudes of urban providers may leave them feeling like “country bumpkins,” increasing patients’ reluctance to seek distant care. Rural patients appreciated long-term relationships with health care providers that were personalized by familiarity; this was more consistent with locally provided care. A culture of self-reliance and community belonging in rural areas meant patients were further inclined to go without care.

This review has implications for the analyses of continuity of care, advanced access, and specialized nursing practice. The primary implications stem from rural patients’ perspectives on the health system, identification of health system structural problems (such as referral processes), and cultural aspects of health care access in both rural and urban settings.

Patient Experiences of Depression and Anxiety With Chronic Disease

This review examined the empirical qualitative research on the experiences of patients with chronic disease and comorbid depression or anxiety and highlighted the implications of screening on the management of anxiety and/or depression. The review included 20 primary qualitative studies.

Patients experience chronic disease and anxiety or depression as either 2 coincidental, but independent issues, or as interrelated conditions (either the chronic condition led to depression, or vice versa, or both). The overlap of symptoms has implications for identifying depression/anxiety and management, either by clinicians or by patients. This sometimes has the perverse effect of “normalizing” the depression symptoms by making them part of the chronic disease (e.g., sleeplessness, lack of appetite). Additionally, patients can experience uncertainty and anxiety about the future, loss of self, feelings of social isolation, and loss of relationships as a result of a chronic disease diagnosis, which may precipitate at least a temporary depression. Some patients also feel a sense of guilt for behaviours that may have led to the development of a chronic disease (e.g., lack of activity or smoking). For some chronic diseases, the relationship with depression/anxiety is cyclical; for example, patients with COPD who experience acute exacerbations may also have associated exacerbations of anxiety or depression with the fear of worsening disease.

This review has implications for the analysis of depression screening and supports the recommendation that physicians should maintain a higher level of suspicion for depression in patients with chronic diseases, but that mental health issues should not be addressed in isolation. This recommendation also has potential implications for physician education; patient context is important.

Experiences of Patient-Centredness With Specialized Community-Based Care

This review synthesized the qualitative research on patient and provider experiences of specialized community-based care (SCBC) interventions and health care delivery models, using the lens of patient-centredness. The review included 29 primary qualitative studies.

Three main themes emerged: patients’ health beliefs affect their participation in SCBC interventions; patients’ experiences with community-based care differ from their experiences with hospital-based care; and patients and providers value the role of nurses differently in community-based chronic disease care. Patients who participated in SCBC interventions valued the education and self-management that they gained from it, but the information that was provided had to be provided in a meaningful, appropriate way. Patients were happy to develop longer and stronger relationships with their SCBC providers, in contrast to hospital settings, where care was often more disease-focused than patient-focused. SCBC programs often had the advantage of creating communities and relationships with other patients; this helped in some cases address issues of social isolation.

This review has implications specifically for the review on specialized community based care (63) and some community interventions, such as rehabilitation and self-management programs. Much of what is reported applies to how these programs are developed and implemented and the considerations for staffing, location, and content.

Contextualization

An expert panel was engaged to provide guidance and frame the context of the EBA and synthesis findings. The panel met 4 times over 1 year to comment on the scope of the work, the findings of the individual EBAs, the synthesis, and opportunities for follow-up. The panel's input can be categorized as scope of work, challenges, opportunities, and recommendations.

Scope of Work

One of the concerns raised in the panel's initial meetings was limitations to the scope of work. The focus of the meta-analysis was chronic disease care in an adult population, and this automatically excluded other populations (e.g., pediatrics) and other types of conditions (e.g., infections, cancers). The focus on patients with existing chronic diseases also excluded community-based primary prevention of chronic disease. The panel felt that the focus on a preselected group of chronic diseases (derived via mandate rather than consultation) could miss opportunities to improve overall community-based chronic disease care. The conditions that the panel specifically noted as missing included cognitive conditions (e.g., dementias) and musculoskeletal conditions (e.g., arthritis and osteoporosis), both of which affect patients' functional status. Within the reviews, the panel also stressed the importance of considering variation in effectiveness by subpopulation, such as those living in rural areas, marginalized groups, or different patient demographics. For such subpopulations, the panel noted that acknowledgement of barriers and opportunities would be important for recommendations and implementation considerations.

Challenges

The panel identified a number of challenges related to the body of work. One of the main challenges to interpretation and recommendations was the complexity of interventions and variability in findings. The risk is that inconsistent evidence reflects not variability in effectiveness, but fidelity in implementation. To be useful, recommendations would need to be specific enough to provide direction, but flexible enough to allow tailoring to different populations and settings. Recommendations should provide guidance while still allowing for novel methods of delivery.

The panel also noted that the "messaging" of findings would be important. For interventions that appeared not to work, findings may have been related more to limitations of the underlying studies than to the interventions themselves. For interventions that were expected to affect processes (e.g., eTools) or intermediate outcomes such as patient engagement (e.g., self-management), outcomes of interest and adequacy of follow-up were important for evaluating effectiveness.

Finally, the panel commented on a recurring issue related to the drafting of policy with limited evidence: "There is a push for ideas and not a lot of available evidence or not strong enough evidence to proceed with confidence [with an intervention]." The panel noted that it would be important to provide thoughtful, useful recommendations on questionable interventions where there was already substantial policy support (e.g., advanced access). Such situations may provide opportunities to suggest restructuring or refocusing interventions to be more effective.

Opportunities

The reviews and synthesis present an opportunity to identify effective interventions and models of care that apply to multiple conditions, and importantly, to multimorbid populations. This work can move the health system away from the current structure of "boutique" systems of care based on single conditions to one that is patient-centred. The opportunity to make policy recommendations allows the work to draw on a range of levers from the provider, structural, and governance levels, among others.

The panel also recognized that where the evidence was of low quality and findings were inconsistent, there was an opportunity to recommend local (Ontario) evaluations. While there may be a hesitancy to deny services if additional evidence of effectiveness is needed, there is good rationale to at least delay wider service delivery until an intervention is more comprehensively tested.

Recommendations

There were a number of instances where the results were not clear or where better-quality research was needed. Governments and other groups need to create more opportunities to fund studies exploring these gaps; 1 such opportunity is work around postdischarge support to improve care transitions. Gaps should also be catalogued to allow areas of research need to be identified and prioritized. It is likely that it will be possible to gain reasonable answers in a timely fashion and with a reasonable amount of resources for only a subset of gaps. Focused calls for evaluation are necessary under these circumstances.

Similarly, there should be a plan to evaluate what is recommended and implemented in a short time frame. If interventions are found not to work in an Ontario setting, implementation may identify a need to reassess or even drop ineffective programs. Alternatively, programs that are shown to be effective on a small scale in a local setting could be scaled up rapidly. Some smaller questions could be tested in “living labs,” intended to encourage creativity and idea generation through field evaluations, targeted calls, and/or through collaborations with other programs (e.g., BRIDGES). Project failure should be seen not as money wasted but as money saved, since ineffective programs would not be broadly implemented. The plan should be to “fail cheaply and quickly.”

Gaps and Limitations

The objective of this report series was to compile an evidence base and economic analysis to optimize chronic disease management in the outpatient setting, but it is equally important to identify the limitations and gaps of this synthesis.

One of the major gaps was that no interventions had been identified that could reduce admissions to LTC facilities. However, HQO had conducted a synthesis of interventions that could assist older Ontarians to live longer and more healthfully in the community. The *Aging in the Community* (62) report series was an EBA intended to identify drivers and interventions that could help reduce or delay admissions to LTC facilities. The review focused on interventions to reduce falls and fall-related injuries; treat urinary incontinence and dementia; and address issues of social isolation. Despite the strength of the evidence and the potential economic impact of the interventions reviewed,¹ the report has so far had only limited traction in policy. As such, the findings and recommendations of the *Aging in the Community* series have been incorporated into the Optimizing Chronic Disease Management mega-analysis in an effort to highlight them.

Some of the general limitations that faced all EBAs stemmed from the complexity of the interventions themselves. Often, interventions could not always be described in detail because of variations in delivery, and this made it difficult to interpret findings and determine what was working. As well, because of the breadth of work in many areas, reviews had to be limited either by population (e.g., self-management support interventions), scope of intervention (e.g., in-home care), or setting of care (e.g., specialized nursing practice). In other cases, the quality of the evidence limited the ability to make strong recommendations (e.g., advanced access).

Some interventions identified in the initial scoping were not prioritized for review, but aside from these, there were other gaps in the evidence. A number of interventions were not applied to all conditions or did not evaluate the effectiveness of the interventions for all outcomes of interest; this was a limitation of the available evidence. Tables 13 and 14 describe these gaps.

¹Exercise interventions for community-dwelling elderly, support programs for caregivers, environmental modifications for high-risk populations, vitamin D and calcium supplementation in women, multicomponent interventions for urinary incontinence, behavioural management and/or multicomponent interventions for dementia.

Table 13: Gaps in the EBAs—Disease Cohorts for Which Data Were Not Available

EBA	Cohorts for Which Data Were Available								
	Diabetes	CAD	AF	Stroke	HF	COPD	Chronic Wounds	General CD	Multi-morbid
Discharge planning	No	No	No	No	Yes	No	No	Yes	Yes
In-home care	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes
Continuity of care	Yes	Yes	No	No	No	Yes	No	Yes	Yes
Advanced (open) access scheduling	Yes	Yes	No	No	No	No	No	Yes	Yes
Screening and management of depression	Yes	Yes	No	No	Yes	No	No	No	No
Self-management support	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	Yes
Specialized nursing practice	Yes	Yes	No	No	Yes	No	No	Yes	No
Electronic tools	Yes	Yes	No	No	Yes	No	No	Yes	Yes
Previous EBAs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No

Abbreviations: AF, atrial fibrillation; CAD, coronary artery disease; CD, chronic disease; COPD, chronic obstructive pulmonary disease; EBA, evidence-based analysis; HF, heart failure.

Table 14: Gaps in the EBAs—Outcomes for Which Data Were Not Available

EBA	Outcomes for Which Data Were Available									
	Admits	Readmits	LOS	ED Visits	LTC Admission	Mortality	Disease-Specific Measures	HRQOL	Functional Status	Patient Satisf'n
Discharge planning	No	Yes	Yes	No	No	Yes	No	Yes	No	Yes
In-home care	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No
Continuity of care	Yes	No	No	Yes	No	Yes	Yes	No	No	Yes
Advanced (open) access scheduling	Yes	No	Yes	Yes	No	No	Yes	No	No	Yes
Screening and management of depression	No	No	No	No	No	Yes	Yes	NA	No	No
Self management support	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Specialized nursing practice	Yes	No	Yes	Yes	No	No	Yes	Yes	No	Yes
Electronic tools	Yes	Yes	Yes	Yes	No	No	Yes	No	No	No
Previous EBAs	Yes	No	Yes	No	No	Yes	Yes	Yes	No	No

Abbreviations: EBA, evidence-based analysis; ED, emergency department; HRQOL, health-related quality of life; LTC, long-term care; LOS, length of stay.

Conclusions

A number of interventions in this analysis were effective and cost-effective at improving chronic disease management in the community. The results were classified into 3 groups: strategies that were clinically effective; strategies that showed some clinical effectiveness, but may require further review and assessment for the Ontario setting; and strategies that were not more effective than alternatives.

Strategies that were clinically effective (and should be considered for implementation/expansion in Ontario) were as follows:

- discharge planning (individualized predischarge planning)
- in-home care
- continuity of care
- specialized nursing practice
- a number of previously reviewed health technologies
- SCBC (intermediate care)

Strategies that showed some clinical effectiveness, but may require further review and assessment for Ontario setting were as follows:

- Stanford CDSMP
- eTools for health information exchange

Strategies that were not more effective than alternatives were as follows:

- addition of postdischarge support programs to predischarge planning
- advanced access scheduling
- screen-and-treat strategy for depression

“The ideal health system would put more emphasis on preventing poor health. It would be patient-centric and would feature coordination along the complete continuum, of care the patient may require. Primary care would be the main point of patient contact, with a good part of the coordination across care taking place through the administration of hospitals or regional health authorities. There would be much less emphasis on patients being in hospital: they are expensive, expose people to contagious disease and yield poor patient satisfaction”

— Don Drummond, 2011 (64)

Acknowledgements

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Expert Panel for Health Quality Ontario: Optimizing Chronic Disease Management in the Community (Outpatient) Setting

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Appendices

Appendix 1: Summary of Results

Table A1: Summary of Results from Evidence-Based Analyses

Intervention	Comparator	Study Population	Number of Studies (N)	Findings	GRADE
TRANSITIONS FROM HOSPITAL TO COMMUNITY AND BACK					
Discharge Planning					
Research Question: What is the effectiveness of discharge planning bundles at reducing health resource utilization and improving patient outcomes compared to usual care alone?					
Individualized pre-discharge planning	Usual care	Chronic disease populations (including heart failure) who were admitted to hospital	11 (2,552)	Individualized pre-discharge planning is more effective at reducing readmissions	Moderate
			10 (1,765)	Individualized pre-discharge planning is more effective at reducing initial hospital LOS	Moderate
			4 (978)	Individualized pre-discharge planning is not more effective at reducing mortality	Moderate
			1 systematic review of RCTs	Individualized pre-discharge planning is more effective at improving HRQOL	Very low
			1 systematic review of RCTs	Individualized pre-discharge planning is more effective at improving patient satisfaction	Very low
Individualized pre-discharge planning plus post-discharge support	Usual care	Heart failure patients admitted to hospital (primarily limited to this condition)	17 studies (2,941) and additional 4 studies (882)	Individualized pre-discharge planning plus post-discharge support is more effective at reducing readmissions	Low
				Individualized pre-discharge planning plus post-discharge support is not more effective at reducing initial hospital LOS	Low
				Individualized pre-discharge planning plus post-discharge support planning is not more effective at reducing mortality	Low
				Individualized pre-discharge planning plus post-discharge support is more effective at improving HRQOL	Very low
				Individualized pre-discharge planning plus post-discharge support is more effective at improving patient satisfaction	Very low

In-Home Care					
Research Question: What is the effectiveness of care delivered in the home (i.e., in-home care) compared to no home care or usual care/care received outside of the home (e.g., a health care setting)?					
Patient education around condition	Usual care	Heart failure patients	1 (106)	There was no significant difference in unplanned admissions and on ED visits	Moderate
Components of home care included disease education, assessment of medication adherence, clinical exam	Usual care	Heart failure patients	2 (558)	There was no significant difference in hospital LOS	Moderate
Components of home care included disease education, assessment of medication adherence, clinical exam	Usual care	Heart failure patients	3 (859)	There was a significant benefit of in-home care on the combined events of all cause mortality and hospitalization	Moderate
OT/PT to assess home environment and assist with strength and exercise training (general CD population) HF interventions were multiple types	Usual care	Heart failure patients; chronic disease/ comorbid patients	Heart failure 5 (1,240); chronic disease/ comorbid 1 (319)	There was no significant difference in all-cause mortality	Moderate High (CD population only)
Components of home care included disease education, assessment of medication adherence, clinical exam	Usual care	Heart failure patients	2 (562)	There was no significant difference in CVD-specific mortality	Moderate
				There was no significant difference in heart failure-specific mortality	Moderate
OT/PT to assess home environment and assist with strength and exercise training (general CD population)	Usual care	Chronic disease/ comorbid patients	1 (300)	There was a significant benefit of in-home care for activities of daily living (showed improvement). However, there was no difference in instrumental activities of daily living or mobility	Moderate
Patient education around condition	Usual care	Heart failure patients	1 (106)	There was a significant benefit of home care for the physical component summary of the SF-36 (showed improvement). However, there was no difference for the mental component summary of the SF-36	Low
Components of home care included disease education, assessment of medication adherence, clinical exam	Usual care	Heart failure patients	2 (672)	There was a beneficial effect of nurse-led in-home care on heart failure-specific HRQOL	Low
Patient education, medication, lifestyle changes, signs and symptoms	Usual care	Heart failure patients	1 (158)	There was no difference between pharmacist-led in-home care and usual care for heart failure-specific QOL	Low

COMMUNITY-OPTIMIZED CARE

Continuity of Care

Research Question: Is higher continuity of care effective at reducing health resource utilization and improving patient outcomes?

Continuity of care (not an intervention—it is an outcome or characteristic of relationships; as such, the comparison is between low and high continuity)	General population; patients with diabetes; patients with COPD	9 (622,573) (general population 3, diabetes 5, COPD 1)	Despite heterogeneity in the measurement of continuity, higher continuity of care appeared to decrease hospital admission rates consistently in all studies and with a gradient shown in most studies that measured multiple levels of continuity	Low
	General population; patients with diabetes; patients with COPD	7 (1,218,200) (general population 3, diabetes 3, COPD 1)	Despite heterogeneity in the measurement of continuity, higher continuity of care appeared to decrease ED visits	Low
	Diabetes population	2 (11,400)	Higher continuity appeared to improve HbA1c levels in patients with diabetes	Low
	CAD population	1 (7,000)	There is insufficient evidence (no difference in 1 study) to comment on the relationship of continuity of care on other disease-specific measures	Very low
	General population	3 systematic reviews	There appeared to be a positive association between high continuity and patient satisfaction , particularly among those with chronic conditions	Low

Advanced (Open) Access Scheduling

Research Question: What is the effectiveness and cost-effectiveness of advanced access scheduling compared to traditional scheduling for the management of chronic diseases in Ontario adults?

Advanced access scheduling	Traditional scheduling	Diabetes population	2 studies (1st study, 4,060; 2nd study 6,741 [pre]; 7,238 [post])	Both studies reported no (significant) reduction in hospitalization rates for patients with diabetes after advanced access scheduling	Low
			1 study (4,060)	There was no significant reduction in ED visit rates between the pre and post period of advanced access scheduling	Very low
			2 studies (1st study, 4,060; 2nd study 6,741 [pre]; 7,238 [post])	There were inconsistent findings with 1 study showing a small but nonsignificant decrease in ED/urgent care visits and 1 study showing a significant decline in these visits (from 41% to 37.6%; $P < 0.001$)	Very low
		1 study (6,741 [pre]; 7,238 [post])	There was a significant reduction in the percentage of patients with a LOS >3 days	Very low	
		3 studies (1st study, 4,060; 2nd study 6,741 [pre]; 7,238 [post]; 3rd study 156)	There were inconsistent findings related to the impact of advanced access on clinical measures, including HbA1c, cholesterol, and BP .	Very low	
		CAD population	1 study (3,555 [pre]; 3,802 [post])	There was a significant reduction in hospitalization rates (percent of patients hospitalized at least once in a 1-year period) from 58.4% (pre) to 57.3%	Very low

			1 study (3,555 [pre]; 3,802 [post])	There was no significant change in ED visit rates between the pre and post periods	Very low
			1 study (3,555 [pre]; 3,802 [post])	There was a significant reduction in the percent of patients with a LOS >3 days	Very low
			2 studies (1st study 3,555 [pre], 3,802 [post]; 2nd study 77)	There were inconsistent findings related to the impact of advanced access on clinical measures, including HbA1c, cholesterol, and BP	Very low
	Geriatric population		No sample size provided	Unable to draw a conclusion on patient satisfaction , as there was only 1 study and it did not conduct a statistical analysis	Very low

Screening and Management of Depression					
Research Question: In a chronic disease population, is a screen-and-treat strategy for depression associated with an improvement in chronic disease outcomes?					
Paroxetine	Placebo	Patients with diabetes and mild depression	1 (48)	Medication management of depression did not significantly improve clinical measures of diabetes (HbA1c)	Low
Citalopram	Placebo	Heart failure population	1 (37)	For patients with heart failure and depression (including mild depression), medication management of depression did not significantly affect (improve or worsen) cardiopulmonary performance	Low
Sertraline	Placebo		1 (469)	For patients with heart failure and depression (including mild depression), medication management of depression did not significantly affect (improve or worsen) cardiac event rates or mortality	Moderate
Citalopram (Esperance) or mirtazapine (Honig)	Placebo	CAD population	2 (375)	For patients with CAD and depression (including mild depression), medication management of depression did not significantly affect (improve or worsen) ECG findings	Low
Sertraline	Placebo		1 (369)	For patients with CAD and depression (including mild depression), medication management of depression did not significantly affect (improve or worsen) the percentage of patients with reduced LVEF (<30%)	Moderate
CBT (ENRICH), citalopram (Lesperance); sertraline (Glassman)	Placebo		3 (3,134)	For patients with CAD and depression (including mild depression), management of depression appeared to have a potentially protective, but not statistically significant effect on MI rates	Moderate
CBT (ENRICH), sertraline (Glassman)	Placebo		2 (2,850)	For patients with CAD and depression (including mild depression), management of depression appeared to have a potentially protective, but not statistically significant effect on mortality	Moderate

Self-Management Support Interventions					
Research Question: What is the effectiveness of self-management support interventions for persons with chronic diseases compared to usual care?					
Stanford CDSMP	Usual care	Population with chronic diseases	2–6 studies (1,730–3,901) patients	There was no significant difference in health care utilization (median follow-up 6 months) between patients who received the Stanford CDSMP and usual care, including: visits with GPs, ED visits, hospitalizations or number of days in hospital	Very low
			4–6 studies (2,742–3,854) patients)	The Stanford CDSMP led to statistically significant (albeit clinically minimal) short-term (median 6 months) improvements across a number of health status measures, including: reduction in pain, dyspnea disability, fatigue, depression, health distress , and an improvement in self-rated health	Low
			3–6 studies (2,084–3,818) patients)	The Stanford CDSMP led to statistically significant short-term (median 6 months) improvements across a number of healthy behaviours , including: aerobic exercise, cognitive symptom management, communication with health professionals	Low
			6 studies (3,119)	The Stanford CDSMP led to significant improvements in self-efficacy	Low
			2 studies (905)	The Stanford CDSMP led to statistically significant (albeit clinically minimal) short-term improvements in EQ-5D scores	Moderate
Specialized Nursing Practice					
Research Question: What is the effectiveness of specialized nursing practice in comparison to usual care in improving patient outcomes and health system efficiencies for chronic disease management in the primary health care setting?					
Specialized nurse alone (Model 1) (equivalence)	Physician alone (usual care)	Primary care population with oversampling of chronic disease populations	1 (1,981)	There was no significant difference in health service utilization (hospitalizations, ED visits, specialist visits, or primary care visits)	Moderate
				There was no significant difference in some clinical measures (SBP, peak flow) but a significant decrease in DBP	Very low
				There was no significant difference in QOL (SF-36)	Moderate
		Diabetes subpopulation (substudy of the above)	1 (214)	There was no significant difference in health service utilization (hospitalizations, ED visits, specialist visits, or primary care visits)	Very low
			There was no significant difference in HbA1c	Very low	
			There was either no difference or a significant increase in patient education or monitoring of clinical measures	Very low	
	There was no significant difference in QOL (SF-36)	Very low			

Specialized nurse plus physician (Model 2)	Physician alone (usual care)	Diabetes	1 (206)	There was a significant increase in the number of primary care visits	Low
			1 (157) absolute HbA1c 2 (363)	There was a significant decrease in HbA1c , but no difference in the percent of patients reaching target levels (HbA1c, BP, or cholesterol)	Moderate (absolute value for HbA1c); low (achievement of threshold)
			2 (1 study included 2 scales) (363)	There was inconclusive evidence on the effect of the intervention on HRQOL	Low
			1 (157)	There was a significant increase in patient satisfaction	Moderate
			2 (maximum 363, but variable)	There was a trend towards improvement in process of care indicators ; most but not all showed significant improvement	Low to moderate
		CAD/CHD	1 (1,058)	There was a significant decrease in number of hospitalizations and LOS for intervention patients	Low
			2 (variable Ns depending on measure)	There was a significant increase in the percent of patients achieving target levels (BP, cholesterol, lifestyle measures, and management of BP and cholesterol)	Low to moderate
			2	There was inconclusive evidence on the effect of the intervention on HRQOL	Moderate
			1 (maximum 1,059)	There was a trend towards improvement in process-of-care indicators ; most but not all showed significant improvement	Low to moderate
			1 (maximum 1,173)	There was no significant difference in number of physician consultations in the 2 models	Low
		Chronic disease population	1 (maximum 30 GP practices)	There was no significant difference in total clinic hours or out of office hours ; but a significant increase in COPD/asthma hours and no difference in subjective physician workload	Low

INTERVENTIONS ACROSS THE SYSTEM

Electronic Tools for Health Information Exchange

Research Question: What is the impact of electronic tools (eTools) for health information exchange on patient outcomes and health services utilization when used to improve the care coordination of adults with chronic disease? What specifications of eTools contribute to their effectiveness?

Automated laboratory results report with clinical alerts mapped to guidelines	Usual care	Adult patients with diabetes	1 (7,368)	There was evidence of a significant reduction in acute health service utilization (hospitalizations, ED visits, and LOS)	Moderate
Automatically generated personalized discharge	Paper-based summaries	Population discharged from hospital and with	1 (631)	There was evidence of no difference in the proportion of patients who experienced a readmission	High

summaries		an increased likelihood of readmission			
Electronic data interchange tool (facilitates communication between providers; including specialists)	Physicians not using EDI tool Pre/post comparison	Patients with diabetes (and primary care providers treating these patients)	1 study (32 GPs; 275 patients) 1 (607)	There was evidence of no difference in HbA1c levels in diabetes patients	Very low to low
DEMS	Before use of DEMS	Patients with diabetes (and primary care providers treating these patients)	1 (607)	There was evidence of no difference in blood pressure (SBP or DBP) in diabetes patients	Low
DEMS Electronic system that identifies high-risk patients and emails information on decision supports, as well as integration into EHR	Before use of DEMS, standard EHR	Patients with diabetes patients with CAD or CAD risk	1 (607) 1 (163)	There was evidence of no difference in lipid levels	Low
Automatically generated personalized discharge summaries	Paper-based summaries	Population discharged from hospital and with an increased likelihood of readmission	1 (631)	There was evidence of no difference in the proportion of patients identified as having an adverse event within 1 month of discharge	High
eTools for health information exchange (variety of tools)	Usual care	Variety of chronic disease populations and general population	Various	The evidence does not demonstrate that eTools had an overall positive impact on process-of-care measures (based on a number of measures; some showed an increase in the number of tests/assessment, some showed a decrease, and some showed no difference or had inconclusive findings)	Very low to low
Automatically generated personalized discharge summaries DEMS; EDI tool (diabetes) Electronic system that identifies high-risk patients and emails information on decision supports, as well as integration into EHR	Paper-based summaries, standard EHR Pre-DEMS physicians not using EDI	Population discharged from hospital and with an increased likelihood of readmission; patients with diabetes; patients with CAD or CAD risk	1 (631) 1 (607); 1 (32 GPs; 275 patients) 1 (235)	The evidence does not demonstrate improved efficiency for care providers	Very low to high

Abbreviations: BP, blood pressure; CAD, coronary artery disease; CBT, cognitive behavioural therapy; CD, chronic disease; CDSMP, Chronic Disease Self-Management Program; CHD, coronary heart disease; COPD, chronic obstructive pulmonary disease; CVD, cardiovascular disease; DBP, diastolic blood pressure; DEMS, diabetes electronic management system; ECG, electrocardiogram; ED, emergency department; EDI, electronic data interchange; EHR, electronic health record; eTool, electronic tool; GP, general practitioner; HbA1c, hemoglobin A1c; HF, heart failure; HRQOL, health-related quality of life; LOS, length of stay; LVEF, left ventricular ejection fraction; MI, myocardial infarction; OT, occupational therapist; PT, physiotherapist; RCT, randomized controlled trial; SBP, systolic blood pressure; SF-36, Short Form (36) Health Survey.

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