Specialized Multidisciplinary Community-Based Care Series

A Summary of Evidence-Based Analyses

November 2009
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Contact Information

The Medical Advisory Secretariat
Ministry of Health and Long-Term Care
20 Dundas Street West, 10th floor
Toronto, Ontario
CANADA
M5G 2N6
Email: MASinfo.moh@ontario.ca
Telephone: 416-314-1092

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About the Medical Advisory Secretariat

The Medical Advisory Secretariat is part of the Ontario Ministry of Health and Long-Term Care. The mandate of the Medical Advisory Secretariat is to provide evidence-based policy advice on the coordinated uptake of health services and new health technologies in Ontario to the Ministry of Health and Long-Term Care and to the healthcare system. The aim is to ensure that residents of Ontario have access to the best available new health technologies that will improve patient outcomes.

The Medical Advisory Secretariat also provides a secretariat function and evidence-based health technology policy analysis for review by the Ontario Health Technology Advisory Committee (OHTAC).

The Medical Advisory Secretariat conducts systematic reviews of scientific evidence and consultations with experts in the health care services community to produce the Ontario Health Technology Assessment Series.

About the Ontario Health Technology Assessment Series

To conduct its comprehensive analyses, the Medical Advisory Secretariat systematically reviews available scientific literature, collaborates with partners across relevant government branches, and consults with clinical and other external experts and manufacturers, and solicits any necessary advice to gather information. The Medical Advisory Secretariat makes every effort to ensure that all relevant research, nationally and internationally, is included in the systematic literature reviews conducted.

The information gathered is the foundation of the evidence to determine if a technology is effective and safe for use in a particular clinical population or setting. Information is collected to understand how a new technology fits within current practice and treatment alternatives. Details of the technology’s diffusion into current practice and input from practising medical experts and industry add important information to the review of the provision and delivery of the health technology in Ontario. Information concerning the health benefits; economic and human resources; and ethical, regulatory, social and legal issues relating to the technology assist policy makers to make timely and relevant decisions to optimize patient outcomes.

If you are aware of any current additional evidence to inform an existing evidence-based analysis, please contact the Medical Advisory Secretariat: MASinfo.moh@ontario.ca. The public consultation process is also available to individuals wishing to comment on an analysis prior to publication. For more information, please visit http://www.health.gov.on.ca/english/providers/program/ohtac/public_engage_overview.html.

Disclaimer

This evidence-based analysis was prepared by the Medical Advisory Secretariat, Ontario Ministry of Health and Long-Term Care, for the Ontario Health Technology Advisory Committee and developed from analysis, interpretation, and comparison of scientific research and/or technology assessments conducted by other organizations. It also incorporates, when available, Ontario data, and information provided by experts and applicants to the Medical Advisory Secretariat to inform the analysis. While every effort has been made to reflect all scientific research available, this document may not fully do so. Additionally, other relevant scientific findings may have been reported since completion of the review. This evidence-based analysis is current to the date of publication. This analysis may be superseded by an updated publication on the same topic. Please check the Medical Advisory Secretariat Website for a list of all evidence-based analyses: http://www.health.gov.on.ca/ohtas.
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2. Community-Based Specialized Management for Heart Failure
3. Community-Based Care for Chronic Wound Management

ACKNOWLEDGMENTS

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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUC</td>
<td>Area under the curve</td>
</tr>
<tr>
<td>CDA</td>
<td>Canadian Diabetes Association</td>
</tr>
<tr>
<td>CI</td>
<td>Confidence interval(s)</td>
</tr>
<tr>
<td>CINAHL</td>
<td>Cumulative Index to Nursing &amp; Allied Health Literature</td>
</tr>
<tr>
<td>EMBASE</td>
<td>Excerpta Medica Database</td>
</tr>
<tr>
<td>HbA1c</td>
<td>Glycosylated hemoglobin</td>
</tr>
<tr>
<td>HF</td>
<td>Heart Failure</td>
</tr>
<tr>
<td>INAHTA</td>
<td>International Agency for Health Technology Assessment</td>
</tr>
<tr>
<td>MAS</td>
<td>Medical Advisory Secretariat</td>
</tr>
<tr>
<td>ODEM</td>
<td>Ontario Diabetes Economic Model</td>
</tr>
<tr>
<td>OR</td>
<td>Odds ratio</td>
</tr>
<tr>
<td>OHTAC</td>
<td>Ontario Health Technology Advisory Committee</td>
</tr>
<tr>
<td>PATH</td>
<td>Programs for Assessment of Technology and Health</td>
</tr>
<tr>
<td>QALY</td>
<td>Quality-Adjusted Life Year</td>
</tr>
<tr>
<td>RCT</td>
<td>Randomized controlled trial</td>
</tr>
<tr>
<td>RR</td>
<td>Relative risk</td>
</tr>
<tr>
<td>SBP</td>
<td>Systolic blood pressure</td>
</tr>
<tr>
<td>SD</td>
<td>Standard deviation</td>
</tr>
<tr>
<td>SROC</td>
<td>Summary receiver operating characteristic</td>
</tr>
</tbody>
</table>
Background

In August 2008, the Medical Advisory Secretariat (MAS) presented a vignette to the Ontario Health Technology Advisory Committee (OHTAC) on a proposed targeted health care delivery model for chronic care. The proposed model was defined as multidisciplinary, ambulatory, community-based care that bridged the gap between primary and tertiary care, and was intended for individuals with a chronic disease who were at risk of a hospital admission or emergency department visit. The goals of this care model were thought to include: the prevention of emergency department visits, a reduction in hospital admissions and re-admissions, facilitation of earlier hospital discharge, a reduction or delay in long-term care admissions, and an improvement in mortality and other disease-specific patient outcomes.

OHTAC approved the development of an evidence-based assessment to determine the effectiveness of specialized community-based care for the management of heart failure, Type 2 diabetes and chronic wounds.

Please visit the Medical Advisory Secretariat Web site at: www.health.gov.on.ca/ohtas to review the following reports associated with the Specialized Multidisciplinary Community-Based care series.

1. Specialized multidisciplinary community-based care series: a summary of evidence-based analyses
2. Community-based care for the specialized management of heart failure: an evidence-based analysis
3. Community-based care for chronic wound management: an evidence-based analysis

Please note that the evidence-based analysis of specialized community-based care for the management of diabetes titled: “Community-based care for the management of type 2 diabetes: an evidence-based analysis” has been published as part of the Diabetes Strategy Evidence Platform at this URL: http://www.health.gov.on.ca/english/providers/program/mas/tech/ohtas/tech_diabetes_20091020.html

Please visit the Toronto Health Economics and Technology Assessment Collaborative Web site at: http://theta.utoronto.ca/papers/MAS_CHF_Clinics_Report.pdf to review the following economic project associated with this series:

Community-based Care for the specialized management of heart failure: a cost-effectiveness and budget impact analysis.

Objective

The objective of this report is to determine the effectiveness and cost-effectiveness of intermediate care (also called community-based multidisciplinary care) for heart failure, diabetes type 2, and chronic wound management.

Clinical Need: Target Population and Condition

Intermediate care is a community-based specialized multidisciplinary care model that manages chronic illness through formalized links between primary and specialized care. In so doing, it provides a resource to primary care for the treatment of persons with higher acuity of disease, as well as a community-based ‘after hospital discharge’ resource to manage patients with chronic illness.
**Project Scope**

Chronic disease conditions considered for analysis were determined after examining the following criteria: burden of illness, impact on health systems, previous and on-going MAS evidence based analyses, existence of a disease-specific Ontario economic model, and alignment with provincial policy directions. From this, three chronic diseases, heart failure, diabetes type 2, and chronic wounds, were put forth to form the focus of the analysis. The following report is a summary of the evidence-based analyses of the three disease conditions noted above. Where possible, economic analyses were performed using an Ontario-specific economic model.

**Assessment of Quality of Evidence**

In all analyses, the quality of the evidence was assessed as high, moderate, low or very low according to the GRADE methodology and GRADE Working Group (see Appendix 1).

As per GRADE the following definitions apply:

- **High:** Further research is very unlikely to change confidence in the estimate of effect
- **Moderate:** Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate
- **Low:** Further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate
- **Very low:** Any estimate of effect is very uncertain
Community-Based Care for the Management of Type 2 Diabetes

Objective

The objective of this evidence-based review is to determine the effectiveness of specialized multidisciplinary community care for the management of type 2 diabetes compared to usual care.

Clinical Need: Target Population and Condition

Diabetes (i.e. diabetes mellitus) is a highly prevalent chronic metabolic disorder that interferes with the body’s ability to produce or effectively use insulin. The majority (90%) of diabetes patients have type 2 diabetes. Based on the United Kingdom Prospective Diabetes Study (UKPDS), intensive blood glucose and blood pressure control significantly reduce the risk of microvascular and macrovascular complications in type 2 diabetics. While many studies have documented that patients often do not meet the glycemic control targets specified by national and international guidelines, others factors associated with glycemic control are less well studied, one of which is the provider(s) of care.

Multidisciplinary approaches to care may be particularly important for diabetes management. According to the Canadian Diabetes Association (CDA) Guidelines, the diabetes health care team should be multi- and interdisciplinary. Presently in Ontario, the core diabetes health care team consists of at least a family physician and/or diabetes specialist and diabetes educators (a registered nurse or registered dietitian). Increasing the role played by allied health care professionals in diabetes care and their collaboration with physicians may present a more cost-effective option for diabetes management.

Several systematic reviews and meta-analyses have examined multidisciplinary care programs, but these have either been limited to a specific component of multidisciplinary care (e.g. intensified education programs), or were conducted as part of a broader disease management program, of which not all were multidisciplinary in nature. Most reviews also do not clearly define the intervention(s) of interest, making the evaluation of such multidisciplinary community programs challenging.

Evidence-Based Analysis of Effectiveness

Research Questions

1. What is the evidence of efficacy of specialized multidisciplinary community care provided by at least a registered nurse, registered dietitian, and physician (primary care and/or specialist) for the management of type 2 diabetes compared to usual care? [Herein referred to as Model 1]

2. What is the evidence of efficacy of specialized multidisciplinary community care provided by at least a pharmacist and a primary care physician for the management of type 2 diabetes compared to usual care? [Herein referred to as Model 2]

Inclusion Criteria

- English language full-reports
- Published between January 1, 2000 and September 28, 2008
- RCTs, systematic reviews, and meta-analyses
- Type 2 diabetic adult population (≥18 years of age)
- Total sample size ≥30
• Describe specialized multidisciplinary community care defined as ambulatory-based care provided by at least two health care disciplines (of which at least one must be a specialist in diabetes) with integrated communication between the care providers.
• Compared to usual care defined as health care provision by non-specialist(s) in diabetes, such as primary care providers; may include usual referral to other health care professionals or services as necessary
• ≥6 months follow-up

Exclusion Criteria

• Studies where discrete results on diabetes cannot be abstracted
• Predominantly home-based interventions
• Inpatient-based interventions

Outcomes of Interest

The primary outcomes for this review were glycated hemoglobin (HbA1c) levels and systolic blood pressure (SBP).

Search Strategy

A literature search was performed on September 28, 2008 using OVID MEDLINE, MEDLINE In-Process and Other Non-Indexed Citations, EMBASE, CINAHL, the Cochrane Library, and the INAHTA database for studies published from January 1, 2000 to September 28, 2008. 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. Articles with unknown eligibility were reviewed with a second clinical epidemiologist, then a group of epidemiologists, until consensus was established. The quality of evidence was assessed as being high, moderate, low or very low according to GRADE methodology.

Given the high clinical heterogeneity of the articles that met the inclusion criteria, specific models of specialized multidisciplinary community care were examined based on models of care that are currently supported in Ontario, models of care that were commonly reported in the literature, as well as suggestions from an Expert Advisory Panel Meeting held on January 21, 2009. The inclusion criteria were revised to examine specific models of care, as described in the research questions.

Summary of Findings

The initial search yielded 2,116 unique citations. From these, a total of 22 randomized controlled trials and nine systematic reviews published between January 2000 and October 2008 were identified as meeting the eligibility criteria, assessing specialized multidisciplinary care defined by the inclusion of at least two health care professional disciplines. Of these, five studies focused on care provided by at least a nurse, dietitian, and physician (primary care and/or specialist) model of care (Model 1), while three studies focused on care provided by at least a pharmacist and primary care physician (Model 2).

A summary of the results of the meta-analyses examining the effects of both models of specialized multidisciplinary community care is presented in Tables 1 and 2. Based on moderate quality evidence, specialized multidisciplinary community care Model 1 has demonstrated a statistically and clinically significant reduction in HbA1c of 1.0% compared with usual care. Compared with usual care, the effects of this model on SBP, however, are uncertain based on very-low quality evidence. Model 2 demonstrated a statistically and clinically significant reduction in both HbA1c (-1.05%, based on high quality evidence)
and SBP (-7.13 mmHg, based on moderate quality evidence) compared to usual care. For both models, the evidence does not suggest a preferred setting of care delivery (i.e. primary care vs. hospital outpatient clinic vs. community clinic).

### Table 1: Summary of Results of Meta-Analyses of the Effects of Multidisciplinary Care Model 1

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Estimate of effect* (95% CI)</th>
<th>Heterogeneity I²</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycosylated Hemoglobin (% HbA1c %)</td>
<td>-1.00 (-1.27, -0.73)</td>
<td>4%</td>
<td>Moderate-quality</td>
</tr>
<tr>
<td>Subgroup: Moderate-to-High Quality</td>
<td>-0.91 (-1.19, -0.62)</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Systolic Blood Pressure (mmHg)</td>
<td>-2.04 (-13.80, 9.72)</td>
<td>89%</td>
<td>Very-low quality</td>
</tr>
</tbody>
</table>

* Mean change from baseline to follow-up between intervention and control groups

### Table 2: Summary of Results of Meta-Analyses of the Effects of Multidisciplinary Care Model 2

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Estimate of effect* (95% CI)</th>
<th>Heterogeneity I²</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycosylated Hemoglobin (% HbA1c %)</td>
<td>-1.05 (-1.57, -0.52)</td>
<td>0%</td>
<td>High-quality</td>
</tr>
<tr>
<td>Systolic Blood Pressure (mmHg)</td>
<td>-7.13 (-11.78, -2.48)</td>
<td>46%</td>
<td>Moderate quality</td>
</tr>
</tbody>
</table>

*Mean change from baseline to follow-up between intervention and control groups

### Conclusions

1. Model 1: Specialized multidisciplinary community care provided by at least a registered nurse, registered dietitian and physician (primary care and/or specialist) for the management of type 2 diabetes:
   - Demonstrated a statistically and clinically significant reduction in HbA1c compared to usual care based on moderate quality evidence.
   - Demonstrated an uncertain estimate of effect on SBP compared to usual care based on very-low quality evidence.

2. Model 2: Specialized multidisciplinary community care provided by at least a pharmacist and primary care for the management of type 2 diabetes:
   - Demonstrated a statistically and clinically significant reduction in HbA1c compared to usual care based on high quality evidence.
   - Demonstrated a statistically and clinically significant reduction in SBP compared to usual care based on moderate quality evidence.

3. For both models, the evidence does not suggest a preferred setting of care delivery (i.e. primary care vs. hospital outpatient clinic vs. community clinic).

4. Based on examination of an Ontario-specific multidisciplinary care program, specialized multidisciplinary community care for the management of type 2 diabetes is a cost-effective strategy.
Economic Analysis

**DISCLAIMER:** The Medical Advisory Secretariat uses a standardized costing method for its economic analyses of interventions. The main cost categories and the associated methods from the province’s perspective are as follows:

**Hospital:** Ontario Case Costing Initiative cost data are used for in-hospital stay, emergency visit and day procedure costs for the designated International Classification of Diseases (ICD) diagnosis codes and Canadian Classification of Health Interventions procedure codes. Adjustments may be required to reflect accuracy in estimated costs of the diagnoses and procedures under consideration. Due to the difficulties of estimating indirect costs in hospitals associated with a particular diagnosis or procedure, the secretariat normally defaults to considering direct treatment costs only.

**Nonhospital:** These include physician services costs obtained from the Ontario Schedule of Benefits, laboratory fees from the Ontario Schedule of Laboratory Fees, drug costs from the Ontario Drug Benefit Formulary, and device costs from the perspective of local health care institutions whenever possible or its manufacturer.

**Discounting:** For cost-effectiveness analyses, a discount rate of 5% is applied as recommended by economic guidelines.

**Downstream costs:** All numbers reported are based on assumptions on population trends (i.e. incidence, prevalence and mortality rates), time horizon, resource utilization, patient compliance, healthcare patterns, market trends (i.e. rates of intervention uptake or trends in current programs in place in the Province), and estimates on funding and prices. These may or may not be realized by the system or individual institutions and are often based on evidence from the medical literature, standard listing references and educated hypotheses from expert panels. In cases where a deviation from this standard is used, an explanation is offered as to the reasons, the assumptions, and the revised approach. The economic analysis represents an estimate only, based on the assumptions and costing methods that have been explicitly stated above. These estimates will change if different assumptions and costing methods are applied to the analysis.

All figures are reported in Canadian Dollars, except where noted.

**Objective**

The objective of this economic analysis was to compare the lifetime costs, effects, and cost-effectiveness of a specialized multidisciplinary community-based care program versus no program in adults with type 2 diabetes using the Ontario Diabetes Economic Model (ODEM).

The Programs for Assessment of Technology and Health (PATH) was commissioned by MAS to predict the long-term costs and effects of strategies for successful management and treatment of type 2 diabetes, as well as their cost-effectiveness. The MAS conducts full evidence-based analyses of health technologies being considered for use in Ontario. These analyses are then presented to OHTAC, whose mandate is to provide evidence-based examination of proposed health technologies in the context of existing clinical practice and to provide advice and recommendations to Ontario practitioners, the broader health care system, and the Ministry. This report summarizes the economic analyses of the multi-disciplinary diabetes programs strategy.

An assessment of type 2 diabetes interventions requires an evaluation of both short- and long-term cost and effectiveness. Early management of diabetes can help delay and even prevent complications that can have a large impact on patients’ quality of life and healthcare costs. Reductions in future complications may also offset ‘up-front’ medical resources invested in intensive disease management.
Evidence-Based Analysis of Cost-Effectiveness

Research Questions

1. Is a multi-disciplinary diabetes program cost-effective in improving glycemic control in adults with type 2 diabetes?
2. What are the lifetime costs, effects, health events, and the cost-effectiveness of a multi-disciplinary diabetes program in adults with type 2 diabetes?

Ontario Diabetes Economic Model

The recently developed UKPDS Outcomes Model, uses a system of equations in a computer simulation to predict the occurrence and timing of seven diabetes-related complications (fatal or non-fatal myocardial infarction, other ischaemic heart disease, stroke, heart failure, amputation, renal failure, and blindness) and death to calculate life expectancy and quality-adjusted life expectancy for Type 2 diabetes patients. To account for event-related dependencies, the model makes use of time-varying risk factors (e.g. blood pressure and HbA1c), which also facilitates its application to patient groups at different stages of the disease. The Model is based on data from over 5,000 patients with over 53,000 years of patient follow-up. If it’s to be applied to other geographic areas (such as Ontario), however, the Model requires adapting. Specifically, cross-country differences may exist in: the incidence and prevalence of diabetes, baseline demographics, diabetes risk factors, overall mortality or mortality from diabetes-related complications, costs (e.g. treatment and management of complications), and the cost and effects of treatment programs. Accordingly, the Model was populated with Ontario-specific data for use in the province.

In brief, more than 734,000 patients with diabetes were identified in the Ontario Diabetes Database (ODD) and followed for up to 10 years. Various administrative databases were linked to this population in order to measure the prevalence and incidence of complications, healthcare resource utilization (i.e. inpatient and outpatient hospitalizations, outpatient visits, prescription drugs, emergency room visits, and home care), and death. Unit costs were collected and assigned to each of the different health care sectors. Complication-specific costs were divided into two time periods:

1) immediate costs that accrue within the year in which a complication first occurs; and
2) long-term costs that reflect ongoing costs in subsequent years associated with the management of the complication (including subsequent events of the same type).

Hospital inpatient and non-inpatient event and state costs were estimated for each complication. The perspective taken for estimating costs was that of the Ontario Ministry of Health and Long-term Care. All healthcare costs used in the model were based on direct costs; it was not possible to measure productivity costs or other patient costs from the data available. The ODEM was then used to conduct the cost-effectiveness analyses.

Summary of Findings

Table 3 summarizes the multi-disciplinary diabetes program based on the ODEM analysis over a 40 year time horizon. Table 4 describes the population and health system impact based on the ODEM analysis in a 40 year time horizon and the assumptions used to calculate the eligible population for a multi-disciplinary diabetes program.

Conclusions

Based on an analysis of an Ontario-specific model of diabetes care (ODEM) using data on clinical efficacy obtained from the above MAS systematic reviews, a multi-disciplinary diabetes programs would be considered cost-effective for the treatment and management of adults with type 2 diabetes.
Table 3: Summary of diabetes programs based on ODEM.

<table>
<thead>
<tr>
<th>Incremental Costs, QALYS, CE and Events per 1,000</th>
<th>Multi-disciplinary Diabetes Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>∆ HbA1c</td>
<td>-1.02%</td>
</tr>
<tr>
<td>∆ Costs</td>
<td>$7,551</td>
</tr>
<tr>
<td>∆ QALYs</td>
<td>0.390</td>
</tr>
<tr>
<td>$/QALY gained</td>
<td>$19,869/QALY</td>
</tr>
<tr>
<td>∆ IHD</td>
<td>20.5</td>
</tr>
<tr>
<td>∆ MI</td>
<td>54.9</td>
</tr>
<tr>
<td>∆ Heart Failure</td>
<td>11.5</td>
</tr>
<tr>
<td>∆ Stroke</td>
<td>18.9</td>
</tr>
<tr>
<td>∆ Amputation</td>
<td>17.7</td>
</tr>
<tr>
<td>∆ Blindness</td>
<td>8.3</td>
</tr>
<tr>
<td>∆ Renal Failure</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Table 4: Summary of health system impact based on ODEM.

<table>
<thead>
<tr>
<th>Incremental Costs, QALYs, CE and Events per 1,000</th>
<th>Multi-disciplinary Diabetes Program*</th>
</tr>
</thead>
<tbody>
<tr>
<td>∆ HbA1c</td>
<td>-1.02%</td>
</tr>
<tr>
<td>∆ Costs</td>
<td>$5,623</td>
</tr>
<tr>
<td>∆ QALYs</td>
<td>290,424</td>
</tr>
<tr>
<td>$/QALY gained</td>
<td>$19,869/QALY</td>
</tr>
<tr>
<td>∆ IHD</td>
<td>15,265</td>
</tr>
<tr>
<td>∆ MI</td>
<td>40,882</td>
</tr>
<tr>
<td>∆ Heart Failure</td>
<td>8,563</td>
</tr>
<tr>
<td>∆ Stroke</td>
<td>14,074</td>
</tr>
<tr>
<td>∆ Amputation</td>
<td>13,180</td>
</tr>
<tr>
<td>∆ Blindness</td>
<td>6,180</td>
</tr>
<tr>
<td>∆ Renal Failure</td>
<td>819</td>
</tr>
</tbody>
</table>

*All type 2 diabetes = 745,00
Community-Based Care for the Management of Heart Failure

Objective
The objective of this evidence-based review is to determine the effectiveness of specialized multidisciplinary care in the management of heart failure (HF).

Clinical Need: Target Population and Condition
HF is a progressive, chronic condition in which the heart becomes unable to sufficiently pump blood throughout the body. There are several risk factors for developing the condition including hypertension, diabetes, obesity, previous myocardial infarction, and valvular heart disease. Based on data from a 2005 study of the Canadian Community Health Survey (CCHS), the prevalence of congestive heart failure in Canada is approximately 1% of the population over the age of 12. This figure rises sharply after the age of 45, with prevalence reports ranging from 2.2% to 12%. Extrapolating this to the Ontario population, an estimated 98,000 residents in Ontario are believed to have HF.

Disease management programs are multidisciplinary approaches to care for chronic disease that co-ordinate comprehensive care strategies along the disease continuum and across healthcare delivery systems. Evidence for the effectiveness of disease management programs for HF has been provided by seven systematic reviews completed between 2004 and 2007 with consistency of effect demonstrated across four main outcomes measures: all cause mortality and hospitalization, and heart-failure specific mortality and hospitalization. While disease management programs are multidisciplinary by definition, however, the published evidence lacks consistency and clarity as to the exact nature of each program and usual care comparators are generally ill defined. Consequently, the effectiveness of multidisciplinary care for the management of persons with HF is still uncertain. Therefore, MAS has completed a systematic review of specialized, multidisciplinary, community-based disease management programs compared to a well-defined usual care group for persons with HF.

Evidence-Based Analysis of Effectiveness

Research Questions
What is the effectiveness of specialized, multidisciplinary, community-based care (SMCC) compared with usual care for persons with HF?

Inclusion Criteria
1. Randomized controlled trials
2. Systematic review with meta analysis
3. Population includes persons with New York Heart Association (NYHA) classification 1-IV HF
4. Intervention includes a team consisting of a nurse and physician, one of which is a specialist in HF management.
5. The control group receives care by a single practitioner (e.g. primary care physician (PCP) or cardiologist)
6. The intervention begins after discharge from the hospital
7. The studies reporting 1-year outcomes

Exclusion Criteria
1. The intervention is delivered predominately through home-visits
2. Studies with mixed populations where discrete data for HF is not reported
Outcomes of Interest

1. All cause mortality
2. All cause hospitalization
3. HF specific mortality
4. HF specific hospitalization
5. All cause duration of hospital stay
6. HF specific duration of hospital stay
7. Emergency room visits
8. Quality of Life

Search Strategy

A comprehensive literature search was completed of electronic databases including MEDLINE, MEDLINE In-Process and Other Non-Indexed Citations, EMBASE, Cochrane Library and Cumulative Index to Nursing & Allied Health Literature. Bibliographic references of selected studies were also searched. After a review of the title and abstracts, relevant studies were obtained and the full reports evaluated. All studies meeting explicit inclusion and exclusion criteria were retained. Where appropriate, a meta-analysis was undertaken to determine the pooled estimate of effect of specialized multidisciplinary community-based care for explicit outcomes. The quality of the body of evidence, defined as one or more relevant studies was determined using GRADE Working Group criteria (see Appendix)

Summary of Findings

One large and seven small randomized controlled trials were obtained from the literature search. A meta-analysis was completed for four of the seven outcomes including:

1. All cause mortality
2. HF-specific mortality
3. All cause hospitalization
4. HF-specific hospitalization

Where the pooled analysis was associated with significant heterogeneity, subgroup analyses were completed using two primary categories:

- direct and indirect model of care; and
- type of control group (PCP or cardiologist).

The direct model of care was a clinic-based multidisciplinary HF program and the indirect model of care was a physician supervised, nurse-led telephonic HF program.

All studies, except one, were completed in jurisdictions outside North America. Similarly, all but one study had a sample size of less than 250. The mean age in the studies ranged from 65 to 77 years. Six of the studies included populations with a NYHA classification of II-III. In two studies, the control treatment was a cardiologist and two studies reported the inclusion of a dietitian, physiotherapist and psychologist as members of the multidisciplinary team.

All Cause Mortality

Eight studies reported all cause mortality (number of persons) at 1 year follow-up. When the results of all eight studies were pooled, there was a statistically significant RRR of 29% with moderate heterogeneity ($I^2$ of 38%). The results of the subgroup analyses indicated a significant RRR of 40% in all cause mortality when SMCC is delivered through a direct team model (clinic) and a 35% RRR when SMCC was compared with a primary care practitioner.

HF -Specific Mortality
Three studies reported HF-specific mortality (number of persons) at 1 year follow-up. When the results of these were pooled, there was an insignificant RRR of 42% with high statistical heterogeneity ($I^2$ of 60%). The GRADE quality of evidence is moderate for the pooled analysis of all studies.

**All Cause Hospitalization**

Seven studies reported all cause hospitalization at 1-year follow-up. When pooled, their results showed a statistically insignificant 12% increase in hospitalizations in the SMCC group with high statistical heterogeneity ($I^2$ of 81%). A significant RRR of 12% in all cause hospitalization in favour of the SMCC care group was achieved when SMCC was delivered using an indirect model (telephonic) with an associated ($I^2$ of 0%). The Grade quality of evidence was found to be low for the pooled analysis of all studies and moderate for the subgroup analysis of the indirect team care model.

**HF-Specific Hospitalization**

Six studies reported HF-specific hospitalization at 1-year follow-up. When pooled, the results of these studies showed an insignificant RRR of 14% with high statistical heterogeneity ($I^2$ of 60%); however, the quality of evidence for the pooled analysis of was low.

**Duration of Hospital Stay**

Seven studies reported duration of hospital stay, four in terms of mean duration of stay in days and three in terms of total hospital bed days. Most studies reported all cause duration of hospital stay while two also reported HF-specific duration of hospital stay. These data were not amenable to meta-analyses as standard deviations were not provided in the reports. In general, however, it appears that persons receiving SMCC had shorter hospital stays, whether measured as mean days in hospital or total hospital bed days.

**Emergency Room Visits**

Only one study reported emergency room visits. This was presented as a composite of readmissions and ER visits, where the authors reported that 77% (59/76) of the SMCC group and 84% (63/75) of the usual care group were either readmitted or had an ER visit within the 1 year of follow-up ($P=0.029$).

**Quality of Life**

Quality of life was reported in five studies using the Minnesota Living with HF Questionnaire (MLHFQ) and in one study using the Nottingham Health Profile Questionnaire (results reported in the full MAS analysis). Two studies reported the mean score at 1 year follow-up, although did not provide the standard deviation of the mean in their report. One study reported the median and range scores at 1 year follow-up in each group. Two studies reported the change scores of the physical and emotional subscales of the MLHFQ, of which only one reported a statistically significant change from baseline to 1 year follow-up between treatment groups in favour of the SMCC group in the physical sub-scale. A significant change in the emotional subscale scores in the treatment groups was not reported in either study.
Economic Analysis

Note: The disclaimer information provided on page 12 applies to the following economic section. All figures are reported in Canadian Dollars averaged over 2009.

Table 5 reports the estimated costs for fiscal year (FY) 2008 of HF hospitalizations and HF hospital transfers to either a long-term care facility or home with support service care. Emergency room visits to manage heart failure patients cost approximately $15 million. Heart failure hospitalizations totalled approximately $214 million and long-term care transfers cost approximately $85 million. The approximate cost of managing persons with heart failure who are discharged home with support services is not estimable.

Table 6 reports the estimated costs with an estimated 25% decrease in HF hospitalizations and a 1 day reduction in hospital length of stay (LOS) with an intermediate care program. The anticipated cost savings per year is $67 million. Program costs have not been included in these estimates. These savings are not constant and numbers may change based on population trends, rate of intervention uptake, trends in current programs in place in the Province, and assumptions on costs. Further economic analysis is required to estimate the current situation in Ontario and downstream costs associated uptake.

Table 5: Cost Estimates for Fiscal Year (FY) 2008

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number of Visits</th>
<th>Total Costs ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF ER Visits</td>
<td>25,852</td>
<td>15</td>
</tr>
<tr>
<td>HF Hospitalizations</td>
<td>17,578</td>
<td>214</td>
</tr>
<tr>
<td>Hospital Transfers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long Term Care Facility</td>
<td>2,365</td>
<td>85</td>
</tr>
<tr>
<td>Home with support service (e.g., home care)</td>
<td>3,825</td>
<td>Not estimable</td>
</tr>
</tbody>
</table>

*Assumptions:
- ER Visits: Average total cost/case $579 (OCCI data, accessed June 11-2009)
- Hospitalization: Average total costs/case $12,405 and based on an average LOS 10 days (OCCI data, accessed June 11, 2009); costs only for hospitalization and ER visits and does not include physician costs.
- LTC provincial funding/bed $98.51 as of August 1, 2009
- Intermediate Care program costs are not included in the analysis

Table 6: Adjusted costs/yr as per 25% reduction in HF hospitalization from systematic review

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number of Visits</th>
<th>Costs/ YR ($M, CAD.)</th>
<th>Adjusted no. of Visits and LOS</th>
<th>Adjusted costs/ YR (Millions, CAD.)</th>
<th>Savings/ YR (millions, CAD.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF Hospitalizations</td>
<td>17,575</td>
<td>214</td>
<td>13,182</td>
<td>147</td>
<td>67</td>
</tr>
</tbody>
</table>

*Assumptions:
- Hospitalization: Average total costs/case $12,405 and based on an average LOS of 10 days (OCCI data, accessed June 11-2009); Cost/day $1240, costs only for hospitalization and does not include physician costs.
- Adjusted number of visits and LOS estimated with a 25% reduction in number of visits and a 1 day reduction in LOS.
- Intermediate care program costs are not included in these cost estimates
**Conclusion**

There is moderate quality evidence that SMCC:

1) Reduces all cause mortality by 29-40%
2) Reduces all cause hospitalization by 12 %
3) Reduction HF-specific hospitalization by 25-27%

There is low quality evidence that SMCC:

1) Reduces HF-specific mortality by 58%
2) Contributes to a shorter duration of hospital stay
3) Improves QoL compared to usual care

The evidence supports that SMCC is effective when compared to usual care provided by either a primary care practitioner or cardiologist. It does not, however, suggest an optimal model of care or discern what the effective program components are. A field evaluation could address this uncertainty.
Community-Based Care for Chronic Wound Management

Objective
The objective of this evidence-based review is to determine the effectiveness of a multidisciplinary wound care team for the management of chronic wounds.

Clinical Need: Target Population and Condition
Chronic wounds develop from various aetiologies including pressure ulcers, diabetes, venous pathology and surgery. 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, alone or in combination. Approximately 1.5 million Ontarians will sustain a pressure ulcer, 111,000 will develop a diabetic foot ulcer, and between 80,000 and 130,000 will develop a venous leg ulcer. Chronic leg ulcers are associated with decreased quality of life, restricted mobility, anxiety, depression, and severe or continuous pain.

Multidisciplinary Wound Care Team
Multidisciplinary wound care teams involve the coordinated effort of specialists from multiple disciplines operating in a collaborative manner. There is general consensus that a group of multidisciplinary professionals is necessary for optimum specialist management of chronic wounds stemming from all aetiologies. There is little evidence, however, to guide the decision of which professionals might be needed to optimize a wound care team.

Evidence-Based Analysis of Effectiveness
Research Questions
What are the effectiveness and cost-effectiveness of a community based, multidisciplinary care model for the treatment and management of chronic wounds.

Inclusion Criteria
- Randomized controlled trials and Controlled clinical Trials (CCT)
- Systematic reviews with meta analysis
- Population includes persons with pressure ulcers (anywhere) and/or leg and foot ulcers
- The intervention includes a multidisciplinary (2 or more disciplines) wound care team.
- The control group does not receive care by a wound care team
- Studies published in the English language between 2004 and 2009

Exclusion Criteria
- Single centre retrospective observational studies

Outcomes of Interest
- Proportion of persons and/or wounds completely healed
- Time to complete healing
- Quality of Life
- Pain assessment
Search Strategy

A literature search was performed on July 7, 2009 using OVID MEDLINE, MEDLINE In-Process and Other Non-Indexed Citations, OVID EMBASE, Wiley Cochrane, Centre for Reviews and Dissemination/International Agency for Health Technology Assessment, and on July 13, 2009 using the Cumulative Index to Nursing & Allied Health Literature (CINAHL), and the International Agency for Health Technology Assessment (INAHTA) for studies pertaining to leg and foot ulcers. A similar literature search was conducted on July 29, 2009 for studies pertaining to pressure ulcers. 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. Articles with an unknown eligibility were reviewed with a second clinical epidemiologist and then a group of epidemiologists until consensus was established.

Summary of Findings

Two studies met the inclusion and exclusion criteria, one randomized controlled trial (RCT) and a CCT using a before and after study design. Between the two studies, there was variation in setting, composition of the wound care team, outcome measure and follow-up period, but in both the wound care team members received training in wound care management and followed a wound care management protocol.

In the RCT by Vu et al., the authors reported a non-significant difference between the proportion of wounds healed in 6 months using a univariate analysis (61.7% vs. 52.5%, treatment vs. control, P=0.074, RR=1.19). There was also a non-significant difference in the mean time to healing (82 days vs. 101 days, treatment vs. control, p=0.095). More persons in the intervention group had a Brief Pain Inventory (BPI) score equal to zero (better pain control) at 6 months when compared with the control group (38.6% vs. 24.4%, intervention vs. control p=0.017, RR=1.58). By multivariate analysis a statistically significant hazard ratio was reported in the intervention group (1.73, 95% CI 1.20-1.50, P=0.003).

In the CCT by Harrison et al., the authors reported a statistically significant difference in healing rate between the pre (control) and post (intervention) phases of the study. Of patients in the pre phase, 23% had healed ulcers 3 months after study enrolment, whereas 56% were healed in the post phase (P<0.001, OR=4.17). As well, 27% of patients were treated daily or more often in the pre phase, while only 6% were treated at this frequency in the post phase (P<0.001), which is equal to a 34% relative risk reduction in frequency of daily treatments. The authors did not report the results of pain relief assessment.

The body of evidence was assessed using the GRADE methodology for 4 outcomes: proportion of wounds healed, proportion of persons with healed wounds, wound associated pain relief, and proportion of persons needing daily wound treatments. In general, the evidence is low to very low quality.

Conclusions

The evidence supports that managing chronic wounds with a multidisciplinary wound care team significantly increases wound healing and reduces the severity of wound-associated pain and the required daily wound treatments compared to persons not managed by a wound care team. The quality of evidence supporting these outcomes is low to very low meaning that further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Overall Conclusions

Clinical Efficacy

1. Community Programs for Diabetes Type 2

There is moderate quality evidence that specialized multidisciplinary community care provided by at least a registered nurse, registered dietitian and physician (primary care and/or specialist) is an effective model of care for the improvement of glycemic control. However, the effects of this model of care on SBP control are uncertain, based on very-low quality evidence. Specialized multidisciplinary community care provided by at least a pharmacist and primary care physician is also an effective model of care for the improvement of both glycemic control (based on high quality evidence) and SBP (based on moderate quality evidence).

Cost-effectiveness: Type 2 Diabetic Population – ODEM Analyses

Based on an analysis of an Ontario-specific model of diabetes care (ODEM), using data on clinical efficacy obtained from the above MAS systematic reviews, multi-disciplinary programs would be considered cost-effective for the treatment and management of adults with type 2 diabetes.

2. Community-Based Specialized Management for Heart Failure

There is moderate quality evidence that SMCC reduces all cause mortality by 29%. There is low quality evidence that SMCC contributes to a shorter duration of hospital stay and improves quality of life compared to usual care. The evidence supports that SMCC is effective when compared to usual care provided by either a primary care practitioner or a cardiologist. It does not, however, suggest an optimal model of care or discern what the effective program components are. A field evaluation could address this uncertainty.

3. Community-Based Care for Chronic Wound Management

The evidence supports that managing chronic wounds with a multidisciplinary wound care team significantly increases wound healing and reduces the severity of wound-associated pain and the required daily wound treatments compared to persons not managed by a wound care team. The quality of evidence supporting these outcomes is low to very low meaning that further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
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Christian Taylor, Medical Advisory Secretariat
### Appendix: GRADE Tool

**Table A1: GRADE tool for grading the quality of evidence and strength of recommendations**

<table>
<thead>
<tr>
<th>Number of Studies</th>
<th>Study Design</th>
<th>Quality of Studies</th>
<th>Consistency</th>
<th>Directness</th>
<th>Other Modifying Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>RCT = High</td>
<td>Serious limitation to study quality (-1)</td>
<td>Important inconsistency (-1)</td>
<td>Some uncertainty about directness (-1)</td>
<td>Association Strong (+1)</td>
</tr>
<tr>
<td></td>
<td>Observational = Low</td>
<td>Very Serious Limitation to study quality (-2)</td>
<td></td>
<td>Major uncertainty about directness (-2)</td>
<td>Association Very Strong (+2)</td>
</tr>
<tr>
<td></td>
<td>Any other evidence = Very Low</td>
<td></td>
<td></td>
<td></td>
<td>Dose Response Gradient (+1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Association Very Strong (+2)</td>
<td></td>
<td>All plausible confounders would have reduced the effect (+1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Imprecise or sparse data (-1)</td>
<td></td>
<td>High probability of reporting bias (-1)</td>
<td></td>
</tr>
</tbody>
</table>