

# **Diabetes Task Force**

## **Report to the Ministry of Health and Long-Term Care**

September 2004

*This report is dedicated to people with diabetes, who bear the burden of the disease, and to the caregivers who tend to their needs. This work is conducted in the shadow of the work of Drs. Banting and Best who discovered insulin in this province. As such, the Task Force would like to see Ontario, once again, placed in a position of international excellence in maximizing patient outcomes for diabetes.*

*The Task Force report is also dedicated to the late Dr. Bernie O'Brien and Dr. Hui Lee whose tragic and untimely deaths occurred during their time with the Task Force. Drs. O'Brien and Lee were young, enthusiastic and brilliant individuals whose work on the Task Force was instrumental in allowing new solutions to be considered. Their memory is an inspiration to all who knew them.*

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## EXECUTIVE SUMMARY

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Diabetes Mellitus (diabetes) is a chronic illness that affects 706,500 people, or 7.5% of Ontario's population. In the last decade, the number of people with diabetes in Ontario has doubled and could reach 1.2 million by 2010.

Significant lifestyle changes are required to manage not only diabetes, but also other co-existing conditions associated with diabetes, such as hypertension and dyslipidemia, as well as to prevent the complications of diabetes including cardiovascular disease. Diabetes and its complications contribute significantly to the burden of illness:

- life expectancy of people with diabetes is 13 years less than people without diabetes;
- almost one quarter of people who died in Ontario in 1997 had diabetes
- the risk of end stage renal disease (kidney disease) is 13 times higher in people with diabetes compared with people without diabetes; <sup>1</sup>
- 70 percent of lower extremity amputations are performed on people with diabetes;
- cardiovascular disease accounts for about 70% of deaths among people with diabetes;
- hospitalizations for stroke are approximately 3-fold higher in people with diabetes compared to people without diabetes; <sup>2</sup>
- diabetic retinopathy is the leading cause of blindness in Canadians aged 30 to 69; <sup>3</sup>
- the age at which acute myocardial infarction (AMI) is seen is 15 to 20 years earlier for people with diabetes; <sup>4</sup>
- on average, people with diabetes receive surgical treatment for vascular disease 20 years earlier than people without diabetes.

Tight control of blood glucose (glycemic) levels has been shown to significantly reduce the risk of developing complications of diabetes. It has been shown that every 1% drop in the hemoglobin A1C, an index of averaged blood glucose levels, is associated with a 14% decrease in the incidence of acute myocardial infarction and a 16% decrease in heart failure rates.<sup>5</sup> Studies have also shown that complications of diabetes can be reduced by optimizing blood pressure and lipid

levels and by having regular foot and eye care. Dietary modifications, increased physical activity and smoking cessation are also positively associated with better outcomes for people with diabetes.

The current health system is geared towards addressing acute episodes of care of persons with diabetes. However, comprehensive diabetes management including effective blood glucose control, management of co-existing cardiovascular risk factors such as hypertension and dyslipidemia and screening for complications cannot be effectively delivered in such a context.

Evidence from *Diabetes in Ontario: An ICES Practice Atlas* illustrates numerous gaps between current care delivery and evidence-based practice as well as high levels of avoidable complications. For example, over a seven year period from 1992 to 1999, 87,425 Ontarians with diabetes had at least one hospitalization or emergency room visit for abnormally high or low blood glucose even though such hospitalizations should be largely avoidable with effective out-patient diabetes management. Screening and early treatment of diabetic eye disease has been proven to prevent blindness, yet only 51% of persons with newly-diagnosed diabetes received recommended screening within one year of diagnosis of type 2 diabetes. Selected medications have been repeatedly demonstrated to reduce the risk of diabetes complications, yet these drugs are consistently under-prescribed. In 1999, over 900 Ontarians with diabetes underwent a major amputation and over 500 lost a portion of a foot even though the risk of such events can be reduced substantially with effective foot care and aggressive management of vascular risk factors. Diabetes now accounts for more than half of new cases of end-stage kidney disease and has become the major contributor to the growing demand for dialysis. The numbers of dialysis starts increased by 84% among persons with diabetes between 1995 and 2000 while increasing by less than 10% in the non-diabetic population a trend in part related to the under-use of appropriate blood pressure medication in persons at risk.

In acknowledgment of the startling figures of the growing pervasive nature of diabetes, and its dramatic impact on the health of Ontario's population, as reported in *Diabetes in Ontario: An ICES Practice Atlas (2003)*<sup>6</sup>, the Ontario Ministry of Health and Long-Term Care established the Task Force in 2003 to advise the Ministry of the best methods for reducing the burden of diabetes on the Ontario population. Concerns were raised that Ontario's health care services

might not be effectively directed at improving treatment for persons suffering from diabetes.

The aim of the Task Force was not to provide comprehensive recommendations covering all aspects of diabetes prevention and care, but to focus on priority areas deemed by the Task Force to be the most pressing issues which would achieve maximum impact in improving outcomes for people with diabetes and the population as a whole. As such, the Task Force has made twelve high-level recommendations:

1. Reduce waiting times for structured diabetes education and care in the province by improving access from the present level of 28% of people diagnosed with diabetes to at least 50%, over the next three years progressing to 100% thereafter.
2. Ensure that access to high-quality, provincially standardized and integrated, structured diabetes education and care is provided in Ontario based on a provincial framework.
3. Improve patient outcomes for people with diabetes by providing high-quality, integrated care within a provincial framework and provide structured diabetes education and care predominantly through multidisciplinary, community-based, primary care services.
4. Improve access to eye exams and treatment of retinal complications.
5. Implement hospital-based diabetes resource teams for complex inpatient care.
6. Develop comprehensive, rational, long-term funding strategies that are fair to all people with diabetes and demonstrate downstream improvements in patient outcomes.
7. Improve access to insulin, insulin needles, insulin pumps, glucose testing strips and lancets.
8. Fund studies to determine the barriers to accessing anti-hyperglycemic agents, lipid-lowering drugs, anti-hypertensives and ACE inhibitors for people with diabetes and ways in which removing these barriers could improve compliance and patient outcomes.

9. Provide direct research funding to enhance the level of evidence for clinical care and delivery of diabetes care.
10. Use the newly-developed, Ontario-specific economic model to help the government make decisions regarding new interventions.
11. Ensure that a comprehensive strategy is developed to support an enabling environment to increase physical activity and healthy eating.
12. Provincial and federal governments should consider implementing new policies that provide incentives and facilitate access (including affordability) to healthy foods, such as fruits and vegetables.

Members of the Task Force feel privileged that they were asked to make this contribution to addressing one of the most important chronic diseases facing the people of Ontario. The Task Force recommends that an implementation committee be appointed as soon as possible, if the recommendations are acceptable to the Minister.

# TABLE OF CONTENTS

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|   |           |
|---|-----------|
| EXECUTIVE SUMMARY.....  | IX        |
| TABLE OF CONTENTS .....   | XIII      |
| INTRODUCTION .....  | 1         |
| <i>Type 1 Diabetes</i> .....  | 1         |
| <i>Type 2 Diabetes</i> .....  | 1         |
| <i>Impaired Glucose Tolerance (IGT) and Impaired Fasting Glucose (IFG)</i> .....  | 3         |
| <i>Gestational Diabetes</i> .....   | 3         |
| <i>Risk Management</i> .....  | 4         |
| <i>Economic Burden</i> .....  | 4         |
| <i>Current Services and Programs in Ontario for People with Diabetes</i> .....  | 6         |
| <i>Diabetes Task Force</i> .....  | 6         |
| <b>ACCESS TO STRUCTURED EDUCATION AND CARE.....</b>   | <b>9</b>  |
| RECOMMENDATION 1: REDUCE WAITING TIMES .....  | 9         |
| RECOMMENDATION 2: IMPROVE ACCESS TO STANDARDIZED STRUCTURED DIABETES EDUCATION AND<br>CARE IN ONTARIO .....   | 13        |
| RECOMMENDATION 3: PROVIDE REGIONALLY-ALIGNED STRUCTURED EDUCATION AND CARE SERVICES<br>WITHIN THE PROVINCIAL FRAMEWORK .....                                  | 15        |
| RECOMMENDATION 4: IMPROVE ACCESS TO EYE EXAMS & TREATMENT OF RETINAL COMPLICATIONS .  | 20        |
| RECOMMENDATION 5: IMPLEMENT HOSPITAL-BASED DIABETES RESOURCE TEAMS FOR COMPLEX INPATIENT<br>CARE .....  | 22        |
| <b>ACCESS TO DRUGS, DEVICES AND SUPPLIES.....</b>   | <b>23</b> |
| RECOMMENDATION 6: DEVELOP LONG-TERM COMPREHENSIVE AND RATIONAL FUNDING STRATEGIES FOR<br>DRUGS, DEVICES AND SUPPLIES THAT REFLECT THE CONTINUUM OF CARE. .... | 23        |
| RECOMMENDATION 7: IMPROVE ACCESS TO INSULIN, INSULIN NEEDLES, INSULIN PUMPS, GLUCOSE<br>TESTING STRIPS AND LANCETS. ....                                      | 27        |
| RECOMMENDATION 8: ADDRESS BARRIERS FOR PATIENTS TO ACCESSING DRUGS.....   | 29        |
| RECOMMENDATION 9: IMPROVE EVIDENCE FOR DIABETES CARE.....   | 30        |
| <b>ECONOMICS .....</b>  | <b>31</b> |
| RECOMMENDATION 10: USE ECONOMIC MODELING TO PRIORITIZE INVESTMENTS.....   | 31        |
| <b>PREVENTION .....</b>   | <b>33</b> |
| RECOMMENDATION 11: INCREASE PHYSICAL ACTIVITY AND HEALTHY EATING.....   | 33        |
| RECOMMENDATION 12: FACILITATE ACCESS TO HEALTHY FOODS.....  | 38        |
| <b>EVALUATION .....</b>   | <b>39</b> |
| <b>COSTING .....</b>  | <b>44</b> |

**APPENDIX A – CURRENT DIABETES PROGRAMS AND SERVICES PROVIDED BY THE ONTARIO  
MINISTRY OF HEALTH AND LONG-TERM CARE .....45**

**APPENDIX B – DIABETES TASK GROUP TERMS OF REFERENCE .....52**

**APPENDIX C – ONTARIO COST CALCULATION FOR INSULIN INFUSION PUMPS AND GLUCOSE  
TESTING STRIPS. ....58**

**REFERENCES .....60**

## **INTRODUCTION**

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Diabetes Mellitus (diabetes) is a chronic illness that affects 706 500 people, or 7.5 percent of Ontario's population. Each year, 53 600 people are diagnosed with diabetes. In the last decade, the number of people with diabetes in Ontario has doubled and could reach 1.2 million by 2010. Estimates suggest that the number of people with undiagnosed diabetes equals those with diagnosed diabetes.

The aging of the population combined with people living longer with the disease is expected to result in an increase in the number of people with diabetes. Rates of diabetes increase dramatically in middle age, and are highest in older age groups.

Diabetes is a chronic metabolic condition in which the body does not produce insulin or is unable to utilize the insulin it does produce. Without insulin, the body is unable to use glucose in the blood for energy. Chronically high blood glucose levels can lead to serious complications such as eye disease, kidney disease, nerve damage, heart disease, and stroke. There are several types of diabetes mellitus: type 1, type 2, and gestational.

### **Type 1 Diabetes**

In type 1 diabetes the body does not produce any insulin because the pancreatic beta cells have been destroyed by the body's immune system. People with type 1 diabetes must supply their bodies with insulin through daily injections; for this reason, type 1 diabetes was formerly referred to as insulin-dependent or juvenile diabetes mellitus.

Type 1 diabetes is most often diagnosed in people under the age of 20. Approximately 5–10 % of people with diabetes have type 1. There are no known modifiable risk factors for type 1 diabetes; this type of diabetes is not preventable at the present time.

### **Type 2 Diabetes**

In Type 2 diabetes, the body's cells and tissues do not fully respond to insulin, resulting in a need for the pancreatic beta cells to produce more insulin in an

attempt to bring blood sugar levels down to normal. Because the insulin isn't being used effectively, not enough glucose is available to the body's cells for their energy needs. To compensate for the reduced availability of glucose, the liver releases extra glucose from the glycogen it has previously stored. Over time, the pancreatic beta cells produce more and more insulin, while the body's cells become more and more resistant to insulin. The result is high levels of glucose in the blood and the development of type 2 diabetes. Eventually the beta cells are no longer able to produce extra insulin leading to a further increase in blood glucose levels. The majority of people who have type 2 diabetes are unable to manage their diabetes without oral medications or insulin to lower their blood glucose levels..

Approximately 90–95% of people with diabetes have type 2 diabetes. Unlike type 1 diabetes, type 2 diabetes is most prevalent in people aged 40 and older. Although type 2 diabetes was historically diagnosed only in older people, people younger than 20 years of age are now being diagnosed with type 2 diabetes more frequently than in the past and this has been linked to the increasing prevalence of obesity and physical inactivity among children.

Risk factors for type 2 diabetes include:

- age 40 or older;
- a first degree relative with diabetes;
- member of a high risk population (Aboriginal, Hispanic, South Asian, Asian or African descent);
- history of Impaired Glucose Tolerance(IGT)/Impaired Fasting Glucose (IFG) (also known as pre-diabetes);
- presence of complications associated with diabetes;
- vascular disease;
- history of gestational diabetes;
- history of delivering a macrosomic infant (> 4500g);
- hypertension (high blood pressure);
- dyslipidemia (elevation of total cholesterol, low-density lipoprotein (LDL) cholesterol and triglyceride concentrations, and a decrease in high-density lipoprotein (HDL) cholesterol concentration in the blood);
- overweight;
- abdominal obesity (excess body fat around the stomach area);

- polycystic ovarian syndrome (an insulin resistance condition in women that affects ovulation and can also affect metabolism);
- acanthosis nigricans (skin manifestation characterized by dark, thick, velvety skin in body folds and creases);
- schizophrenia. <sup>7</sup>

## **Impaired Glucose Tolerance (IGT) and Impaired Fasting Glucose (IFG)**

IGT and IFG are terms used to describe conditions in which an individual has blood glucose levels that are higher than normal but not high enough to be considered diabetes; the term pre-diabetes is also used. Identifying people with IGT and IFG is important as there is evidence to suggest that progression from IGT/IFG to type 2 diabetes can, in some cases, be prevented through increased physical activity and weight loss as well the use of certain medications.

Approximately 2–12% of patients with IFG/IGT/year will develop diabetes.<sup>8,9,10,11</sup>

## **Gestational Diabetes**

Gestational diabetes mellitus occurs in about 4% of pregnant women and is usually detected between the 24<sup>th</sup> and 28<sup>th</sup> weeks of pregnancy. Gestational diabetes occurs as a result of some of the hormones produced as the fetus grows and develops, blocking the action of insulin. If a woman's body isn't able to produce enough extra insulin to compensate for this resistance to insulin, she will develop gestational diabetes. By definition, gestational diabetes resolves once the pregnancy is over.

This report does not specifically address gestational diabetes; however, it is important to note that women who have had gestational diabetes have a 17% to 63% chance of developing type 2 diabetes within 5 to 16 years.<sup>12</sup>

Diabetes requires daily, on-going attention and close monitoring. Significant lifestyle changes are required to manage not only diabetes, but also other co-existing conditions associated with diabetes, such as hypertension and, dyslipidemia as well as to prevent complications of diabetes including cardiovascular disease. Diabetes and its complications contribute significantly to the burden of illness:

- life expectancy of people with diabetes is 13 years less than people without diabetes;
- almost one quarter of people who died in Ontario in 1997 had diabetes
- the risk of end stage renal disease (kidney disease) is 13 times higher in people with diabetes compared with people without diabetes; <sup>1</sup>
- 70 percent of lower extremity amputations are performed on people with diabetes;
- cardiovascular disease accounts for about 70% of deaths among people with diabetes;
- hospitalizations for stroke are approximately 3-fold higher in people with diabetes compared to people without diabetes; <sup>2</sup>
- diabetic retinopathy is the leading cause of blindness in Canadians aged 30 to 69; <sup>3</sup>
- the age at which acute myocardial infarction(AMI) is seen is 15 to 20 years earlier for people with diabetes; <sup>4</sup>
- on average, people with diabetes receive surgical treatment for vascular disease 20 years earlier than people without diabetes;

## **Risk Management**

Tight control of blood glucose (glycemic) levels has been shown to significantly reduce the risk of developing complications of diabetes. It has been shown that every 1% drop in the hemoglobin A1C, an index of averaged blood glucose levels, is associated with a 14% decrease in the incidence of acute myocardial infarction and a 16% decrease in heart failure rates.<sup>5</sup> Studies have also shown that complications of diabetes can be reduced by optimizing blood pressure and lipid levels and by having regular foot and eye care. Dietary modifications, increased physical activity and smoking cessation are also positively associated with better outcomes for people with diabetes. Due to its complexity and multi-faceted nature, management of diabetes is most effectively achieved by self-management by the patient, with education, support and planned visits to a team of health care providers, including the patient's family physician.

## **Economic Burden**

A Canadian study reported by Dawson et al. determined that the direct medical cost (hospital services, physician services and prescription medications) to the

health system for treating diabetes, excluding complications, was \$573M (US) in 1998.<sup>13</sup> Chronic complications added \$921M in direct costs: 24.3% for cardiovascular disease, 5.7% for neurological disease, 2.4% for peripheral vascular disease and 1.9% for renal disease.

A second Canadian study<sup>14</sup> examined the costs of treating complications of diabetes both in terms of event costs and state costs: event costs include the acute episode and care in the subsequent year; state costs include the annual costs of continued management of the complication after first year. Data were obtained from Canadian sources, including the Ontario Case Cost Project. The study reported significantly higher costs associated with complications in advanced stages (major events) compared with early stages of the complication. For example, microalbuminuria (the earliest stage of diabetes-related kidney damage) had an event cost of \$62 and a state cost of \$10 (does not include use of angiotensin-converting inhibitors); whereas, end-stage kidney disease had a state cost of \$63,045 (2000 Canadian dollars). Costs for other complications of diabetes included:

- acute myocardial infarction – \$18,635 event cost, \$1,193 state cost;
- angina – \$3,183 event cost, \$1,485 state cost;
- ischemic stroke – \$33,256 event cost, \$8,769 state cost;
- transient ischemic attacks – \$3,262 event cost, \$73 state cost.

No studies of the costs associated with treating diabetes in Ontario could be found. However, a study from Saskatchewan, based on administrative data, showed a cost of \$134.3 million to provide care for 38,124 people with diabetes in Saskatchewan in 1996. Hospitalization costs accounted for approximately 55% of the total costs, followed by prescription medications, physician services, dialysis services and day surgical procedures. On average, the cost per person to the health system was \$3,524 including prescriptions and \$2,768 excluding prescriptions. Overall, 36.4% of costs were attributable to treating major comorbidities that could have been prevented through better control of diabetes: 26% for cardiovascular complications, 7.5% for renal services and 2.5% for ophthalmologic services. Costs increased significantly for people with a major comorbidity.<sup>15</sup> Over the last decade, application of advances in the pharmacotherapy of diabetes has led to substantially higher drug expenditures<sup>6</sup> so that these figures are likely to underestimate current costs.

Although it is difficult to determine the out-of-pocket costs incurred by people with diabetes, estimates produced by the Ministry of Health and Long Term Care suggest that the annual costs for insulin and supplies for people with type 1 diabetes are \$1000 for those with Ontario Drug Benefit Program (ODB) or third-party coverage and \$3500 for those without any coverage. Similarly, the costs for people with type 2 diabetes (and requiring insulin) are \$500 for those with ODB or third-party coverage and \$1600 for those without any coverage.

### **Current Services and Programs in Ontario for People with Diabetes**

In addition to the programs and services available to all residents of Ontario, the Ministry of Health and Long Term Care provides funding for the following diabetes-specific programs:

- Northern Diabetes Health Network;
- Ontario Aboriginal Diabetes Initiative;
- Diabetes Complication Prevention Strategy;
- Pediatric Diabetes Initiative;
- Primary Prevention (type 2 Diabetes) Initiative.

For Ontario residents who have diabetes, Diabetes Education Centres provide diabetes-specific education and care either in hospitals or in the community. In addition, people with diabetes who require insulin can apply for financial assistance for devices (not including insulin pumps) and supplies through the Ontario Monitoring for Health Program.

Details of these programs are provided in Appendix A.

The current title of most programs providing structured education and care is Diabetes Education Programs or Diabetes Education Centres; however, these centres provide both education and care. In this report, these centres will be referred to as diabetes education and care centres (DECCs).

### **Diabetes Task Force**

The current health system is geared towards addressing acute episodes of care of persons with diabetes. However, comprehensive diabetes management including effective blood glucose control, management of co-existing

cardiovascular risk factors such as hypertension and screening for complications cannot be effectively delivered in such a context. Evidence from *Diabetes in Ontario: An ICES Practice Atlas* illustrates numerous gaps between current care delivery and evidence-based practice as well as high levels of avoidable complications. For example, over a seven year period from 1992 to 1999, 87,425 Ontarians with diabetes had at least one hospitalization or emergency room visit for abnormally high or low blood glucose levels even though such hospitalizations should be largely avoidable with effective out-patient diabetes management. Screening and early treatment of diabetic eye disease has been proven to prevent blindness yet only 51% of persons with newly-diagnosed diabetes received recommended screening within one year of diagnosis of type 2 diabetes. Selected medications have been repeatedly demonstrated to reduce the risk of diabetes complications yet these drugs are consistently under-prescribed to Ontario seniors. In 1999, over 900 Ontarians with diabetes underwent a major amputation and over 500 lost a portion of a foot even though the risk of such events can be reduced substantially with effective foot care and aggressive management of vascular risk factors. Diabetes now accounts for more than half of new cases of end-stage kidney disease and has become the major contributor to the growing demand for dialysis. The numbers of dialysis starts increased by 84% among persons with diabetes between 1995 and 2000, while increasing by less than 10% in the non-diabetic population; a trend in part related to the under-use of appropriate blood pressure medication in persons at risk.

In acknowledgment of the startling figures of the growing and pervasive nature of diabetes, and its dramatic impact on the health of Ontario's population, as reported in *Diabetes in Ontario: An ICES Practice Atlas (2003)*, the Ontario Ministry of Health and Long-Term Care established the Task Force in 2003 to advise the Ministry of the best methods for reducing the burden of diabetes on the Ontario population. In December 2003, the Canadian Diabetes Association updated its diabetes clinical practice guidelines in the *Canadian Diabetes Association 2003 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada (CDA Guidelines)*. The CDA guidelines were based on current evidence and were the basis of many of the recommendations made by the Task Force. Concerns were raised that Ontario's health care services might not be effectively directed at improving treatment for persons suffering from diabetes.

The Task Force terms of reference are provided in Appendix B.

The aim of the Task Force was not to provide comprehensive recommendations covering all aspects of diabetes prevention and care, but to focus on areas deemed by the Task Force to be those which would achieve maximum impact in improving outcomes for people with diabetes and the population as a whole. As such, twelve high-level recommendations that are specific enough to be implemented have been proposed, but the implementation methods have been left to the MOHLTC.

The Task Force did not propose specific recommendations for high risk groups, such as ethno-cultural groups, as the needs of these groups were seen to be met by the high-level recommendations. It was assumed that the specific needs of high risk groups would be taken into consideration at the regional level during implementation, as high risk groups vary between regions.

Since 2002, the Ministry of Health and Long Term Care (MOHLTC) has worked with Ontario Aboriginal organizations to develop an Ontario Aboriginal Diabetes Strategy (OADS). The OADS Steering Committee developed a comprehensive policy document outlining key policy principles and objectives for MOHLTC-funded Aboriginal diabetes programming according to the following five themes:

- Prevention
- Care and Treatment
- Education
- Research
- Coordination

The Task Force fully supports the OADS and, therefore, did not include specific recommendations for Ontario's Aboriginal population.

Clinical and epidemiological information about diabetes and its complications has been provided in this report as background information. The information provided is limited to that which is relevant to the recommendations and is not

a comprehensive review of diabetes care and prevention. Where applicable, additional information has been provided in appendices.

## **ACCESS TO STRUCTURED EDUCATION AND CARE**

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### **Recommendation 1: Reduce Waiting Times**

Reduce waiting times for structured diabetes education and care in the province by improving access from the present level of 28% of people diagnosed with diabetes to at least 50%, over the next three years, progressing to 100% thereafter. This increase will allow 180,000 additional people with diabetes to access structured education and care which have been shown to maximize self-management and reduce downstream complications and costs.<sup>16,17</sup> Structured education and care is provided by health professionals specifically trained in diabetes and uses planned visits and evidence-based care, as outlined in practice guidelines.

Increase capacity by hiring at least 135 full time equivalent (FTE) registered nurses and 135 full time equivalent registered dietitians for adult diabetes programs in Southern Ontario over the next three years and provide and fund diabetes training as required for these nurses and dietitians. Since the ultimate goal is to have all people with diabetes access structured programs, there will need to be a sustained recruitment effort for additional nurses and dietitians beyond the three year horizon.

- a. To address the shortage of dietitians in Ontario, work directly with Dietitians of Canada to increase the number of internship positions for dietitians graduating from Ontario universities and work with Dietitians of Canada and the College of Dietitians of Ontario to find ways of enabling dietitians educated in other countries to practice in Ontario.
- b. Establish guidelines for defining, prioritizing, monitoring and managing processes for waiting times.
- c. Evaluate and refine the current benchmark for diabetes healthcare teams of 1 registered nurse FTE and 1 registered dietitian FTE per 1000 patients diagnosed with diabetes, based on:
  - differing patient complexities (new and established);

- broader spectrums of care delivery (risk factor modification);
- other health professionals being added to the team;
- education delivery methods (group versus individual);
- differing service intensities (education versus management);
- cultural make-up of the community;
- geographic considerations.

## **Rationale**

In June 2004, the Task Force, through BearingPoint, undertook a gap analysis by surveying 125 diabetes education and care centres (DECCs) in southern Ontario to gather information about the current service levels and planned program expansion of DECCs.<sup>18</sup> The survey was restricted to southern Ontario because northern Ontario is served by the Northern Diabetes Health Network and has already established its human resource requirements to the levels proposed in this recommendation.

Eighty DECCs responded before the deadline, for a response rate of 64%.

The results from the 2004 survey were compared to a similar survey from 2001. Despite issues around waiting time definitions and data capture, the results of the 2004 survey showed that waiting time for DECCs have increased since 2001, with 71% of DECCs reporting an average increase of 17.3 days. On average, clients have a 26-day waiting period for their first appointment with a diabetes educator (range=7 to 75 days). The waiting times reported in the survey are considered to be conservative estimates and do not include the 72% of people with diabetes who have not accessed these services at all. Implementing consistent definitions for waiting times would allow more accurate data capture and comparisons of waiting times both between DECCs and over time.

Data from the 2004 survey were used to determine the current percentage of people with diabetes being served by DECCs. Because many DECCs did not provide complete information on staffing and the number of clients seen, it was necessary to supplement the survey data with data from the MOHLTC. Details of the methods are provided in the complete gap analysis report. The average

percentage of people with diabetes being served by the 94 DECCs included in the analysis was 28%, with a range of 21% to 35% between regions (Table 1).

A human resources gap analysis was used to identify additional human resources required to provide service to varying percentages of people with diabetes in Ontario. In March 2001, a benchmark of 1.0 FTE team (1.0 RN FTE & 1.0 RD FTE) per 1,000 clients was established for southern Ontario. This benchmark was based on a literature review and scan of national and international diabetes programs for examples of resource allocation (none were found), a provincial workshop with an expert panel, and a review of DECC statistics for resource allocation.

Client need was estimated from service utilization (the number of patients using service) and prevalence (number of people with diabetes), based on the following assumptions: a case mix ratio of 50% newly-diagnosed people with diabetes and 50% established clients; new clients requiring 5 hours of service and established clients requiring two hours of service; a delivery method of 40% group sessions and 60% individual sessions. Further work is required to evaluate and refine this benchmark to include:

- differing case mix ratios of newly-diagnosed and established clients because the number new clients and previous clients (established) may not be 50% new and 50% existing for all DECCs;
- broadened spectrum of care to include risk factor modification (management of hypertension and lipid abnormalities, smoking cessation) in addition to education and optimizing blood glucose control;
- other health professionals being added to the team—inclusion of other health professional such as social workers, pharmacists, chiropodists/podiatrists, etc. will require a shift in roles and responsibilities;
- differing education delivery mixes—the mix of group versus individual sessions at each DECC may vary and individual sessions generally require more resources;
- differing service intensities—DECCs may vary in the amount of education versus management they do and more time spent on patient care requires greater resources and different staff qualifications;

- cultural make-up of the community—DECCs may vary in the populations they serve and will require varying resources to be able to deliver appropriate care to special populations;
- geographic considerations—DECCs that are geographically isolated require different methods of delivering education and care and may require different staff ratios and mixes.

The human resource gap analysis based on the 1 RN FTE & 1RD FTE per 1000 people with diabetes for each region is outlined in Table 1. The Task Force believes that the existing staffing ratio is very conservative as it does not factor in increasing complexities of diabetes care and expectations of outcomes.

**Table 1: Human Resource Analysis.**

| Region                   | Current number of FTE Teams* | Number of People with Diabetes | Current capacity to provide services to people with diabetes | Change in FTE teams* required to serve the following percent of people with diabetes |      |      |       |
|--------------------------|------------------------------|--------------------------------|--|--|------|------|-------|
|                          |                              |                                |  | 25%  | 30%  | 40%  | 50%   |
| Central East             | 35.1                         | 99,424                         | 35%  | 0.0  | 0.0  | 4.7  | 14.7  |
| Central South            | 14.0                         | 66,119                         | 21%  | 2.5  | 5.8  | 12.4 | 19.0  |
| Central West             | 25.2                         | 102,862                        | 24%  | 0.5  | 5.6  | 15.9 | 26.2  |
| East                     | 25.6                         | 84,906                         | 30%  | 0.0  | 0.0  | 8.3  | 16.8  |
| South West               | 23.7                         | 86,450                         | 27%  | 0.0  | 2.2  | 10.9 | 19.5  |
| Toronto                  | 49.4                         | 176,065                        | 28%  | 0.0  | 3.4  | 21.0 | 38.6  |
| Southern Ontario (Total) | 173.0                        | 615,826                        | 28%  | 3.0  | 17.1 | 73.3 | 134.9 |

\* 1 full time equivalent (FTE) team = 1 registered nurse (RN) and 1 registered dietitian (RD).

Ideally, 100% of people with diabetes should have access to structured education and care. However, building capacity to provide these services takes time; therefore, the recommended three-year goal is 50%.

Priority should be given to people with diabetes who are newly-diagnosed and to those who have never accessed the services of a DECC.

Certification as a diabetes educator is preferred but should not be a requirement for applicants applying for the new RN/RD positions because having a minimum of 800 hours of experience in direct diabetes education in the last 3 years is an eligibility requirement for certification<sup>19</sup>; as such, this requirement would disqualify otherwise qualified nurses and dietitians transferring from other areas into diabetes and prevent them from applying for these positions. Nurses and dietitians who are new to diabetes should receive subsidized training through a college approved program. Currently, 81% of registered nurses and 86% of registered dietitians working in DECCs in Southern Ontario are Certified Diabetes Educators.

### **Recommendation 2: Improve Access to Standardized Structured Diabetes Education and Care in Ontario**

Ensure that access to high-quality, provincially-standardized and integrated, structured diabetes education and care is provided in Ontario based on a provincial framework:

- providing province-wide coordination of information systems to support regional decision-making and quality improvement;
- developing province-wide performance measures with standardized definitions and data collection methodology;
- establishing province-wide sharing of performance measures, achievable benchmarks and best practices
- standardizing data collection and reporting requirements for all MOHLTC diabetes services within the province.
- promulgating and measuring adherence to provincially determined standards and guidelines;
- establishing standardized electronic tracking of lab data and exploring home monitoring for high acuity patients;
- integrating diabetes care with management of other chronic diseases;
- enhancing the Ontario Diabetes Database;

- developing an inventory of resources (clinical and educational) and links to diabetes websites and providing access to both health professionals and the general public.

Any health system changes to enhance care of patients with diabetes should be integrated with the Ministry of Health and Long Term Care's current initiatives, for example, primary care reform, chronic disease management and the transformation agenda.

Because the Network of Northern Ontario Diabetes Programs and the Network of Ontario Pediatric Diabetes Programs (managed by the Northern Diabetes Health Network) are working well, the current structures, processes and management of these networks should not be disrupted in implementing these recommendations, but they should also benefit from any enhancements to the system. The NDHN should be an active participant in implementing these recommendations and receive similar enhancements to prevention and care as outlined in these recommendations.

Similarly, while the Task Force recognizes and supports the Aboriginal Diabetes Strategy (ADS), the ADS should also benefit, as appropriate, from the enhancements outlined in these recommendations.

## **Rationale**

Evidence from systematic reviews of structured education and care indicates that structured education and care is an effective approach to managing diabetes.<sup>17,20</sup>

Information systems have been shown to facilitate and improve information sharing between team members and health providers.<sup>7</sup> However, sharing information electronically between providers requires that systems be compatible. Some diabetes programs already have, or are in the process of developing, electronic information systems. However, as illustrated through the analysis of waiting times for DECCs in Southern Ontario, varying definitions and data collection methods make it very difficult to make comparisons between DECCs. Thus, province-wide coordination is required to ensure that data can be

shared and that there is consistency in data capture methods and data definitions.

Electronic information systems alone may not, however, improve patient outcomes: they may increase the number of A1C and cholesterol tests that are ordered but may not lead to better control of A1C and cholesterol levels if the appropriate follow-up care is not provided.<sup>10</sup> Establishing province-wide performance measure with consistent data definitions would allow achievable benchmarks to be established and would promote best-practices.

The Ontario Diabetes Database (ODD) was used to produce *Diabetes in Ontario: An ICES Practice Atlas*. The findings reported were instrumental in identifying not only the prevalence and incidence of diabetes, but also risk factors, service utilization, drug utilization and rates of complications for people with diabetes. Services and drug utilization were compared to evidence-based clinical practice guidelines to identify gaps in care and areas requiring improvement and formed the basis for much of the Task Group's report. The ODD will be valuable in tracking the burden and distribution of the diabetes epidemic, assessing the outcomes of changes to current system and could be used to apply similar methods to determine changes in care over time. Because the ODD relies heavily on OHIP claims data for identifying persons with DM, attention needs to be given to the capacity for ongoing capture of diagnostic and utilization data as primary care shifts toward non-fee-for-service reimbursement arrangements.

### **Recommendation 3: Provide Regionally-Aligned Structured Education and Care Services within the Provincial Framework**

Improve patient outcomes for people with diabetes by providing high-quality, integrated care within a provincial framework outlined in Recommendation 2. Provide structured diabetes education and care predominantly through multidisciplinary, community-based, primary care services set up as diabetes teams. A variety of models may be implemented, depending on regional preferences and realities; for example:

- RNs and RDs with expertise in diabetes working within very large family practices;
- RNs and RDs with expertise in diabetes working within DECCs;

- established community health centres;
- established North Diabetes Health Network;
- Aboriginal Diabetes Strategy.

In order to achieve the above, the following specific recommendations are made:

- a. re-align the system to ensure that a critical mass of registered nurses and registered dietitians in each Local Integrated Health Network (LIHN) is available to patients and aligned with family practice, endocrinologists and other relevant specialists (e.g. nephrologists and cardiologists) , hospitals and all relevant community resources to ensure coordination and continuity of care.
- b. increase the involvement, as members of the diabetes healthcare teams, of pharmacists, in particular, and other health professionals in the care of people with diabetes.
- c. provide funding to regions to support the development of new and expansion of existing diabetes teams;
- d. expand the role of all diabetes programs to include tracking of all patients through diabetes case managers or care coordinators;
- e. develop low, intermediate and high acuity follow-up regimens and processes for patients according to tracked outcomes, following a model such as the Kaiser Permanente model.
- f. develop systems, such as electronic patient records and flow sheets, to share patient information between providers and to track management and associated risks of diabetes and other chronic diseases;
- g. increasingly re-align hospital-based Diabetes Education and Care Centres to become community-based, except in cases where complex hospital-based care is being provided, and ensure that global hospital funds currently being used for ambulatory diabetes programs are transferred to the community with the programs;
- h. implement an incentive-based remuneration system to reimburse physicians who are diabetes specialists (including endocrinologists and internists), taking into account case complexity, time spent acting as a resource to primary care physicians and the diabetes healthcare

teams, whether through face-to-face meetings, telephone or education sessions, and for associated administrative roles;

- i. implement a remuneration system that provides incentives for primary care physicians to undertake on-going, regular risk assessment and risk management of diabetes and its complications.

## **Rationale**

Central to good diabetes management, is the person with diabetes and his/her commitment and ability to self-manage her care; in particular, making good food choices, exercising, administering medication, monitoring blood glucose and making adjustments for high and low blood glucose, controlling cholesterol levels and blood pressure. Patient-centered diabetes care that focuses on self-management has been shown to be effective, particularly when comprehensive care and on-going education are delivered together. <sup>7</sup>

Providing education to people with diabetes requires time and skilled educators. Although physicians may provide patient education during office visits, they do not generally have sufficient time to do so, as the purpose of the patient's visit may not be diabetes-related or the time is spent addressing other, more pressing, diabetes-related issues.

Patients with diabetes need regular laboratory tests and follow-up to assess their blood glucose and lipid levels and risks of complications. For example, it is recommended that people with diabetes have an A1C test every three months to monitor their blood glucose levels, a lipid test every 1 to 3 years to check their cholesterol levels and an eye exam every 1 to 2 years to check for retinopathy. Regular assessment of blood pressure, assessment for evidence of early kidney disease and foot exams have also been demonstrated to reduce complications. Many physicians do not have the time or extra resources required to coordinate and follow-up to ensure the recommended tests have been done.

Registered nurses and registered dietitians are a key resource to assisting in care and education for patients with diabetes. Registered nurses and dietitians can provide routine care for patients and lessen the workload for physicians as part of the diabetes healthcare team. Specialized training is available to RNs and RDs to become Certified Diabetes Educators.

People with diabetes also require services from other health professionals, such as pharmacists, chiropodists/podiatrists, and social workers. Referral and communication with these other professionals to ensure continuity and coordination of care also requires time and effort. Involving other health professionals as part of the team will provide continuity of care and ensure that consistent messages are being given to people with diabetes.

Under the current system, people with diabetes receive care from their family physician, endocrinologists and other specialists, registered nurses and dietitians through the Diabetes Education and Care Centres and other health professionals. In most cases these groups work independently or through informal networks. A team-based approach that involves all relevant health professionals has been shown to be an effective way to provide comprehensive, continuous care; however, someone must coordinate the services being provided to patients. Case managers/case coordinators have been shown to improve the efficiency of the system and may also improve outcomes for people with diabetes.<sup>7</sup> The case manager or case coordinator is a specific individual on the team (physician, nurse, or dietitian) who oversees and coordinates care for the patient in terms of scheduling planned visits, ensuring that lab tests are done according to recommended schedules and assisting the patient in establishing and achieving self-management goals.

Ongoing communication and participation by all members of the team, also referred to as shared care, has been shown to be effective in increasing commitment and participation of the person with diabetes while also enhancing the roles and practices of the physician and other team members.<sup>7</sup>

Physicians and other diabetes specialists are not currently reimbursed for time spent providing education and risk assessment for patients, nor are they reimbursed for providing non-formal consultations such as team conferences and telephone advice to other providers. The consultative role of physicians and diabetes specialists on the team enables the team to be more efficient.

People with diabetes require different types of services and different levels of service intensity: some people are able to manage their diabetes with little support and may only require initial diabetes education followed by two or three

follow-up visits per year, while others who have complications or other difficulties in managing their diabetes may require additional services, such as those of an endocrinologist or a social worker.

Kaiser-Permanente has implemented a three-level care path for people with diabetes to improve continuity of care: level 1 is self-care support, level 2 is care management and level 3 is intensive management. Patients enter the system and are directed to the appropriate level of care based on a protocol. They then receive the necessary services and may move up or down the care path as their conditions change. From 1998 to 2003, the program has seen an increase in the percentage of patients who have been screened for complications or who have managed their risks for complications:

- good glycemic control increased from 44% to 63%;
- good LDL control increased from 31% to 64%;
- renal screening increased from 43% to 74%;
- retinopathy screening increased from 66% to 75%.<sup>21</sup>

In a team-based environment in which team members are not necessarily situated in the same physical space, continuity of care and increased communication can be facilitated through the use of an information system to track patients and share information between providers. A centralized, computerized, database system has been shown to improve the transfer of information among all DECC team members.<sup>7</sup> Reminders and recall prompts for diabetes metabolic control and complication risk assessment, such as flow sheets, when accompanied by regular review and audit, can help promote the delivery of accepted standards of care and have been shown to improve diabetes management health outcomes<sup>7</sup>. This also provides opportunities for practice guidelines to be embedded in the information system so that tracked outcomes prompt the appropriate practice guideline to be displayed.

The benefits of a team-based approach to delivering care, reimbursing physicians for consultation and risk assessment, and implementing information systems to support patient care are not unique to diabetes: management of all chronic diseases would benefit from these enhancements.

#### **Recommendation 4: Improve Access to Eye Exams & Treatment of Retinal Complications**

It is recommended that the Ministry of Health and Long Term Care:

- a. fund or undertake a study to investigate reasons behind the low rates of eye exams among people with diabetes in Ontario;
- b. ensure that people with diabetes in Ontario are all covered for eye examinations as per the CDA Guidelines;
- c. ensure that adequate capacity exists for treatment of retinal complications of diabetes.

#### **Rationale**

Diabetic retinopathy, a non-inflammatory eye disorder caused by changes in the retinal blood vessels, is the leading cause of blindness in Canadians aged 30 to 69<sup>3</sup>. It occurs in 70% of people with Type 1 diabetes and 40% of people with Type 2 diabetes.<sup>22</sup> Macular edema, a deposit of fluid and protein on or under the macula which causes it to thicken and swell, distorting a person's vision, and retinal detachment may develop as a complication of retinopathy. Cataracts and glaucoma also occur more frequently among people with diabetes than those without.

It is estimated that 20% of all people with diabetes will eventually experience vision loss; those with diabetes and high blood pressure are at an even greater risk of developing visual impairment.<sup>23</sup> In most cases, the patient does not experience symptoms of retinopathy until significant damage has occurred.

Damage caused by retinopathy and its complications cannot be reversed, but further damage can be prevented using photocoagulation, a procedure in which an intense beam of light is used to break down protein deposits, to destroy abnormal retinal vessels, or to seal off bleeding blood vessels. Photocoagulation for those with the worst forms of retinopathy reduces the incidence of severe visual impairment by 90% and by 50% for those with macular edema.<sup>24</sup> The effectiveness of treatment is optimal prior to vision loss and falls sharply following vision loss. Tight control of blood glucose and hypertension can delay onset and progression of diabetic retinopathy. Thus, early detection and treatment of diabetic retinopathy are important in preventing vision loss.

Recognized techniques for assessing diabetic retinopathy include 7–standard field, stereoscopic–colour fundus photography and direct ophthalmoscopy, indirect slit–lamp fundoscopy through a dilated pupil and digital fundus photography. It is important that these exams be performed by people experienced in these techniques, as exams performed by inexperienced observers and through undilated pupils fail to detect proliferative retinopathy in 50% of patients and macular edema in 100% of patients.<sup>7</sup> Digital fundus photography is a fairly recent innovation, currently being employed in retinal screening in the UK and elsewhere, and can be undertaken by a nurse or technician through an undilated pupil with the digital image transferred to a central facility for interpretation.

The CDA Guidelines, endorsed by the Task Force, recommend that all people with type 2 diabetes be screened for diabetic retinopathy upon diagnosis and, if retinopathy is not present, every 1 to 2 years thereafter. For people with type 1 diabetes who are aged 15 and over, the CDA Guidelines recommend screening 5 years after diagnosis and annually thereafter. However, in Ontario, only 51% of people newly–diagnosed with diabetes have had an eye exam.<sup>24</sup> Follow–up exam rates are also poor, with only 43% of people with newly–diagnosed diabetes had an initial and follow–up exam. Five years after diagnosis, 12% of people with diabetes aged 30 and over still had not had an eye exam.<sup>24</sup>

Rates of eye exams were similar for people with and without diabetes, suggesting that the eye exams being performed among people with diabetes are not necessarily being done specifically to access diabetic retinopathy. People with diabetes in low income groups, men with diabetes and those in younger age groups are less likely to have had an eye exam.<sup>24</sup>

Changes in OHIP coverage for eye exams appear to affect people with diabetes even when they are exempt from the restrictions. In Ontario, the rate of eye exams increased from 1995 to 1998 and then dropped 5% in 1999 for both people with and without diabetes. This drop coincided with OHIP policy changes restricting reimbursement for routine eye exams from yearly to once every two years for people aged 20 to 64. Rates of photocoagulation also decreased in 1999 after showing a steady rise from 1995 to 1998.<sup>24</sup>

It is unclear whether the low rates of eye exams among people with diabetes are due to an insufficient number of qualified professionals to perform the exams or to people with diabetes simply not accessing available services. Thus, the reasons for the low rates of eye exams require further investigation to understand the specific nature of the problem, before a solution can be proposed.

Establishing a requirement for optometrists to send eye examination reports to patients' family physicians would ensure that notification and necessary information was provided to the family physician for follow-up.

The Task Force was led to believe that human resources, operating and capital resources to treat retinal complications is inadequate. Providing the infrastructure required for fluorescein angiography and laser photocoagulation, treatments for macular edema or proliferative retinopathy, is expensive and, therefore, access to such them limited. The limited number of highly-specialized ophthalmologists who perform these procedures further compounds the problem of inadequate access to these procedures. Providing adequate hospital appointments and operating room time for subspecialty trained vitreoretinal surgeons who are willing to treat patients with advanced stages of diabetic retinopathy would decrease waiting times for surgery and improve visual outcomes.

### **Recommendation 5: Implement Hospital-Based Diabetes Resource Teams for Complex Inpatient Care**

Hospitals must ensure that designated diabetes resource teams are available in hospitals to implement evidence-based best practices to achieve optimal glycemic control for severely ill hospitalized patients, including patients with myocardial infarctions and those in surgical intensive care units.

#### **Rationale**

Patients with diabetes or hyperglycemia have greater short-term and long-term mortality after an acute myocardial infarction than people without diabetes. Diabetes also increases the risk of mortality following other acute coronary syndromes (ACS), such as unstable angina.

The Diabetes Mellitus Insulin Glucose Infusion in Acute Myocardial Infarction (DIGAMI) study demonstrated a 30% reduction in mortality after 3.4 years of follow-up. For every nine patients treated with intensive insulin therapy, one life was saved. The benefits were pronounced in patients with fewer cardiovascular risk factors and in those who had not been using insulin prior to participating in the study.<sup>25</sup>

It is proposed that a team, rather than a single individual, assume the responsibility for coverage and that the capacity to integrate new evidence into practice be shared among the team members.

## **ACCESS TO DRUGS, DEVICES AND SUPPLIES**

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Identify and address barriers to using drugs, devices and supplies required for optimal diabetes management as recommended in the CDA Guidelines.

### **Recommendation 6: Develop Long-Term Comprehensive and Rational Funding Strategies for Drugs, Devices and Supplies that Reflect the Continuum of Care.**

The Task Force urges the Ministry to develop comprehensive, rational, long-term funding strategies that are fair to all people with diabetes and demonstrate downstream improvements in patient outcomes. In particular, government should avoid consideration of funding isolated devices, services, supplies or drugs based on cost alone. Failure to develop a comprehensive strategy could result in fragmentation of funded services.

#### **Rationale**

Residents of Ontario who have diabetes may receive financial assistance for drugs, devices and supplies from three main MOHLTC programs: the Ontario Drug Benefits Program, the Trillium Drug Program and the Assisted Devices Program (Ontario Monitoring for Health Program is administered by the Canadian Diabetes Association but funded through the Assisted Devices Program.) An analysis of funded/subsidized services provided to people with diabetes shows that funding of drugs, devices and supplies for people with diabetes is fragmented and covers only certain subsets of the population. This is likely the result of policy decisions being made in a piecemeal way.

The Ontario Drug Benefits program includes coverage for the following groups:

- Ontario residents 65 years of age and older (seniors);
- residents of long-term care facilities;
- residents of Homes for Special Care;
- people receiving professional services under the Home Care program;
- Trillium Drug Program recipients;
- social assistance recipients (Ontario Works or Ontario Disability Support Program recipients).

Single seniors with an annual income of \$16,018 or more and senior couples with a combined annual income of \$24,175 or more pay a \$100 deductible and up to \$6.11 per prescription toward the dispensing fee; others pay only a co-payment of up to \$2 per prescription.

The Trillium Drug Program provides assistance to people who have high drug costs in relation to their net household incomes. Applicants may apply for the Trillium Drug Program if they have a valid OHIP number, are not eligible for ODB, do not have private insurance to cover drug costs, or their private insurance does not cover the full cost of drugs. In cases where the applicant's private insurance covers partial drug costs, the TDP covers the applicant's portion of the drug cost. The applicant must pay a deductible that is based on family size and income and may pay up to \$2 per prescription thereafter. ODB coverage policies apply to Trillium Drug Program recipients as well.

The Ontario Monitoring for Health program provides financial assistance for testing strips, lancets and blood glucose monitors to people of any age who are using insulin and women with gestational diabetes if they do not have other financial coverage. Those who qualify are reimbursed for 65% of the cost of lancets and glucose testing strips to a maximum of \$500 per year. Blood glucose meters are reimbursed at the lesser of 65% or \$75 for regular monitors and \$300 for talking monitors, once every five years.<sup>26</sup>

The Ministry of Children and Social Services (MCSS) provides funding for drugs, devices and supplies for people with diabetes who are recipients of social assistance (Ontario Works and the Disability Support Program). Coverage for social assistance recipients is administered through the MOHLTC Ontario Drug

Benefits Program, based on ODB coverage policies, but funding is provided through MCSS. For recipients of the Disability Support Program, MCSS provides coverage, through the Mandatory Special Necessities Program, for supplies not covered under ODB and also provides assistance for transportation costs.

Table 2 shows the populations served by each program; Table 3 shows the drugs, devices and supplies covered by each program. From an examination from Table 3 it is apparent that funding for diabetes drugs, devices and supplies is fragmented and confusing; a person with diabetes may potentially have to seek assistance from all three programs. Ontario’s coverage for diabetes-related drugs, supplies and devices compares favourably to other provinces and territories; however, 39% of people aged 20 to 64 do not have any insurance coverage for these items.<sup>27</sup>

**Table 2. Populations covered by MOHLTC-Funded Programs for Drugs, Devices and Supplies.**

| Population Served   | ODB | Trillium | Monitoring for Health |
|---|-----|----------|-----------------------|
| Seniors (aged 65+)  | X   |          |                       |
| Residents of Long Term Care Facilities and Homes for Special Care   | X   |          |                       |
| Home Care Program Recipients  | X   |          |                       |
| Social Assistance Recipients*                                       | x   |          |                       |
| People with High Drug Costs in Relation to Income                   |     | X        |                       |
| People with diabetes who require insulin and have no other coverage |     |          | X                     |

\* administered through ODB but funded through MCSS

**Table 3. Diabetes Drugs, Devices and Supplies Covered by Ontario Government Programs.**

|                                 | <b>Ontario Drug Benefit Program (ODB) / Trillium Drug Program</b><br><i>(mostly aged 65+)</i> | <b>Ontario Monitoring for Health(OMH)* / Assistive Devices Programs (ADP)</b><br><i>(only if using insulin)</i> | <b>Ministry of Community and Social Services</b><br><i>(Recipients of Ontario Disability Support Program, Ontario Works Program)</i> |
|---------------------------------|---|---|--|
| <b>Testing Strips</b>           | Maximum \$0.729/unit for strips   | 65% of cost to maximum \$500/year for strips and lancets combined   | Covered through ODB  |
| <b>Lancets</b>                  | No  | 65% of cost to maximum \$500/year for strips and lancets combined   | Balance of cost not paid by OMH is covered by Mandatory Special Necessities  |
| <b>Blood Glucose Meters</b>     | No  | Every 5 years, lesser of 65% of cost or \$75 for regular monitors and \$300 for talking monitors                | Balance of cost not paid by OMH or full cost up to \$54 for those ineligible for OMH is covered by Mandatory Special Necessities     |
| <b>Oral Anti-Hyperglycemics</b> | Yes<br>(Approved Agents Only)   | No  | Covered through ODB  |
| <b>Insulin</b>                  | Yes<br>(Approved Insulins Only)   | No  | Covered through ODB  |
| <b>Needles and Syringes</b>     | No  | Grant of \$125/year for those aged 65 and over (through ADP directly)   | Ontario Disability Support Program   |
| <b>Insulin Pumps</b>            | No  | No  | No   |

\* this program is funded through the Assisted Devices Programs and administered by the Canadian Diabetes Association. Coverage applies only to people requiring insulin.

Table 3 also shows that coverage for insulin and oral anti-hyperglycemic medications is limited to certain subsets of the diabetes population and that coverage for required supplies, such as strips, lancets, needles and syringes, is even more limited. This fragmented approach to funding is not conducive to effective diabetes management. For example, blood glucose monitoring is an essential component of diabetes self-management; however, test strips are not covered for all people with diabetes. It would be unfortunate if insulin infusion

pumps were funded without consideration of funding for insulin, testing strips or lancets.

Comprehensive, long-term funding strategies would remedy this problem of fragmented and unnecessarily complex and administratively burdensome funding arrangements.

**Recommendation 7: Improve Access to Insulin, Insulin Needles, Insulin Pumps, Glucose Testing Strips and Lancets.**

- a. Provide reimbursement for persons requiring insulin who are not covered by the Ontario Drug Benefit Program, Trillium Drug Program or third party insurance.
- b. For persons with type 1 diabetes receiving intensive insulin therapy, provide devices and supplies for continuous subcutaneous insulin infusion (insulin infusion pumps) if the following criteria are met in full:
  - The patient fails to achieve the goals of intensive therapy and/or has significant problems with hypoglycemia with multiple daily insulin injections.
  - The patient has the cognitive and physical ability to acquire the necessary knowledge and skills to use an insulin infusion pump.
  - The patient demonstrates willingness and ability to monitor blood glucose at least four times daily.
- c. Implement policy to ensure that all people with diabetes who do not have Ontario Drug Benefit (ODB) or third party insurance are reimbursed a minimum of 75% for the cost of lancets and testing strips.
- d. Provide in-school care for children and adolescents requiring lunch-time insulin injections.

**Rationale**

The Diabetes Control and Complications trial<sup>16</sup>, a 7-year multi-centre trial, reported a 60% reduction in risk for diabetic retinopathy, nephropathy, and neuropathy for people with type 1 diabetes who were given intensive treatment compared with those who were given standard treatment. Intensive therapy

slowed progression of and delayed onset of these complications. Intensive treatment included three or more daily injections of insulin or the use of an insulin pump.

Similarly, the United Kingdom Prospective Diabetes Study (UKPDS), a large clinical trial of 3867 people aged 26 to 65 with type 2 diabetes, found that intensive glycemic control (maintaining A1C=7.0) compared with less intensive glycemic control (A1C=7.9) resulted in a 12% reduction in risk for any diabetes-related endpoint (sudden death, death from hyperglycaemia or hypoglycaemia, fatal or non-fatal myocardial infarction, angina, heart failure, stroke, renal failure, amputation of at least one digit) and a 37% reduced risk for the microvascular complications (retinopathy, nephropathy, and/or neuropathy).<sup>5</sup>

Self-testing of blood glucose levels is a very important part of diabetes self-management and is particularly beneficial when the information is used to make timely adjustments to help regulate blood glucose levels.<sup>7</sup> For people with type 1 diabetes, self-monitoring blood glucose 3 or more times per day (using a glucose meter and testing strips) was associated with a 1.0% drop in A1C levels.<sup>28</sup> For people with type 2 diabetes who were being treated with oral anti-hyperglycemic medications, self-testing at least once a day was associated with a 0.6% drop in A1C levels compared with those who self-tested less frequently. For people with type 2 diabetes who were not using medications, any frequency of testing resulted in 0.4% drop in A1C levels compared to those who did not self-test at all. As mentioned previously, a 1% drop in A1C levels reduced the risk of acute myocardial infarction by 14% and heart failure by 16%.

As outlined in Recommendation 5, only certain subsets of the population (predominantly those aged 65+, people requiring social assistance and people requiring insulin) are covered for glucose testing strips. These supplies are necessary for all people with diabetes to monitor their blood glucose levels. A recently-published Canadian study found that lack of insurance coverage for self-monitoring test strips was significantly associated with higher A1C levels, even after controlling for age, income level, education level and marital status.<sup>29</sup>

Intensive therapy for type 1 diabetes requires an insulin injection to be given several times per day. Thus, children and adolescents who are in school over

lunch time require in-school care in order to receive their lunch time insulin injection; without this support, intensive therapy may not be achieved.

### **Recommendation 8: Address Barriers for Patients to Accessing Drugs**

Barriers to appropriate utilization of drugs is a generic consideration that applies to other diseases, not just diabetes. The Task Force recommends that government fund studies to determine the barriers to accessing medications for people with diabetes and ways in which removing these barriers could improve compliance and patient outcomes. These studies should include anti-hyperglycemic agents, lipid-lowering drugs, anti-hypertensives and angiotensin-converting (ACE) inhibitors. As a first priority, a study on the effects of improving access to all currently marketed anti-hyperglycemic agents on glycemic control and other outcomes should be initiated as soon as possible.

#### **Rationale**

Most people with diabetes will require medication to control their blood glucose levels. In addition many people with diabetes will also require medication to manage risk factors for complications of diabetes. The evidence for benefits of medication use among people with diabetes is well established and has been incorporated into clinical practice guidelines.

As reported in *Diabetes in Ontario: an ICES Practice Atlas*, medication use among people with diabetes in Ontario aged 65 and over falls below the recommended guidelines.<sup>30</sup>

Studies have shown three years after diagnosis, only 25% of people with diabetes will be able to adequately control their blood glucose levels without medication so that three years after diagnosis at least 75% of patients will require anti-hyperglycemic medications. However, ICES researchers found that 47% of people with diabetes had not been prescribed oral anti-hyperglycemic medications three years after their diagnosis.

Although evidence supports starting patients with metformin (a type of oral anti-hyperglycemic medication), 75% of people with diabetes started their treatment on a sulfonylurea (also a type of oral anti-hyperglycemic medication).

Antihypertensives and ACE inhibitors are recommended for people with diabetes to control hypertension. ACE inhibitors are also recommended for people with diabetes because they have been shown to slow the progression of kidney disease and to reduce the risk of developing and dying from coronary artery disease. Lipid-lowering drugs are also recommended for people with diabetes to reduce the risk of coronary artery disease. Among people aged 65 and over with diabetes who were newly-diagnosed in 1999, 64% were prescribed antihypertensives. In the year following diagnosis, 34% were prescribed ACE inhibitors and 24% were prescribed lipid-lowering drugs.

Further investigation is required to determine why evidence-based prescribing patterns, as recommended in the CDA Guidelines, are not being consistently followed for people with diabetes.

### **Recommendation 9: Improve Evidence for Diabetes Care**

Provide direct research funding to enhance the level of evidence for clinical care and delivery of diabetes care. Consideration should be given to funding a diabetes clinical trials network.

#### **Rationale**

The availability of high-quality research is the basis of an evidence-based health care system. In *The Canadian Diabetes Association 2003 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada* each recommendation was graded to reflect the level of evidence that existed for that recommendation. The level of evidence was the most influential factor in the grading criteria and took into account each paper's objectives, methodological rigor, susceptibility to bias and generalizability. Level 1 was the highest; level 4, the lowest.<sup>7</sup>

Recognizing that it is not always possible, or necessary, to achieve Level 1 evidence, the CDA Guidelines still clearly identified the shortfall of evidence for some of its guidelines and the need for additional funding to enhance the level of evidence for clinical care and delivery of diabetes care. Prospective studies in diabetes research are difficult and very expensive to conduct, especially when tracking long-term patient outcomes. For areas where clinical trials are not

feasible, economic modeling may be used to provide information to support decision-making.

Because this work is required nation-wide, governments should ideally work together to address this need.

## **ECONOMICS**

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### **Recommendation 10: Use Economic Modeling to Prioritize Investments**

Use the newly-developed, Ontario-specific economic model to help the government make decisions regarding new interventions (including anti-diabetic agents) their costs and associated long-term patient outcomes, while taking into account existing interventions.

#### **Rationale**

##### **Economic Modeling**

The basic rationale of health economics is that choices between alternative uses of resources must be based on both costs and outcomes (consequences). The underlying belief is that medical care can be made more cost-effective by obtaining better value for money spent.<sup>31</sup> One of the main economic questions pertaining to diabetes is whether intensified management of type 2 diabetes is cost-effective.

The Task Force undertook a review of the literature for economic evaluations that consider both outcomes and costs, but found relatively few.<sup>32</sup> Lack of evidence in the literature most likely reflects the long observation time required to track disease progression and complications of diabetes, the difficulties in establishing optimal standard therapies, the range of treatments administered to patients with type 2 diabetes and the fact that effective care management strategies take years to show results. Of the studies reviewed, the intensive treatment of patients with type 2 diabetes appears to be relatively cost effective when compared with more conservative strategies.

Modeling within economic analysis of treatments is generally unavoidable since models can forecast long-term outcomes based on short-term clinical trial data.

Modeling should not be seen as a replacement for clinical knowledge. There is continued need for both longer-term effectiveness data and epidemiological data providing stronger links between intermediate endpoints and final outcomes. However, the need for such information should be weighed against the cost of data acquisition.<sup>33</sup> Attempts to model the cost savings associated with investment in intensive diabetes management assume that the savings result from prevention of expensive complications several years after initiation of more stringent control.

### **The UKPDS Model**

The United Kingdom Prospective Diabetes Study (UKPDS) was a clinical trial evaluating policies for more intensive blood glucose and tight blood pressure control.<sup>34</sup> Between 1977 and 1991, 5102 patients aged 25 to 65 with newly-diagnosed Type 2 diabetes, who subsequently had a fasting plasma glucose > 6 mmol/l on two occasions, and no recent history of myocardial infarction(MI), ischemic heart disease(IHD), congestive heart failure(CHF), more than one major vascular event, and did not suffer from a severe concurrent illness that would limit life expectancy, were recruited to the study. Patients had biochemical measurements including A1C, systolic blood pressure, lipid and lipoprotein fractions at entry to the study, at randomization after three months of dietary therapy, and in each subsequent year. Data from 3642 white, Asian Indian and Afro-Caribbean patients, for whom annual data on potential risk factors were available, were used to develop the UKPDS outcomes model.

The *UKPDS Outcomes Model* estimates lifetime outcomes through a system of equations that predicts the occurrence and timing of diabetes related complications (cardiovascular disease, cerebrovascular disease, amputation, blindness, and nephropathy) and death. From this model both life expectancy and quality-adjusted life expectancy for patients with Type 2 diabetes can be estimated. The model estimates absolute risk of any of the above complications occurring based on the patient's characteristics (e.g. age and sex), and time varying risk factors such as A1C and the patient's history of previous complications. <sup>35</sup>

### **Making the UKPDS Model Ontario-Specific**

The UKPDS needs to be made Ontario-specific because there may be differences between Ontario and the UK in important factors related to diabetes which are included in the model:

- the incidence and prevalence of diabetes;
- baseline demographic (e.g., age, gender, ethnicity);
- diabetes risk factors (e.g., smoking status, body mass index, A1C, blood pressure, cholesterol, and history of heart disease, stroke, renal failure);
- overall mortality, diabetes mortality or mortality from diabetes related complications;
- costs, both in terms of treatment and management of events and complications;
- costs and effects of treatment programs.

Once the Ontario adaptation of the UKPDS outcomes model is complete, programs or interventions can be analyzed for cost-effectiveness using the model. Both the cost of the program and the program's effectiveness in terms of altering patient risks in the model (e.g. A1C, cholesterol, blood pressure, smoking status) will need to be entered into the model to estimate the incremental cost and effects of the intervention.

## **PREVENTION**

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### **Recommendation 11: Increase Physical Activity and Healthy Eating**

Ensure that a comprehensive strategy is developed to support an enabling environment to increase physical activity and healthy eating:

- the strategy should be developed in collaboration with experts in chronic diseases, behaviour modification, social marketing and public health.
- the strategy should be developed as a collaborative cross-ministry initiative with the Ministries of Health and Long Term Care, Tourism and Recreation, Agriculture and Food, Children and Youth Services, Education, and Finance.
- the strategy could include:
  - providing taxation/policy levers to ensure that high quality foods and recreation facilities are available to all neighbourhoods

- a social marketing/public health promotion campaign to raise awareness of adopting healthy lifestyles that can help prevent chronic diseases, such as diabetes, and specifically target groups known to be at risk: ethno-cultural groups (people of Aboriginal, South Asian, Asian, Hispanic or African descent) and people in low-income groups;
- utilizing the important environment and opportunity presented by pre-natal classes, early years centres, schools and workplaces.

The MOHLTC should support any provincial strategy that aims to reduce obesity, such as implementation of the Active 2010 Physical Activity and Amateur Sports Plan developed by the Ministry of Tourism and Recreation that aims to reduce the rate of childhood obesity and to increase physical activity among all Ontarians.

### **Rationale**

In addition to reducing the risk for diabetes, weight loss, exercise and a healthful diet can also prevent the onset of other chronic diseases such as cardiovascular disease and hypertension. Studies have shown that intensive lifestyle intervention for diet and exercise can reduce the risk of developing diabetes by at least 50%.<sup>36</sup>

### **Obesity**

Obesity is due to an excess accumulation of body fat resulting from a greater energy intake than expenditure and can endanger a person's health. Obesity, especially abdominal obesity, is a significant risk factor for diabetes:

- Approximately 80% of people with diabetes are obese<sup>37</sup>.
- The prevalence of diabetes increases 5% to 10% among adults for every 1 kg increase in population-measured body weight.<sup>38, 39</sup>
- Obesity and overweight, with abdominal fat distribution, account for 80-95% of the increase in diabetes.<sup>40</sup>

Obesity is measured using several methods: body mass index (BMI), waist circumference and waist to hip ratio. The calculation for body mass index is:

BMI = weight in kilograms / (height in meters)<sup>2</sup>

Of the three measures, BMI is most highly correlated with body fat. It is less accurate for muscular people, pregnant women or lactating women. The current Canadian weight classifications for BMI values are:

| <u>Classification</u> | <u>BMI value</u> |
|-----------------------|------------------|
| Underweight           | <18.5            |
| Normal Weight         | 18.5–24.9        |
| Overweight            | 25.0–29.9        |
| Obese                 | ≥ 30.0           |

Waist circumference is measured at a person's natural waist while the person is standing. It is usually expressed in centimetres and is used to assess abdominal fat distribution in relation to the rest of the body; i.e., whether the person is apple shaped (carries excess body fat in the abdominal area) or pear shaped (carries excess body fat in the hips and thighs). Apple-shaped people have greater health risks, including a greater risk for type 2 diabetes and cardiovascular disease. A waist circumference of greater than 102 centimetres (40 inches) for men and 88 centimetres (35 inches) for women generally reflects excessive abdominal fat. This method of determining fat distribution may not work well for people less than 1.5 meters (5 feet) tall or for people with a BMI of 35 or above.

According to the 2003 Canadian Community Health Survey (CCHS), among Ontarians aged 18 and over, 48% are overweight or obese:

- 41% of males and 26% of females are overweight (BMI 25.0 –29.9);
- 16% of males and 14% of women are obese (BMI ≥ 30).<sup>41</sup>

A survey of over 3,000 Ontarians conducted by Cancer Care Ontario in 2001/2002, found very similar results to those reported in the CCHS, 48% of those surveyed were overweight or obese;

- 47% of males and 25% of females were overweight (BMI 25.0 –29.9);
- 15% of males and 9% of women were obese (BMI ≥ 30).<sup>42</sup>

Both surveys were based on self-reported data and, as such, are likely to underestimate rates of obesity. The Prince Edward Island Nutrition Survey was a

survey based on a random sample of 1,995 adults aged 18 to 74 and was completed in 2000. Heights, weights and waist circumferences were measured and BMIs were calculated. The survey found that almost a third of those sampled were obese (BMI > 30), almost double what was reported in the 1995 National Population Health Survey which used self-reported weights and heights to calculate BMIs.<sup>43</sup>

Based on the National Population Health Survey<sup>44</sup>, the percentage of overweight adults in Canada has increased since 1994/95:

| National Population Health Survey, Proportion of Overweight Adults (20-59) with BMI > 25.0 |         |         |         |
|--|---------|---------|---------|
|  | 1994/95 | 1996/97 | 1998/99 |
| Women  | 36.5    | 35.4    | 38.0    |
| Men  | 56.9    | 56.9    | 59.7    |

According to the 2000/2001 National Longitudinal Study of Children and Youth in Canada, among children 2 to 12 years of age, 18% were overweight and 16% were obese.<sup>45</sup>

Between 1985 and 2000, the amount of mortality attributable to overweight and obesity (population attributable risk) in Canada increased from 5.1% to 9.3%; the annual number of deaths attributable to overweight and obesity almost doubled from 2,514 to 4,321.<sup>46</sup>

The economic burden of obesity in Canada in 2001 was \$4.3 billion, of which \$1.6 billion was direct costs and \$2.7 billion were indirect costs, representing 2.2% of the total health care budget.<sup>47</sup> These estimates are similar to those produced in a second study which estimated the costs at \$2 billion per annum, or 2.4% of the total health care budget.<sup>48</sup>

### Physical Activity

Controlled trials have provided evidence that moderate physical activity combined with weight loss and a balanced diet can reduce the risk of developing diabetes by 50–60% among those already at high risk.<sup>49</sup>

Based on a large study, people at risk of type 2 diabetes were able to cut their risk 58% by exercising moderately for 30 minutes a day and losing 5–7% of their body weight. In those over age 60, the risk was cut by about 71%.<sup>50</sup>

Physical activity without weight loss has been shown to improve insulin sensitivity in people with diabetes.<sup>51</sup> Both aerobic exercise and resistance training are effective in increasing insulin sensitivity and combining both may be most beneficial because the mechanism for increasing insulin sensitivity is different for each type of activity. Moderate exercise is best, as extreme exercise resulting in muscle damage has a negative affect on insulin sensitivity. Increased insulin sensitivity following exercise lasts for at least 16 hours in both people with and without diabetes and disappears without continued physical activity.<sup>52</sup> Thus, regular exercise is required to maintain increased insulin sensitivity from exercise.

According to the 2003 Canadian Community Health Survey, in Ontario 44% of males and 51% of females aged 12 and older are inactive.<sup>53</sup> These finding are similar to a recent Ontario telephone survey done in 2001/2002 which found that among Ontarians 18 to 64 years of age, 43% of men and 53% of women did less than three hours of moderate exercise per week.<sup>42</sup>

In 2001, the economic burden of physical inactivity was \$5.3 billion, of which \$1.6 billion were direct costs and \$2.7 billion were indirect costs, representing 2.6% of total health care costs in Canada.<sup>47</sup>

## **Recommendation 12: Facilitate Access to Healthy Foods**

Provincial and federal governments should consider implementing new policies that provide incentives and facilitate access (including affordability) to healthy foods, such as fruits and vegetables.

### **Rationale**

Evidence from randomized controlled trials, observational studies, and meta-analyses has established the effects of nutrition therapy on glycemic control: A1C levels for people with diabetes could be reduced by 1% to 2% through nutrition interventions, such as meal-planning and education provided by a registered dietitian experienced in diabetes management.<sup>54</sup>

One of the challenges in preventing diabetes is food security. Food security "exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life".<sup>55</sup> People need access to healthy foods at affordable prices to be able to eat well and maintain a healthy weight. Food security varies across the country, based primarily on geography and income.

Based on the National Population Health Survey and the Food Insecurity Supplement to the survey, 10% of Canadians (3 million people) were living in food-insecure households in 1998/99. People in low-income households, households dependent on social assistance, lone-parent families headed by women, tenants, children and Aboriginal people were at greater risk of experiencing food insecurity. Almost 35% of people in low-income and 14% in middle-income households reported food insecurity. After accounting for other factors, such as household income, people in lone-mother households were 1.5 times more likely to experience food insecurity compared to people in couple-with-child households. Food insecurity was significantly associated with poor/fair health, multiple chronic conditions, obesity, distress and depression.<sup>56</sup>

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## EVALUATION

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Implementation of these recommendations should be evaluated to determine the degree to which benefits have been realized.

The Task Force has proposed specific evaluation measures for some of the recommendations as well as an overall evaluation framework to assess the degree to which process and outcomes measures have improved.

### **Reduce Waiting Times**

In 2007, the percentage of people with diabetes being served, waiting times and the number of FTE teams in place should be re-evaluated.

### **Eye Care**

Improvements to eye care should be evaluated by:

- the percentage of people with diabetes who have had eye exams as outlined in the CDA Guidelines;
- the number of facilities that have the necessary infrastructure required to treat retinal complications.

### **Hospital Based Diabetes Resource Teams**

Implementation of diabetes resource teams in hospitals should be evaluated by:

- the percentage of hospitals with a diabetes resource team;
- in-hospital mortality rates for people with AMI;
- 30-day post-discharge mortality rates for patients hospitalized with AMI.

### **Overall Evaluation of Recommendations**

A key performance measure in achieving the long term clinical outcomes of interest is, first and foremost, regular screening of people with diabetes in terms of their glycemic control and their need for treatment with adjuvant therapies (i.e., antihypertensives, lipid-lowering medications) and, thereafter, adding the appropriate medications to the patient's regimen. Thus, the target for indicators related to adjuvant therapies is not 100% of patients with diabetes; but rather, maximizing the rate of use of these medications in patients where appropriately indicated. Based on data from prevalence studies<sup>30</sup> this may be as high as 80% of people with diabetes in the case of antihypertensive

agents, and up to 60% of diabetics (90% among seniors with diabetes) in the case of lipid-lowering agents.

Population-based measures are expressed as percentages of prevalence of diabetes. The prevalence data is calculated and validated at ICES using hospital discharge abstracts from the Canadian Institute for Health Information, physician service claims from the Ontario Health Insurance Plan database, and information regarding the demographics of persons eligible for health care coverage in Ontario from the Registered Persons Database.

Tables 4 and 5 provide proposed measures for population-based evaluation. These measures would apply to all people with diabetes 3 years following implementation of Task Force recommendations.

**Table 4. Population-Based Process Measures.**

| Indicator (% patients with)           | Target Group                        | Baseline Level <sup>6</sup> | Interim Goal (absolute increase) |
|---------------------------------------|-------------------------------------|-----------------------------|----------------------------------|
| A1C tested <sup>1</sup>               | All prevalent cases                 | ?                           | 20% ▲                            |
| Proteinuria tested (ACR) <sup>1</sup> | All prevalent cases                 | ?                           | 20% ▲                            |
| ≥ 3 primary care visits <sup>2</sup>  | All prevalent cases                 | ? (can get)                 | 10% ▲                            |
| Retinopathy screening (2 yr)          | All incident cases                  | 51%                         | 15% ▲ (to 66%) <sup>3</sup>      |
|                                       | Incident cases >65 yrs              | 57%                         | 15% ▲ (to 72%)                   |
|                                       | All prevalent cases                 | 50%                         | 15% ▲ (to 65%)                   |
| ≥ 2 antihypertensive drugs            | Prevalent cases >65 yr <sup>4</sup> | 33%                         | 15% ▲ (to 48%)                   |
| ACE inhibitor or ARB                  | Prevalent cases >65 yr              | 37%                         | 15% ▲ (to 52%)                   |
| Lipid-lowering drug                   | Prevalent cases >65 yr              | 25%                         | 20% ▲ (to 45%)                   |
| Glucose lowering drug                 | Prevalent cases >65 yr              | 53%                         | 15% ▲ (to 68%)                   |
| Testing regularly <sup>5</sup>        | Prevalent cases >65 yr              | ?                           | 15% ▲                            |

<sup>1</sup> requires lab data to be obtained

<sup>2</sup> not to be measured in areas with high concentration of non-FFS providers

<sup>3</sup> may be difficult to measure in cases where patients pay out of pocket<sup>4</sup> drug outcomes limited to >65 years for ODB data but could include ODB beneficiaries on social assistance; note that the target levels for these drugs are not 100% on a population basis but depend on individual clinical indications.

<sup>5</sup> as reflected in use of at least 1 test strip per day on average

<sup>6</sup> from Diabetes in Ontario: An ICES Atlas. Reflects 1999 data

**Table 5. Population-Based Outcome Measures.**

| Indicator (% patients with)             | Target Group        | Baseline Level | 3 Year Goal    |
|---|---------------------|----------------|----------------|
| A1C tested and <7% <sup>1</sup>         | All prevalent cases | 26%            | 20% ▲ (to 46%) |
| A1C < 7% <sup>1</sup>                   | All persons tested  | 45%            | 10% ▲ (to 55%) |
| ACR <2 (men); <2.8 (women) <sup>1</sup> | All prevalent cases | ?              | 20% ▲          |
| ACR <2 (men); <2.8 (women) <sup>1</sup> | All persons tested  | ?              | 10% ▲          |
| ED visit for DM                         | All prevalent cases | 4%             | 20%▼ (to 3.2%) |
| Hosp'n for hyperglycaemia               | All prevalent cases | 450/100,000    | 15%▼           |
| Hosp'n for hypoglycaemia                | All prevalent cases | 24/100,000     | 15%▼           |
| Hosp'n for skin/ST infection            | All prevalent cases | 600/100,000    | 15%▼           |
| Minor amputation                        | All prevalent cases | 112/100,000    | 15%▼           |

<sup>1</sup> requires lab data to be obtained

\* consider obtaining data on patient satisfaction as an additional outcome measure

### **Evaluation of Improved Access to Structured Diabetes Education**

Enhancements to structured education and care should focus on success in affecting behaviour changes in people with diabetes and in measuring the immediate (learning), intermediate (behaviour change) and long-term (clinical and psychological) outcomes.

Tables 6 and 7 provide proposed measures to evaluate the effect of increased access to structured education and care. These measures would apply only to people with diabetes who have accessed services of a community-based diabetes program.

The following evaluation should be conducted one year after the implementation of the first year increase in RD and RN FTE teams for diabetes programs.

**Table 6. Structured Diabetes Education and Care – Process Measures**

| <b>Indicator</b>   | <b>Target Group</b>                               | <b>12-Month Goal</b>  |
|--|---|---|
| % of people with diabetes accessing diabetes education programs      | All people with diabetes                          | 35%   |
| <b>Indicator</b>   | <b>Target Group</b>                               | <b>% of people that have accessed structure diabetes programs</b> |
| A1C tested <sup>1</sup> at least twice                               | All people accessing structured diabetes programs | 80%   |
| Proteinuria tested (ACR) <sup>1</sup> 1x                             | same  | 50%   |
| Retinopathy screening (at least 1x in the past 2 years) <sup>3</sup> | same  | 65%   |
| Serum lipids tested  | same  | 80%   |
| Blood pressure checked   | same  | 100%  |
| Body weight checked  | same  | 100%  |
| Foot examined 1x   | same  | 75%   |
| ACE inhibitor or ARB   | same  | 50%   |
| Self Testing of blood glucose regularly <sup>4</sup>                 | same  | 80%   |

<sup>1</sup> requires lab data to be obtained

<sup>2</sup> not to be measured in areas with high concentration of non-FFS providers

<sup>3</sup> may be difficult to measure in cases where patients pay out of pocket

<sup>4</sup> as reflected in use of at least 1 test strip per day on average

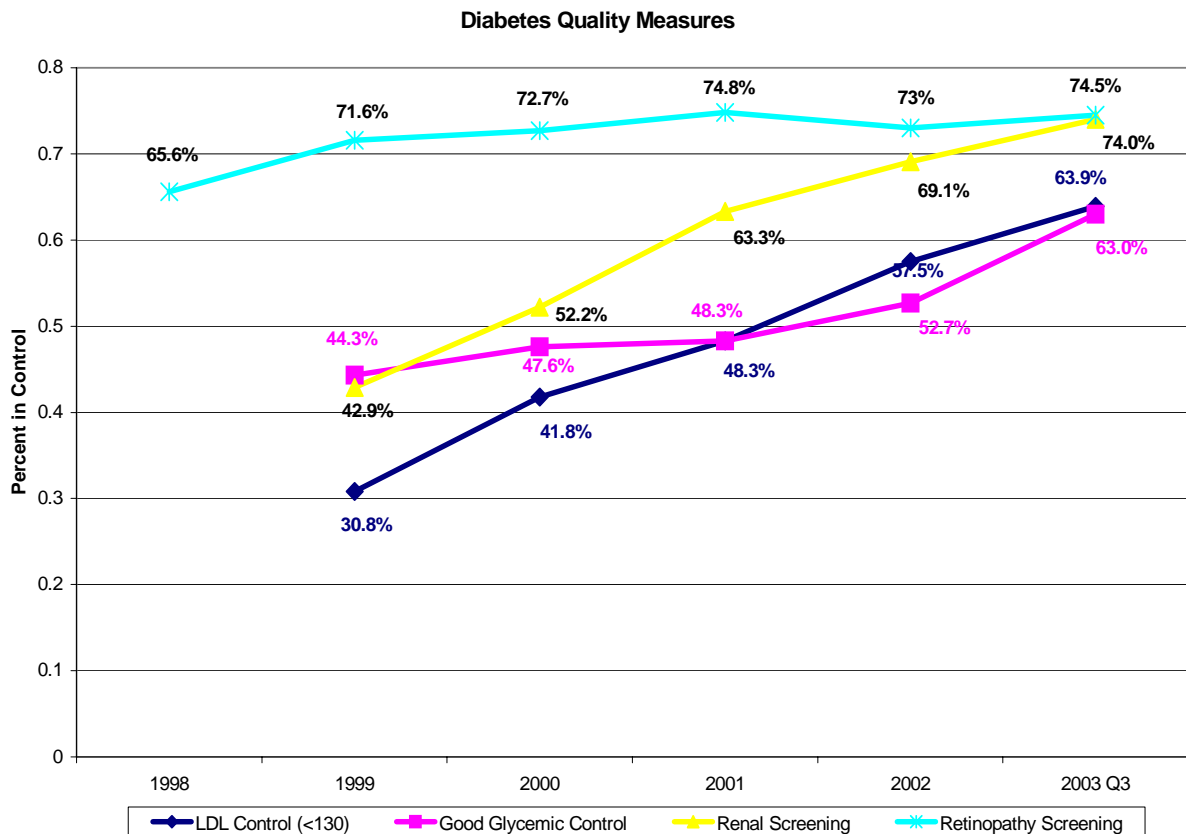
**Table 7. Structured Diabetes Education and Care Outcome Measures**

| <b>Indicator</b>                           | <b>Target Group</b>                                | <b>12 month target – % of people accessing structured diabetes programs</b> |
|--|--|---|
| A1c < 7% <sup>1</sup> or ▼ 0.5% (absolute) | All persons accessing structured diabetes programs | 80%   |
| Blood pressure </= 130/80 mm Hg            | Same   | 75%   |
| Moderate weight loss (5%)                  | Same   | 30%   |

<sup>1</sup> requires lab data to be obtained

Measurement systems are essential to assess the effectiveness of changes made to the system, in order to identify successful strategies and further enhancement required. The proposed evaluation framework measures diabetes care against best practice (e.g. screening for risks and optimal medical therapy), patient outcomes (e.g. glycemic control and need for amputation), as well as system impacts (e.g., emergency room visits). These measurements are only possible if standardized data collection and reporting systems are put in place as recommended in this report.

Kaiser Permanente in the United States has been tracking quality measures of its Diabetes Care Management since 1996. In 1991, there were more than 151,000 people with diabetes enrolled in the program. These measures include both process measures and metabolic outcomes. The results from 1998–2003 are summarized in the following graph provided by Kaiser Permanente.



## **COSTING**

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The Task Force did not have the capacity to determine the costs of implementing each of these recommendations; preliminary estimates are provided, but require more detailed analysis by the implementation committee.

### **Hiring 135 RN FTEs and 135 RD FTEs and enhancements to DECCs.**

The additional operating costs of the enhanced DECCs to form Community Diabetes Programs [CDP] is estimated to be \$40M per year beginning in the third year of implementation. Cost estimates for the first three years of implementation are \$7M for 2004/05, commencing in September, \$26M for 2005/06 and \$40M in 2006/07. While most of these costs are for nurses and dietitians using the benchmark of a team of 1 RN and 1 RD per thousand patients, additional minor costs of behaviour modification expertise, pharmacists, podiatry, scheduling support and resources to integrate and coordinate care are also included as these are considered to be essential to these programs.

### **Increasing access to insulin, insulin pumps, glucose testing strips and lancets.**

The cost of providing insulin infusion pumps and supplies ranges between \$1M to \$2M.

The cost of providing strips to those who do not have ODB or third party coverage ranges from \$22M to \$53M.

Calculations are provided in Appendix C.

## APPENDIX A – Current Diabetes Programs and Services Provided by the Ontario Ministry of Health and Long-Term Care

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| <b>Pediatric Diabetes Initiative – Network of Ontario Pediatric Diabetes Programs – Administered by the Northern Diabetes Health Network (NDHN)</b> |  |
|---|--|
| Funding   | \$2.3 million  |
| Established   | 2001   |
| Mandate   | To improve access to quality diabetes services and ensure the best possible health outcomes are achieved for children and their families affected by diabetes.   |
| Description   | <b>Refer to “Northern Diabetes Health Network”</b><br>Secondary and tertiary level services are provided by multidisciplinary teams in the 34 specialized pediatric diabetes programs through on-site, shared-care and outreach models.  |
| Activities / Accomplishments  | The NDHN negotiates funding/performance agreements with each community-based host agency.<br>Utilization of services increased to an estimated 92% of children with diabetes in Ontario now accessing services in 2003.<br>Creates formal opportunities for sharing of best practices, professional development (accredited by medical Maintenance of Certification program) and mentoring of novice diabetes educators<br>Developing system-wide model by working with key stakeholders.<br>Currently working on the development of a pediatric diabetes electronic chart.<br>Developed/published Pediatric Emergency Room Guidelines (with MoHLTC) |
| Future Directions   | <b>Refer to “Northern Diabetes Health Network”</b>   |
| Other   | <a href="http://www.ndhn.com">http://www.ndhn.com</a> and <a href="http://www.diabetesontario.org">http://www.diabetesontario.org</a>  |

| <b>Northern Diabetes Health Network (NDHN) – Network of Northern Ontario Diabetes Programs</b> |  |
|--|--|
| Funding  | \$5.3 million  |
| Established  | 1993   |
| Mandate  | To improve access to quality diabetes services in northern Ontario and ensure best possible health outcomes.   |
| Description  | A transfer payment agency governed by a volunteer board of directors that administers the <i>Network of Northern Ontario Diabetes Programs</i> (39 programs) servicing 174 communities in northern Ontario and the <i>Network of Ontario Pediatric Diabetes Programs</i> . The 2 main components of the NDHN model of care are system health (provincial, regional and local assessment of services, funding priority needs, implementing, supporting, coordinating and evaluating programs) and client health at the program level (education re: self-management, treatment, and health promotion/diabetes prevention with community partners) by a multidisciplinary team through group and individual approaches.  |
| Activities / Accomplishments   | <p>Funding/performance contracts with each community-based host agency.</p> <p>Utilization of services increased from 4000 clients to over 53,000 clients in the north since inception.</p> <p>Over 4,500 program-based health promotion/diabetes prevention events held with almost 60,000 people attending.</p> <p>Established 2-year Diabetes Education Certificate Program, approved by the Ministry of Training, Colleges and Universities. Creates formal opportunities for sharing of best practices, professional development (accredited by medical Maintenance of Certification program) and mentoring of novice diabetes educators.</p> <p>Developed and launched 2 websites.</p> <p>Ongoing studies of cost/benefit analysis; accountability and quality improvement projects; program best practices; culturally-specific initiatives; applied research</p> <p>Developed a network-wide registry, electronic chart and standardized database.</p> |
| Future Directions  | Sustain and develop current services, key initiatives and future growth. Participate in Ministry initiatives related to diabetes and disease management to further develop, share and disseminate NDHN best practices and experiences. Continue to review and enhance resources to meet the increasing salary and service needs.   |
| Other  | <a href="http://www.ndhn.com">http://www.ndhn.com</a> and <a href="http://www.diabetesontario.org">http://www.diabetesontario.org</a>  |

| <b>Ontario Aboriginal Diabetes Initiative</b> |  |
|---|--|
| Funding                                       | \$1.2 Million  |
| Established                                   | 1993   |
| Mandate                                       | To address the diabetes needs of Aboriginal people in Ontario.   |
| Description                                   | <p>Provides funding for the development, and enhancement of programs and services focusing on the education, prevention, and management of diabetes in Aboriginal communities, both on and off-reserve.</p> <p>Includes:<br/>           Nine Aboriginal Provincial and Territorial Organizations and the Independent First Nations which administer funding to community diabetes prevention and management programs. (\$0.75 M)</p> <p>The Southern Ontario Aboriginal Diabetes Initiative (SOADI) which provides diabetes prevention and education services through the work of 5 regional diabetes workers in southern Ontario. (\$0.5 M)</p> <p>The Ontario Aboriginal Diabetes Plan Steering Committee (OADP-SC) consisting of delegates from major Aboriginal organizations and representatives from the MOHLTC; charged with developing a comprehensive, innovative provincial Aboriginal diabetes plan that includes a long-term vision for prevention, education, care, research and co-ordination.</p> |
| Activities / Accomplishments                  | <p>SOADI provides diabetes prevention and management resources, programs and services to 80 Aboriginal communities in southern Ontario.</p> <p>Developed and delivered an annual education program on type 2 diabetes for health professionals working in Aboriginal communities</p>   |
| Future Directions                             | <p>Continue current funding of Aboriginal Diabetes Initiatives to help meet the diabetes education needs of all on and off-reserve communities.</p> <p>Completion and distribution of the OADP policy document.</p>  |
| Other   | <a href="http://www.soadi.ca">http://www.soadi.ca</a>  |

| <b>Diabetes Complication Prevention Strategy (DCPS)</b> |  |
|---|--|
| Funding   | \$6.5 Million  |
| Established   | 1997   |
| Mandate   | To provide basic-level diabetes education programs and improved service coordination across southern Ontario.  |
| Description   | <p>Over 70 local <b>Diabetes Education Centres / Programs</b> located in hospitals and community health organizations through 46 agencies.</p> <p>Each program consists of a team of educators (Registered Nurse, Dietitian) to teach diabetes clients skills to care for themselves; and to develop a special management plan for each client with the aim of relieving diabetes symptoms, preventing or treating complications, and improving the quality of life.</p>   |
| Activities / Accomplishments                            | <p>Funding to hospitals and community health organizations to establish local programs.</p> <p>Some centres offer group classes as well as individual counselling to both inpatients and outpatients, with outpatients in the majority. The centres provide both initial and follow-up education and management.</p> <p>Provides diabetes education, treatment, complications prevention activities in southern Ontario.</p> <p>Promotes integrated diabetes services and partnerships.</p> <p>Promoting coordination and monitoring services by completing a gap analysis 2001 to study the state of community-based diabetes services for adults in southern Ontario. Key recommendations include:</p> <p>A ratio benchmark of 1 FTE team (1 FTE RN and 1 FTE RD) to 1000 clients served; and 5 hours of service per client.</p> <p>Diabetes centres currently provide service on average to approximately 25% of people living with diabetes.</p> |
| Future Directions                                       | <p>Enhance existing funding to the Complication Prevention Strategy to improve access / coordination of services:</p> <p>Aim to fund all diabetes centres in southern Ontario within five years to serve 50% of the adult diabetes population within their service area.</p>   |

| <b>Primary Prevention (Type 2 Diabetes) Initiative</b> |  |
|--|--|
| Funding  | \$0.5 Million  |
| Established  | 2002   |
| Mandate  | To limit the number of people who develop type 2 diabetes by controlling causes and risk factors for the disease through the development of a primary prevention framework and associated action plan.   |
| Description  | Builds on existing program resources and provides provincial co-ordination, planning and liaison to support the development and implementation of a primary prevention strategy for diabetes in the province.<br>Compliments existing work in Ontario funded by the Canadian Diabetes Strategy.  |
| Activities / Accomplishments                           | Release of two documents:<br>Framework for action: A Population Health Approach to Preventing type 2 Diabetes<br>Provides direction and a common understanding of how population health strategies in Ontario relate to the primary prevention of type 2 diabetes.<br>Preventing type 2 Diabetes: The Ontario Plan of Action<br>Outlines a practical process for achieving the diabetes primary prevention framework; way to encourage people to become more physically active, to adopt healthier eating habits and to create environments that support these activities.<br>Supporting the <i>Active Health School Communities Initiative</i> (AHSCI) managed by the Ontario Physical and Health Education Association (OPHEA):<br>Goal is to create an environment where all members of a community work in collaboration to increase access to and opportunities for active healthy living for all children and youth. Developed curriculum based resource for elementary schools to address type 2 diabetes prevention and other chronic disease by building on existing infrastructure, relationships, programming, and other resources. |
| Future Directions                                      | Participate in developing health promotion interventions that focus on healthy eating and physical activity for key settings within the provincial risk factor strategies.<br>Collaborate with other key stakeholders in chronic disease   |

prevention to develop a provincial policy for physical activity in schools.

AHSCI:  
 OPHEA will pilot test AHSCI in 8 elementary school pilot sites between February 2004 and June 2005 to address the risk factors of: physical activity, nutrition, tobacco use, and alcohol and substance use.

Promote and distribute new resource “Everyone Jump” CD to elementary schools in January 2004:  
 CD targeted to grades 4–6 with songs about diabetes, nutrition, physical activity and healthy living, accompanied by a series of lesson plans for teachers.

Expert review of the resource by the CDA.

| <b>Seniors and Diabetes Initiative</b> |  |
|--|--|
| Funding                                | 0  |
| Established                            | 1992   |
| Mandate                                | To study diabetes as it affects people 65 years and over, and to link seniors’ issues to the Diabetes Strategy and other related health reforms.   |
| Description                            | Seniors and Diabetes Committee formed to show:<br>Identification of issues, gaps in services, and access to diabetes education;<br>An educational approach to prevent complications; and,<br>Opportunities for change.   |
| Activities / Accomplishments           | Developed policy to support a step-by-step disease management approach for the care of seniors with type 2 diabetes and a diabetes education manual for front-line workers working in long-term care facilities.<br>Completed pilot project to enhance disease management in selected long-term care facilities. |
| Future Directions                      | Production and distribution of an implementation manual for disease and management appropriate to the care of seniors with type 2 diabetes in long-term care facilities.   |

| <b>Costing and Evaluation</b> |   |
|-------------------------------|---|
| Funding                       | 0   |
| Established                   | 1992  |
| Mandate                       | To recommend instruments, standards and techniques to the ministry to monitor changes in health service use; Identify key indicators for further evaluation; and Develop a method to show province-wide trends.   |
| Description                   | The Ontario Diabetes Status Index was a project developed by the Diabetes Costing and Evaluation Committee made up of health care providers, consultants and economists to measure the burden of diabetes in Ontario.   |
| Activities / Accomplishments  | Ten indicators were developed including:<br>Service indicators: separations from acute care hospitals, total inpatient days, physicians' office services, and admissions to home care;<br>Complications indicators: photocoagulation, severe visual impairment, vitrectomies on inpatients, dialysis (new cases), kidney transplants, and amputations.<br>The Index and costing charts were used in planning and evaluating diabetes services.<br>The Ontario Diabetes Status Index was last published in 1998. |
| Future Directions             | Continuing to support the work of the Institute of Clinical and Evaluative Studies (ICES) in producing the Diabetes in Ontario Practice Atlas. The comprehensive data assembled provides detailed population health information about diabetes.<br>Last published in June 2003<br>Acts as a resource for administrators, clinicians, epidemiologists, health planners and policy-makers by examining the impact of diabetes on individuals, families, and communities and Ontario's healthcare system.          |

## **APPENDIX B – Diabetes Task Group Terms of Reference**

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## **DIABETES TASK FORCE TERMS OF REFERENCE**

### **Introduction**

Complications from diabetes is the single largest contributor to morbidity in Ontario, accounting for 32% of myocardial infarctions, 43% of patients with heart failure, 30% of strokes, 50% of blindness, 70% of lower limb amputations, and 51% of patients on dialysis and kidney transplants [Diabetes in Ontario. ICES Practice Atlas, 2003] in addition to complications attributed to peripheral nerve damage and sexual dysfunction. Many of the downstream complications of diabetes can be prevented through tight glycemic control and control of risks factors including elevated lipid levels, hypertension, and obesity. Optimal control requires a combination of pharmacologic therapy (e.g., antidiabetic drugs and angiotensin converting enzymes (ACE) inhibitors) and non-pharmacologic means (e.g., appropriate diet, regular physical activity, smoking cessation, proper foot care and regular ophthalmologic follow-up). The prevention of downstream complications achieved through a multidisciplinary approach by family physicians, endocrinologists, nurses, dietitians, pharmacists, ophthalmologists, and podiatrists is referred to as "secondary prevention."

While MOHLTC supports 100% of the clinical services for the management of the downstream complications from diabetes, there has been no attempt to determine ways in which the Ministry supports the optimization of secondary prevention. This is especially important in light of information that people with diabetes are more likely to be in the low-income category. This is particularly true for women. [Diabetes in Ontario. ICES Practice Atlas, 2003]. Furthermore the Aboriginal population is at very high risk for developing diabetes and constitutes an important sub-group to consider in this context.

The prevention of diabetes and its complications is a complex process requiring lifestyle changes through behaviour modification in addition to numerous interventions that are ideally achieved with the help of multidisciplinary community-based primary care providers referred to above. An equally important consideration is the ease of access to drugs, devices and supplies required by people with diabetes to facilitate close control of their disease.

### **Ontario Task Force on Diabetes Mellitus**

The Task Force on Diabetes Mellitus is a time limited joint initiative of MOHLTC and its stakeholders to provide advice regarding ways in which the province can reduce the incidence of diabetes and maximize the health outcomes of people with diabetes.

## Reporting

The Task Force will report to the Deputy Minister of Health and Long-Term Care

## Objectives

- Identify services and funding provided by MOHLTC and third party insurers for drugs, supplies and devices related to secondary prevention.
- Provide an inter-provincial overview and comparisons with other international jurisdictions as appropriate.
- Describe community-based primary and secondary care services available to people with diabetes. Provide an inter-provincial overview and comparisons with other international jurisdictions as appropriate and feasible.
- Identify existing gaps in services that could provide improved opportunities for secondary prevention of diabetes using current ICES data, evidence-based recommendations and any additional perspectives provided by the Task Force.
- Identify existing and future trends affecting economic assumptions
- Determine the economic benefits associated with comprehensive strategies for the prevention of diabetes complications using published economic models and, at the Task Force's discretion, developing health systems models relevant to Ontario.
- Recommend strategies for preventing or reducing the incidence of diabetes in Ontario, including prevention.
- Recommend one or more models and strategies for strengthening Ontario's commitment to prevent or delay the development of complications of people already diagnosed of diabetes.
- Based on the above information, provide advice to MOHLTC regarding the optimal resources required to maximize opportunities for the prevention of diabetes and diabetes complications, including projected costs and human resource requirements.

## **Conflict of Interest**

- Task Force members must ensure that any actual or potential conflict of interest arising in regard to any matter under discussion by the Task Force is drawn to the attention of the Co-Chairs of the Task Force. The Co-Chairs of the Task Force will determine what action, if any, is required arising from the conflict of interest and will take appropriate action, including but not limited to, requesting the member absent themselves from participation in discussion of that matter.
- Task Force members must ensure that while they fulfil their duties as a member of the Task Force, they will not engage in any activity or provide any service for compensation or otherwise, to any other persons or organisations where such service creates an actual or potential conflict of interest with their role as a member of the Task Force, without prior written consent of the chair of the Task Force on the advice of the Deputy Minister of Health and Long-Term Care. Task Force members are expected to make the Co-Chairs of the Task Force aware of any such instances or potential instances whenever they arise.

## **Confidentiality**

- All information and material of any kind whatsoever acquired or prepared by or for the Task Force not in the public domain, pursuant to this appointment shall, both during and following the duration of this Task Force, be the sole property of Her Majesty the Queen in right of Ontario as represented by the Minister of Health and Long-Term Care.
- Members may not use any data or information obtained as a result of their membership on the Task Force for their personal financial benefit or gain, or for the benefit or gain of any entity or corporation in which they have a financial interest or in which they have an interest as an employee or officer.
- Members undertake to keep forever secret, confidential and inviolate and not directly or indirectly disclose to any person, association of persons, corporations or government, or use at any time, either during or subsequent to their term as a member of the Task Force, any data or information that is not generally available to the public. This includes data in any form or format whatsoever concerning or derived from any data or information provided to the Task Force.

The above conflict of interest and confidentiality requirements apply to members of sub-committees of the Task Force

## Communications

- Members are requested to refer media inquiries about the Task Force and its work to the co-chairs of the Task Force.

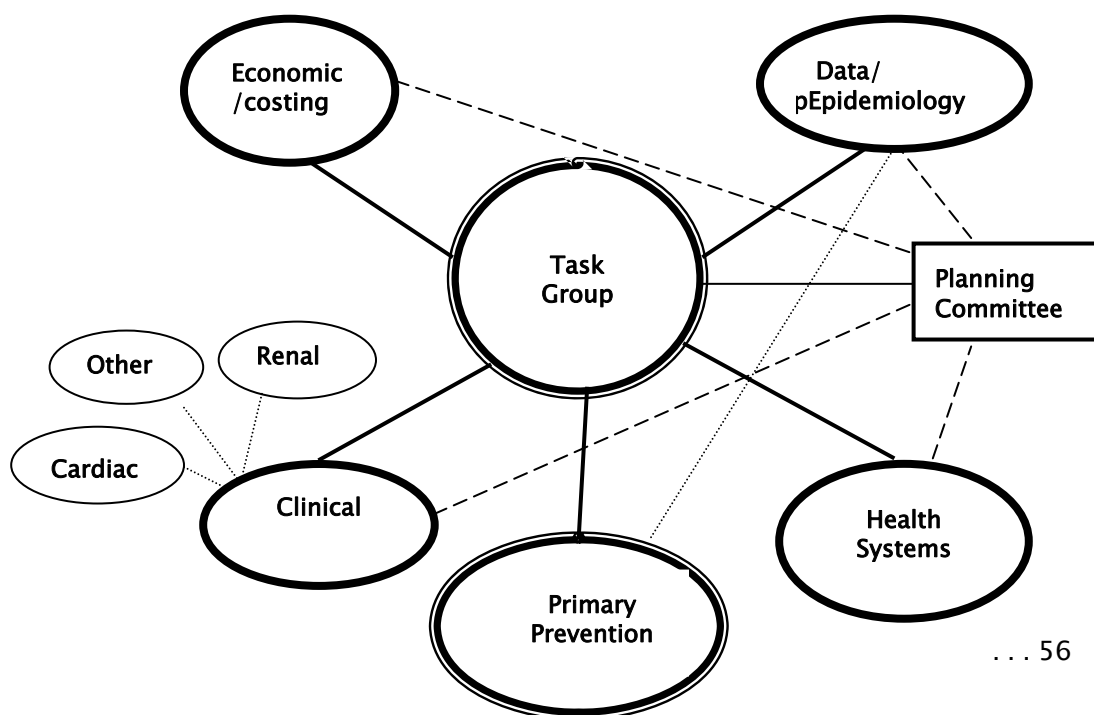
\* Supplies and devices includes all non-drug related requirements to optimize secondary prevention, such as glucose testing strips, footwear, infusion pumps, glucose meters, syringes, needles, lancets and alcohol swabs.

## Task Force Structure

The work plan will be compartmentalized into five major sections comprising epidemiology, prevention, clinical, health systems including human resources, and economic.

Five sub-committees/work groups will develop the work products relating to these four areas. The chairs of these sub-committees will constitute the Planning Group and will sit on, and report to the Task Force. Cross-fertilization of ideas will occur through the writing group and at Task Force levels. Chairs of the sub-committees/working groups are:

|  |                                    |
|--|------------------------------------|
| Epidemiology                             | Dr. Jan Hux                        |
| Primary Prevention                       | Dr. Sheela Basrur/Dr. Rose Bilotta |
| Clinical                                 | Dr. Lawrence Leiter                |
| Health systems including human resources | Donna Lillie                       |
| Economic                                 | Dr. Greg Stoddart                  |



## **Task Force Deliverables**

It is anticipated that a confidential preliminary report will be completed within six months of the first meeting of the Task Force. This report will be used as the basis for a wider consultative process if deemed appropriate by the Task Force.

The final report will be submitted within 8 months of the first meeting of the Task Force.

## **Administrative Support**

The Medical Advisory Secretariat [MAS] of the MOHLTC will provide administrative resources for the Task Force and its sub-committees. Travel expenses will be covered by MOHLTC. A Senior Policy Analyst will be dedicated full time to this project attend all sub-committee meetings.

## **APPENDIX C – Ontario cost calculation for insulin infusion pumps and glucose testing strips.**

The cost of providing insulin infusion pumps and supplies ranges between \$1M to \$2M.

### **i. Insulin Infusion Pumps and Supplies for People with Type 1 Diabetes**

pumps:

75–240 Type 1 diabetes patients needing pump yearly  
@ \$6000 per pump  
= \$450,000 to \$1.44M

*\*\* replacement pump required every 5–7 years – this cost not included in calculation.*

supplies:

240 requests per year  
@ 2400 per person  
= \$576,000

*\*\* number for supplies only will increase as number of pump users increases.*

### **ii. Glucose Testing Strips**

The cost of providing strips to those who do not have ODB or third party coverage ranges from \$24.5M to \$96.4M.

#### **a. Based on MOHLTC report on insulin infusion pumps:**

For those not covered under ODB (i.e., exclude aged 65+ – covered by ODB, type 1 and gestational – covered by MOHLTC)

i. people with diabetes aged 20 to 64  
= 386,077<sup>57</sup>

ii. people aged 20 to 64 who have type 2  
= 90% of 386,077

$$= 347,469$$

iii. 20 to 64 not covered by OBD/3<sup>rd</sup> party

$$= 21\% \text{ of } 347,469$$

$$= 72,969$$

iv. yearly costs of strips and lancets

$$= \$60/\text{month} * 12 \text{ months}$$

$$= \$720$$

v. yearly cost of strips and lancets for non-insured 20-64

$$= 72,969 * \$720$$

$$\approx \$53\text{M}$$

b. Alternate calculation based on \$60M currently paid by ODB for strips

i. people aged 65+ who have diabetes

$$= 706,500 - 381,510 = 324,990$$

ii. people aged 65+ who have type 2 diabetes

$$= 90\% \text{ of } 324,990$$

$$= 292,491$$

iii. 68M spent on diabetic testing supplies in 2002/2003 for 223,274

people with type 2 diabetes aged 65+

$$= \$60\text{M} / 292,491$$

$$\approx \$305 \text{ per person}$$

iv. number of people with type 2 aged 20-64 not covered by OBD/3<sup>rd</sup> party

$$= 72,969$$

v. cost of providing strips for type 2, aged 20-64, no coverage

$$= 72,969 * \$305 \text{ per person}$$

$$\approx \$22\text{M}$$

vi. costs offset by Trillium program

For 2002/2003: government paid \$3.16 million, recipients paid \$562,000)

\* patients paid \$4.9M towards the cost of strips in addition to \$60M paid by ODB

\* this estimate does not include the cost of lancets; whereas, the estimate in (a) does.

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