

## EDITOR'S NOTE

## The Cost of Diabetes: A Game Changer

The past century has witnessed stunning advances in medicine and quality of life. The average life expectancy in the 19th century was about 30 years, but since 1900, it has increased dramatically by more than 30 years, of which 25 years can be attributed to advances in public health (1). Notable among the scientific breakthroughs are the discovery of penicillin and vaccines, which greatly reduced the global prevalence of communicable diseases such as smallpox. The near 50% decline in mortality from cardiovascular disease in the Western world over the past 30 years has also greatly contributed to longer life span (1). Today, the life expectancy for Canadians is 81 years and 78 years for Americans, well above the global average of 63.5 years (2). However, it has been estimated that life expectancy in the US will potentially decline in the 21st century because of the rapidly increasing prevalence of obesity and diabetes (3).

In 1990, diabetes decreased life expectancy by 0.22 years for males and 0.31 years for females, but the negative effect of diabetes on life expectancy has grown rapidly since then, and could now be several times greater (3). A child born with type 1 diabetes in the US can expect to live to about 68 years of age (4), about 10 years less than that of a person without diabetes.

While this is a significant negative effect, it is a striking contrast to those of people with type 1 diabetes before the discovery of insulin, as they rarely lived a year beyond the diagnosis. The discovery of insulin in 1921 by Nobel laureate Sir Frederick Banting revolutionized the life and management of people with type 1 diabetes. In 1948, the world famous Joslin Diabetes Center in Boston was the first to award the Victory Medal to people with type 1 diabetes who have lived with the disease for 25 years. With continued improvement in the management of the disease and its related complications, close to 3,000 50-year medals and 30 75-year medals have been awarded by the Joslin since 1970, a testament that diabetes can be beaten (5).

Despite these successes, a majority of people with diabetes still succumb to excess and premature deaths due mainly to cardiovascular disease and other diabetes complications, and this is most pronounced in younger people with type 1 diabetes (6,7). In individuals with diabetes under 35 years of age, 75% of all deaths are attributable to the disease (8). The secular decline in cardiovascular disease mortality is less evident in people with diabetes (9). Compared with the

general population, people with diabetes, especially women, have a 2–4 fold higher mortality from cardiovascular disease (9,10). The approach to retard and manage diabetic vascular complications over the past 3 decades has focused on optimal glycemic control. To this end, data from the US National Health and Nutrition Examination Survey indicate that significant progress has been made. The likelihood of people with diabetes achieving an A1C of 7% was 2.5 fold greater in 2003–2004 than 1999–2000 (11). Better comprehensive management of diabetes education and management were important contributors to this improvement in glycemic control, but for people living with diabetes, the single most important breakthrough following the discovery of insulin was self-monitoring of blood glucose (SMBG).

SMBG facilitates healthier lifestyle changes by providing feedback on glucose control with changes in diet and physical activity. It also greatly simplifies dosage adjustment of insulin and other glucose lowering drugs. The improvement in glycemic control and reduced hypoglycemia has resulted in SMBG becoming indispensable in the management of individuals with type 1 diabetes, as well as those who require insulin therapy. SMBG is a useful tool and its use has been extended to people with diabetes who are not taking insulin therapy. Several clinical practice guidelines on the management of diabetes, including the 2008 CDA guidelines, have incorporated SMBG in their recommendations as an integral tool to improve glycemic control and reduce hypoglycemia. Unfortunately, SMBG is not inexpensive; each glucose test strips costs about 65–75 cents. The cost of SMBG, whether paid for by individuals or health insurance, is not trivial.

In this issue, Cameron and colleagues provide an overview of the current utilization and expenditure on blood glucose test strips in Canada. Based on limited administrative claims data in 2006, blood glucose test strips accounted for \$247 million in public and over \$81 million in private drug plans. The authors question the cost-effectiveness of self-monitoring of blood glucose in improving the health of people with diabetes, in particular in patients not using insulin, where evidence for improved self-care is lacking—who accounted for half of the total expenditures.

As reports from randomized clinical trials have been inconsistent in demonstrating benefits in improved glycemic control and reduced hypoglycemia, experts started to

question the efficacy of SMBG in improving glycemic control in people with diabetes, especially type 2 diabetes (12-17). A recent report on SMBG in people with type 2 diabetes not using insulin, led by the government-sponsored Canadian Agency for Drugs and Technologies in Health (CADTH), suggested that the frequency of testing could be reduced to increase the cost-effectiveness (18). In those patients in whom the benefit of SMBG is marginal, reducing the frequency of testing could result in considerable savings, which could be redirected to more effective intervention strategies to improve the lives of people with diabetes (19). In its summary report on the optimal prescribing and use of blood glucose test strips for self-monitoring of blood glucose, CADTH made specific recommendations, based on available clinical evidence, on limiting the frequency of testing in people with type 2 diabetes (20).

Should we take a stand on the issue of limiting SMBG in people with type 2 diabetes who do not require insulin therapy? While many national and international diabetes associations (Canadian Diabetes Association [CDA], American Diabetes Association, Diabetes Australia and the International Diabetes Federation) suggest SMBG in type 2 diabetes, the frequency and timing of testing are variable and not clearly stated in their recommendations. *The Canadian Journal of Diabetes* invited two commentaries to debate on this topic, and provide readers with further insights and food for thought.

The time is ripe for the CDA and its sister organizations in other countries to reevaluate and realign their evidence-based recommendations on SMBG in the management of type 2 diabetes. There are several reasons to support this action. First, the recommendations on SMBG, at least for the CDA, did not take into consideration efficacy or cost-effectiveness, but we now have Canadian data on the utilization and cost of SMBG. Second, health professionals are increasingly question the benefit of glycemic control, and by extension the role of SMBG in people with type 2 diabetes, given the negative results of the 3 large glucose lowering trials (ACCORD [Action to Control Cardiovascular Risk in Diabetes], ADVANCE [Action in Diabetes and Vascular Disease: Preterax and Diamicron MR Controlled Evaluation], VADT [Veterans Affairs Diabetes Trial]) in reducing cardiovascular events and mortality (21-23). Third, we have newer oral agents, the incretins, that do not cause hypoglycemia and an economic argument could be made to prescribe these agents without having to worry about SMBG. Finally, the rising cost of diabetes is threatening to compromise optimal care for people with diabetes and can no longer be ignored.

The health care expenditures attributed to diabetes, which include hospitalization, reimbursement of visits to health care professionals, diabetes supplies and medication costs, are escalating. The unrelenting increase in the prevalence of

diabetes and the changing demographics of the aging baby boomers will only accelerate the problem further. To shed light on the economic cost of diabetes in Canada, this issue's Diabetes and Society column is focused on a report commissioned by the CDA. The cost is estimated to rise from \$5.2 billion in 1998 (24) to \$16.9 billion by 2020. In the US, 1 in 5 healthcare dollars in 2007 is spent caring for someone with diabetes, with the total cost of diabetes estimated at a staggering \$174 billion (25). The estimated cost of diabetes will continue to rise as it did not account for the growth and aging of the population and lifestyle changes that greatly increase the risk of developing diabetes. The current and projected economic burden of diabetes in Canada, if left unchecked, is unsustainable and will eventually bankrupt our healthcare system. The authors suggest that stemming the growth of diabetes as a possible solution, a lofty but perhaps somewhat unrealistic goal. A more plausible goal is to call to action all the stakeholders, including the public, health care professionals, private and business sectors, and governments at all levels, to curb the rising cost and to deploy our resources wisely. The enormous cost of diabetes is a game changer and we have to do our share to reduce the global health care expenditures attributable to diabetes. This will inevitably translate into efficient and cost-effective deployment of health care access, delivery and innovative approaches to the management of diabetes. The new mantra may well be saving lives while saving money.

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