THERAPEUTICS INITIATIVE Evidence Based Drug Therapy

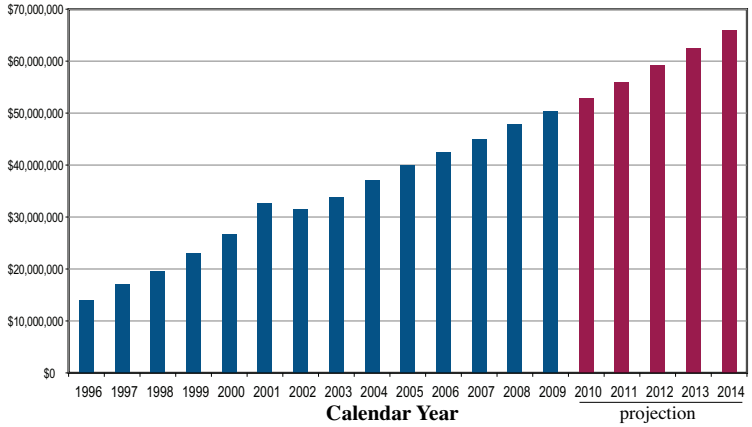
Self-Monitoring of Blood Glucose in Type 2 Diabetes

Since the early 1980s, self-monitoring of blood glucose (SMBG) has been used as a tool for supporting blood glucose and diabetes management. While the role of SMBG in people taking insulin is accepted because of the high risk of severe hypoglycemia,[1,2] there is considerable controversy about the value of SMBG in patients with type 2 diabetes who are not receiving insulin.[3] This Letter presents data on the costs of SMBG and attempts to answer whether these costs are warranted in patients with type 2 diabetes not receiving insulin.

What are the costs of SMBG in BC and Canada?

The Figure shows the amount spent in BC using PharmaNet data on glucose test strips from 1996 to 2009 and the forecasted spending for the years 2010 to 2014. The $50 million expenditure in 2009 represented the third highest for an insurable pharmacy dispensed product in BC according to PharmaNet data; at least $25 million was used for patients with type 2 diabetes. Nationwide, Canada's publicly and privately funded drug plans spend over $330 million annually on glucose test strips, of which $188 million is for patients who are not using insulin.[4]

Figure: Total Spending on Blood Glucose Test Strips in British Columbia†



†This information includes only transactions entered into the BC PharmaNet system and excludes all federally insured claims. Dispensing fees are included as part of the total costs.

What are the benefits of SMBG in Type 2 diabetes?

In 2009 the Canadian Agency for Drugs and Technologies in Health (CADTH) conducted a systematic review of the effect of using SMBG versus no SMBG in patients with non-insulin treated type 2 diabetes. CADTH identified 7 randomized controlled trials (RCTs) with a median duration of 6 months.[5] A meta-analysis of the results from these 7 RCTs showed that using SMBG (more than seven times a week) is associated with a statistically significant improvement in glycemic control, difference in HbA1C –0.25% (95%CI –0.36%, –0.15%). This decrease in HbA1C was not considered to be a clinically significant difference. A similar effect on HbA1C was observed regardless of whether or not education was provided to help patients interpret and act upon the SMBG results. For patients with type 2 diabetes not using hypoglycemic drug therapy, utilization of SMBG did not alter glycemic control. **CADTH found no evidence that SMBG confers benefits for outcomes other than HbA1C such as mortality, long-term complications of diabetes, body weight, patient satisfaction, or quality of life.**

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Key messages from the CADTH report[5]

- **Most adults with type 2 diabetes managed on oral anti-diabetes drugs do not require routine SMBG. Periodic testing in selected patients** (e.g., those with unstable glucose levels, acute illness, pharmacotherapy changes, risk of hypoglycemia with insulin secretagogues like glyburide) **should be linked to specific patient actions** (e.g., prevention or management of hypoglycemia, self-directed dosage adjustment).
- **Most adults with type 2 diabetes controlled by diet alone should not require SMBG.**

Internationally, the United Kingdom, Sweden, Germany, and Scotland have undertaken studies comparable to CADTH's and have reached similar conclusions.

Clinical implications

Two unproven assumptions underlie recommendations for self monitoring of blood glucose in type 2 diabetics:

a) the benefits of intensive glucose lowering treatment outweigh the harms
b) SMBG is essential to reduce the consequences of severe hypoglycemia in patients receiving intensive glucose lowering treatment.

A recently published systematic review and meta-analysis testing these assumptions by comparing intensive glucose lowering treatment with standard treatment showed no effect of intensive glucose lowering treatment on all cause mortality and cardiovascular death, but a significant increase in severe hypoglycemic events with intensive glucose lowering treatment.[6] These findings should lead to a decrease in the number of patients exposed to intensive glucose lowering treatment, decreased prescribing and lower doses of glucose lowering drugs, and less need for frequent routine utilization of glucose test strips.

More productive actions to reduce mortality and morbidity in type 2 diabetics include increased attention to weight reduction (more likely to be achievable without insulin or insulin secretagogues), improved nutrition, regular physical exercise and blood pressure control.

Current BC initiatives to optimize use of SMBG

The Drug Use Optimization Branch in the Pharmaceutical Services Division also considers this topic important and encourages clinicians and patients to 'test with purpose'. 'Testing with purpose' means that patients only monitor their blood glucose when there is a valid reason (e.g., during acute illness, when taking insulin or insulin secretagogues and at risk of hypoglycemia, during pregnancy, etc). In March 2011, materials were distributed to family physicians and pharmacies across BC and health authorities have planned additional educational initiatives.

Conclusions

- Using SMBG in non-insulin treated patients with type 2 diabetes is very costly and has not been shown to improve outcomes that matter to patients: mortality, morbidity or quality of life.
- **Most non-insulin treated patients with type 2 diabetes do not require routine SMBG.**
- Type 2 diabetes patients require effective education about when they may be at risk of hypoglycemia or dangerous hyperglycemia, when SMBG is appropriate and how they should act upon test results.
- **Type 2 diabetes management should focus on weight management, appropriate nutrition, regular physical activity and blood pressure control, rather than intensive glucose lowering treatment.**

The draft of this Therapeutics Letter was submitted for review to 60 experts and primary care physicians in order to correct any inaccuracies and to ensure that the information is concise and relevant to clinicians.

References

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