COST-EFFECTIVENESS OF REAL-TIME CONTINUOUS GLUCOSE MONITORING

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Diabetes Canada Clinical Practice Guidelines recommend the use of rtCGM in people with type 2 diabetes (T2D) on basal-bolus insulin who have not achieved their HbA1c targets and are willing to use CGM on a near daily basis to reduce HbA1c and the duration of hypoglycemia.[1] For more information on the guideline recommendations, watch the below video:

Diabetes Canada Clinical Practice Guidelines: Recommendations for Continuous Glucose Monitoring (CGM)

A 2021 policy statement from Diabetes Canada recommends (level A) that rtCGM should be reimbursed by payers in this patient population.[2]

COST-EFFECTIVENESS ANALYSIS

Study Aim: Conduct a cost-effectiveness analysis (CEA) comparing rtCGM vs SMBG based on a large real-world study of adults with T2D treated with insulin.[3]

Study Design: A health economic CEA of a rtCGM system (Dexcom G6) vs SMBG in adults with T2D treated with insulin.[3] The analysis used the IQVIA CORE Diabetes Model and clinical data were sourced from a large US retrospective cohort study[4] and adapted to Canada. The analysis was performed from the payer perspective over a lifetime time horizon.

Patient Characteristics	Model Inputs	Model Outputs

• Mean age, yrs: 64.5
• Mean BMI: 33.4
• Mean duration diabetes, yrs: 15.8
• Mean HbA1c: 8.27% (67 mmol/mol)
• Proportion female: 49.5%
	• HbA1c: absolute reduction 0.56% in rtCGM group
	• Severe hypoglycemic events requiring ER visit or hospitalization:
	  • 0/100 person-yrs in rtCGM group
	  • 4/100 person-yrs in SMBG group
	• Hyperglycemia/DKA events:
	  • 0/100 person-yrs in rtCGM group
	  • 2.5/100 person-yrs in SMBG group
	• SMBG frequency: 3.8 tests/day
	• QoL benefit (0.03) from reduced finger-stick testing
	• Annual cost associated with rtCGM: CAD 3,588
	• Annual costs in the SMBG group: CAD 1,096
	• Direct medical costs inflated to 2021 CAD
		• Cumulative incidence of long-term complications including CV, renal, ophthalmic, and peripheral neuropathy
		• Direct costs
		• Incremental Cost-Effectiveness Ration (ICER)
		• Life expectancy
		• QALYs

Base Case Results: rtCGM vs. SMBG

QUALITY

rtCGM use had a **+0.95 improvement in QALYs** compared to SMBG (9.971 vs. 9.021).

COST

Lower costs related to long-term complications with rtCGM vs. SMBG.

CAD 17,603 higher total lifetime direct costs with rtCGM than with SMBG.

CAD 18,523/QALY ICUR based on the combination of higher lifetime costs and increased QoL expectancy.

Long-term Complications

- CV
- DKA
- Ophthalmic
- Renal
- Severe hypoglycemia
- Ulcer, amputation, neuropathy

Total lifetime treatment costs were higher with rtCGM but the total mean lifetime complication costs were lower with rt-CGM.

Sensitivity Analyses

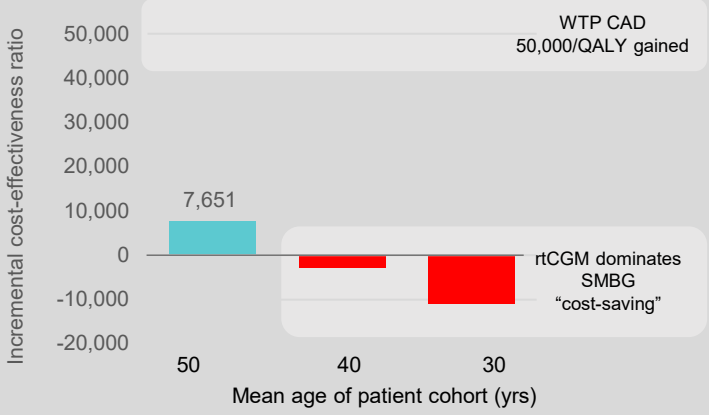
Sensitivity analyses showed the base case findings were sensitive to changes in the HbA1c treatment effect, QoL benefit, frequency of SMBG, age at baseline, and the annual cost of rt-CGM.

FINGERSTICKS

rtCGM becomes more cost-effective as the frequency of SMBG increases and is a cost-saving in patients testing **>10 ten times/day.**

AGE

Reducing the age of rtCGM initiation reduced the ICER, CAD 7,651/QALY at age 50 and rtCGM is a cost-saving relative to SMBG at earlier ages.



rtCGM remains cost-effective below 50,000 WTP CAD vs SMBG despite:

- Increasing costs by 25% (ICUR: 32,021/QALY gained)
- Reducing HbA1c effect by 50% to -0.28% (ICUR: 30,631/QALY gained)
- Assuming one test strip/day in SMBG arm (ICUR: 30,404/ /QALYgained)

rtCGM is dominant to SMBG (cost-savings) when rtCGM costs are reduced by 50%.

Key Takeaway | The ICER of rtCGM vs SMBG is well below the Canadian willingness-to-pay threshold of CAD 50,000/QALY gained.

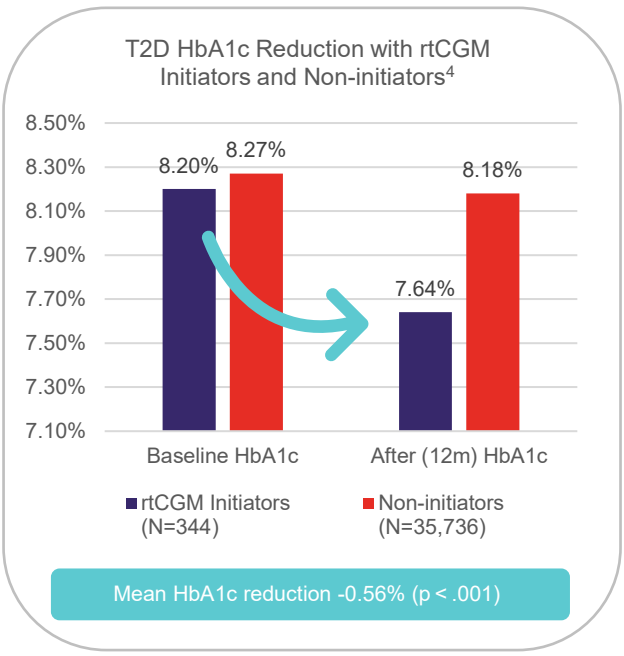
BASELINE COHORT MODEL INPUTS

Baseline Cohort Characteristics and Treatment Effects

The baseline characteristics, HbA1c treatment effects, and incidence of severe hypoglycemic and hyperglycemic events were sourced from the US retrospective real-world cohort study in insulin-treated diabetes, which included a group of over 35,000 people with T2D.[4] Model input data on other long-term harmful effects (disutility)[5] and QoL gains were sourced from several additional published studies.

HbA1c

- In the US retrospective real-world cohort study, patients with T2D using rtCGM saw a significantly larger decline in HbA1c than patients with T1D (p=.003).[4]
- For patients with T2D, the mean HbA1c declined from 8.20% to 7.64% (difference, −0.56%) among rtCGM initiators compared with a decline from 8.27% to 8.18% (difference, −0.09%) among non-initiators (p < .001).[4]



HYPOGLYCEMIA

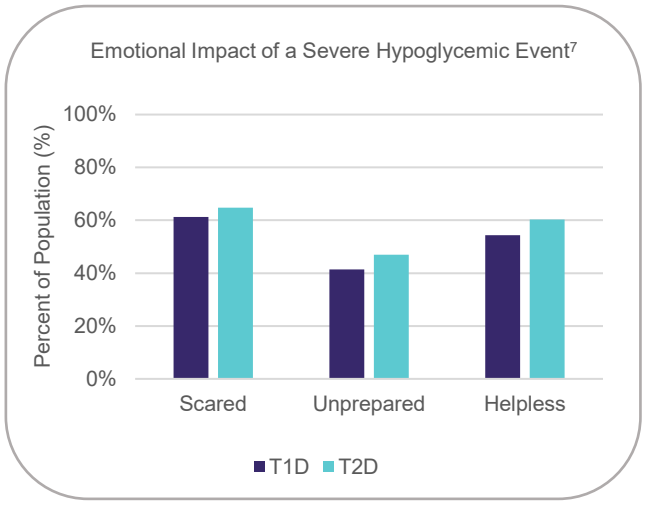
rtCGM Initiators 7.8% to 3.2%

Non-initiators 1.8% to 2.2%

Mean hypoglycemia event reduction -4.0% (p=0.04)[4]

LOW

- rtCGM initiation was associated with a **>50% decrease** in the rate of hospitalizations and ER visits due to severe hypoglycemia.[4]
- The harmful effects associated with severe hypoglycemic events were sourced from a multinational study by Evans et al.[6]



Impact of a Severe Hypoglycemic Event[7]

Mojdami et al. described how patients with diabetes felt helpless (54.3% T1D, 60.3% T2D), unprepared (41.4% T1D, 47.1% T2D) and scared (61.2% T1D, 64.7% T2D) in response to a recent hypoglycemic event.

Additionally, only 54.9% of the study participants reported that the hypoglycemic event was discussed with their health care provider.

The Canada CEA did not account for emotional or indirect costs attributable to hypoglycemic events.[3]

HYPERGLYCEMIA

Hyperglycemic events (assumed to be DKA) were included in the analysis.[4] Disutility associated with a DKA event was conservatively assumed to be −0.01.[3]

FINGERSTICKS

An additional QoL utility benefit of 0.03 was applied only to the rtCGM arm of the CEA owing to the avoidance of routine fingerstick testing, based on the findings of Matza et al.[8]

- Patients in the SMBG arm were assumed to perform a mean of 3.8 tests/day[3], based on the findings from the DIAMOND T2D study.[9]
- The cost of SMBG tests (0.79 per test) was sourced from Yeaw et al. and inflated to 2021 CAD.[10]

Key Takeaway | From a societal perspective the findings of the CEA present a conservative picture of the cost-effectiveness of rtCGM relative to SMBG in the insulin-treated T2D population.

The totality of available evidence shows rtCGM technology to be transformative for many people living with diabetes. Thus, access should be extended to all Canadians for whom these systems have been shown to provide positive benefit to their diabetes management.[2]

BMI: body mass index, CAD: Canadian dollar, CEA: cost-effectiveness analysis, CV: cardiovascular, DKA: diabetic ketoacidosis, HbA1c: hemoglobin A1c, ICER: incremental cost-effectiveness ratio, ICUR: incremental cost-utility ratio, QALYs: quality-adjusted life expectancy, QoL: quality of life, rtCGM: real time continuous glucose monitoring, SMBG: self-monitoring of blood glucose, T1D: type 1 diabetes, T2D: type 2 diabetes, US: United States, WTP: willingness to pay

1. Diabetes Canada Clinical Practice Guidelines Steering Committee. Can J Diabetes. 2021. 2. Diabetes Canada. 2021. Reimbursement of Intermittently Scanned and Real-Time Continuous Glucose Monitoring Systems. 3. Isitt JJ. et al. Cost-effectiveness of a real-time continuous glucose monitoring system versus self-monitoring of blood glucose in type 2 diabetes patients on insulin in Canada. ADA 2022. 4. Karter AJ. et al. *JAMA*. 2021. 5. Beaudet A, et al. *Value Health*. 2014. 6. Evans M, et al. *Health Qual Life Outcomes*. 2013. 7. Mojdami D, et al. *Can J Diabetes*. 2021. 8. Matza LS, et al. *Value Health*. 2017. 9. DIAMOND Study Group. *Ann Intern Med*. 2017. 10. Yeaw J, et al. *Diabetes Ther*. 2012.