

A COST OFFSET ANALYSIS (COA) COMPARING REAL-TIME CONTINUOUS GLUCOSE MONITORING (RT-CGM) WITH INTERMITTENT SCANNING CONTINUOUS GLUCOSE MONITORING (IS-CGM) IN TYPE 1 DIABETES (T1D) SUBJECTS AT INCREASED HYPOGLYCEMIA RISK IN EIGHT COUNTRIES

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Background and Objective

Recent studies using continuous glucose monitors (CGMs) in T1D produce multiple daily readings used to define a novel construct called time in range (TIR), optimally between 70 mg/dl and 180 mg/dl.¹ Multiple readings allow for calculation of a %TIR that has been linked to HbA_{1c} improvements, greater risk for severe hypoglycemia (SH) <54 mg/dl, and diabetic ketoacidosis (DKA) >270 mg/dl. A recent RCT ² comparing an rt-CGM and is-CGM device demonstrated differences in %TIR over several glucose ranges allowing for projection of potential clinical outcomes. A COA was performed comparing these clinical cost offsets for rt-CGM and is-CGM in people with T1D (n=2,000) and impaired awareness of hypoglycemia (IAH; ~30% of people with T1D), applied to eight countries each over a one-year period.

Methods

Clinical effects included %TIR ² for optimal glucose range as a proxy HbA_{1c} measure (algorithm by Beck *et al* ³), along with reduced hospitalizations for SH and DKA ⁴ based on %TIR spent in low and high glucose ranges,² respectively. Annual cost offsets attributable to a 1.0% HbA_{1c} reduction ranged between \$1,433 (low end) to \$1,987 (high end) based on a published US study (adjusted to \$USD 2019).⁵ The US study economic benefit based on low and high end HbA_{1c} cost offset was then applied to each non-US country through adjustment by OECD healthcare purchasing power parity (each country compared to the US) along with 2019 currency exchange rates (Table 1). Costs attributable to SH and DKA hospitalizations were taken from country-specific published literature and inflated to 2019 values.⁶⁻²²

Table 1: Potential Cost Offsets for Reduced HbA_{1c}, SH and DKA Hospitalizations for Hypothetical Cohorts of People with T1D and Impaired Awareness of Hypoglycemia (n=2,000) in Eight Countries (All currencies adjusted to 2019)

Country	Low End HbA _{1c} Cost Offset per T1D Subject with IAH	High End HbA _{1c} Cost Offset per T1D Subject with IAH	Cost Reduction for 126 Fewer SH Hospitalizations	Cost Reduction for 35 Fewer DKA Hospitalizations	Total Cost Offsets per Country: Low End HbA _{1c} + SH + DKA	Total Cost Offsets per Country: High End HbA _{1c} + SH + DKA	Total Cost Offsets per T1D person per Country: Low End HbA _{1c}	Total Cost Offsets per T1D person per Country: High End HbA _{1c}
Australia (\$AUD)	\$810,104	\$1,123,502	\$326,446 ⁶	\$407,508 ⁷	\$1,544,058	\$1,857,456	\$772	\$929
Canada (\$CAD)	\$773,805	\$1,073,161	\$292,847 ⁸	\$433,639 ⁹	\$1,500,291	\$1,799,648	\$750	\$900
France (€)	€531,377	€736,947	€541,488 ¹⁰	€197,729 ¹¹	€1,270,595	€1,476,164	€635	€738
Germany (€)	€621,047	€861,306	€469,008 ¹²⁻¹³	€145,615 ¹⁴	€1,235,671	€1,475,930	€618	€738
Italy (€)	€384,141	€532,751	€742,743 ¹⁵	€169,034 ¹⁶	€1,295,919	€1,444,528	€648	€722
Spain (€)	€365,322	€506,651	€460,817 ¹⁷	€141,067 ¹⁸	€ 967,205	€1,108,535	€484	€554
UK (£)	£424,708	£589,011	£329,060 ¹⁹	£76,946 ²⁰	£830,715	£995,018	£415	£497
USA (\$USD)	\$1,230,039	\$1,705,895	\$490,465 ²¹	\$321,839 ²²	\$2,042,342	\$2,518,198	\$1,021	\$1,259

Results

RT-CGM %TIR compared to is-CGM ² resulted in estimated HbA_{1c} reductions of -0.95% and -0.52%, respectively, for an incremental difference of -0.43%. The %TIR spent at low glucose (<54 mg/dl) between the groups yielded 126 fewer SH hospitalizations for rt-CGM in each country. The %TIR spent at high glucose (>270 mg/dl) yielded 35 fewer DKA hospitalizations for rt-CGM in each country. Estimated annual cost offsets per person with T1D and IAH using rt-CGM instead of is-CGM in each country range as follows: Australia, \$772-\$929; Canada, \$750-\$900; France, €635-€738; Germany, €618-€738; Italy, €648-€722; Spain, €484-€554; UK, £415-£497; USA, \$1,021-\$1,259.

Conclusions

The RCT ² comparing rt-CGM with is-CGM has demonstrated important differences in %TIR spent at low, optimal, and high glucose ranges that are likely to translate into significant clinical and economic benefits for rt-CGM compared with is-CGM. The %TIR metric may grow in clinical significance as the relationship to HbA_{1c} is more fully described and understood.

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