

Evaluation of the clinical and economic effectiveness of continuous glucose monitoring in adults with type 1 diabetes mellitus in the healthcare system of the Republic of Kazakhstan

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INTRODUCTION AND OBJECTIVE

The main goal of this study was to assess the cost and cost-effectiveness of using a continuous glucose monitoring (CGM) system compared to self-monitoring of blood glucose levels (SGM) in people with type 1 diabetes mellitus (T1DM), from the perspective of a payer in the healthcare system of the Republic of Kazakhstan.

MATERIAL AND METHODS

A Markov state transition model was constructed and incremental costs per quality-adjusted life year (QALY) were calculated. Glucose monitoring costs are based on actual costs for CGM devices, test strips, and lancets, assuming full compliance with the monitoring regimen. Direct medical costs associated with severe hypoglycemic events and diabetic ketoacidosis, as well as long-term micro- and macrovascular complications of type 1 diabetes, are calculated based on current clinical protocols and approved tariffs for medical services. The cost is presented in national currency (KZT). State transition probabilities, utility increments when using CGM versus SGM, average time difference in range (TIR), and utilities are based on research data. The analysis was performed with a time horizon of 58 years (patients aged 18–75 years) using an annual discount rate of 3.5% on costs. To assess the uncertainty, a probabilistic sensitivity analysis was carried out. One-way sensitivity analysis was performed on the difference in costs.

RESULTS

The use of CGM devices is associated with an increase in costs of KZT12,191 million and an increase in the number of QALYs received by 973 years, resulting in an incremental cost-effectiveness ratio (ICER) of KZT12.5 million for each QALY received.

The results of the probabilistic sensitivity analysis indicate a high degree of reliability of the results obtained. The obtained simulation results are very sensitive to changes in glucose monitoring costs.

Table 1. Relative risks of DM1 complications for CGM based on difference in TIR

Parameter	Value
Retinopathy	0.5960
Nephropathy	0.7487
Neuropathy	0.7707
CVD	0.8650

Figure 1: Results of the probabilistic sensitivity analysis of the model

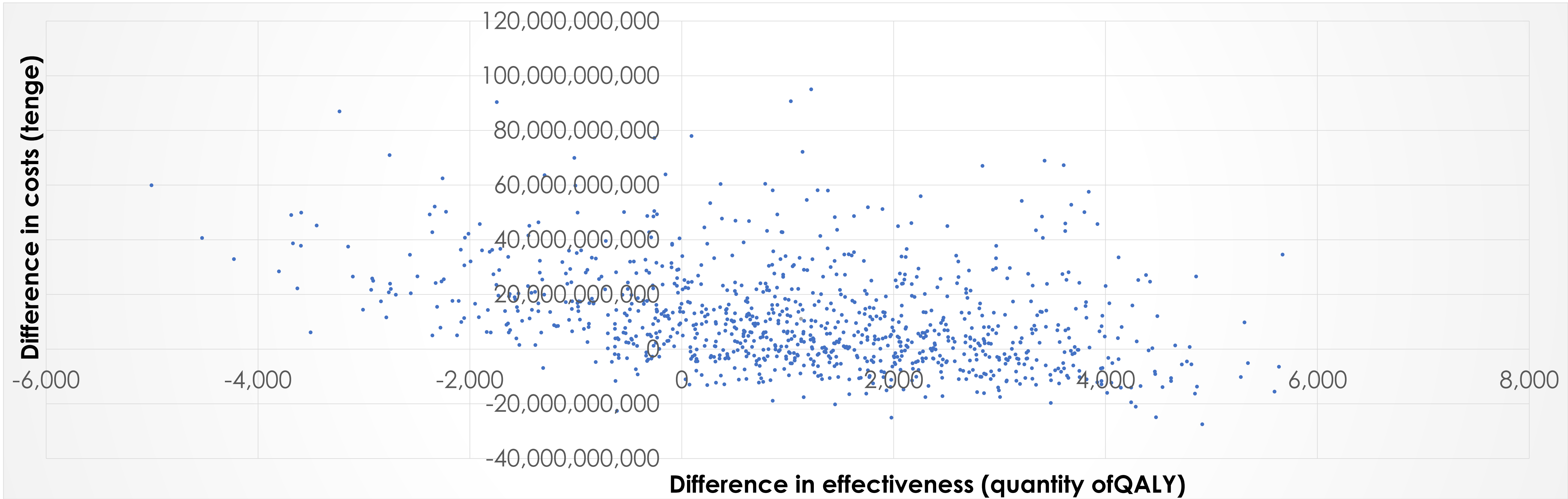


Table 2: Cost-effectiveness results

SGM		CGM		ICER for 1 QALY (million KZT)
Quantity QALY	Costs (million KZT)	Quantity QALY	Costs (million KZT)	
12,733	30,099	13,706	42,290	12,527

CONCLUSIONS

With a willingness-to-pay threshold of three GDP per capita (US\$11,298 in 2022) for each QALY received, CGM is a cost-effective, cost-effective alternative to SGM for T1DM patients in the Kazakh healthcare system setting.

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