HIS modelling and simulation based cost–benefit analysis of a telemedical system for closed-loop diabetes therapy

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A B S T R A C T

Objectives: INCA (Intelligent Control Assistant for Diabetes) is an EU funded project aimed at improving diabetes therapy by creating a personal closed-loop system interacting with telemedical remote control. This study aims at identifying and applying suitable methods for a cost–benefit analysis from the perspective of the payor for health services.

Methods: For cost analysis MOSAIK-M was used, a method and tool for health information systems analysis and design. Two MOSAIK-M models were created describing conventional insulin pump based diabetes care (CSII), and INCA based diabetes care. Both models were parameterised with costs and simulated to determine yearly costs of diabetes management and treatment for a patient with no diabetes related complications. Probability of developing complications and their duration were determined based on the Archimedes model. It was parameterised with results of a clinical study concerning HbA1c-value changes using the INCA system compared with conventional CSII. The simulation results in form of years of disease within a 30-year time frame were multiplied with corresponding treatment costs.

Results: Yearly costs of conventional insulin CSII for a diabetes type 1 patient are €5908 (German health care system). Using INCA based on the clinical study setting would raise yearly costs by €2233. 24% of the INCA costs are generated by the continuous blood glucose measurement device, 5% by IT devices and services. Considering also diabetes related complications in a 30-year time frame and HbA1c value reductions from 7.9 and 7.6% (conventional CSII) to 7.5 and 7.3% (INCA) reduces the additional costs of INCA to €2102 and €2162.

Conclusions: The approach produces an estimation of a lower bound for cost savings concerning the treatment of diabetes related complications in a 30-year time frame. These savings alone do not prove cost efficiency of the INCA approach. Further work is needed to improve the approximation and to include indirect and intangible costs.

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