The Health Technology Reports Series has been developed by the Department of Public Health, University of Tartu.

Continuous subcutaneous insulin infusion in children with type 1 diabetes

Summary

Objectives: To compare effectiveness and cost-effectiveness of continuous subcutaneous insulin infusion (CSII) and multiple daily injections (MDI) and evaluate the costs, cost-effectiveness and budget impact of alternative treatments in Estonian children.

Methods: Effectiveness, safety and cost-effectiveness literature review was conducted in August 2012 based on MEDLINE, Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effectiveness (DARE), National Institute for Health Research Economic Evaluation Database (NH SEED) and Health Technology Assessment database. Cost-effectiveness literature review was updated using the same sources in April 2013. Studies were selected using predefined selection criteria. For effectiveness and safety 32 studies from reference list met the inclusion criteria. From these 17 articles, which gave most valuable information for answering research questions, were included in the report. For cost-effectiveness 6 studies and 2 HTA reports met the criteria and were described in the report.

To simulate the course of type 1 diabetes and its acute complications (severe hypoglycaemia, ketoacidosis) in children a Markov cohort model was used. In the base-case scenario a hypothetical cohort of 200 children aged 3 with frequent severe hypoglycaemia was followed in yearly cycles until the age of 18. To describe the course of disease transition probabilities from published literature were obtained. CSII and MDI treatments were assumed to be equally effective in preventing ketoacidosis and CSII therapy was assumed to be twice as effective in preventing severe hypoglycaemia. Main outcome measures of the model were morbidity and mortality of aforementioned complications. Based on quality of life lost in association with measured outcomes quality-adjusted life-years (QALYs) were calculated for the CSII and MDI cohorts. Costs included diabetes and its complications treatment and blood sugar monitoring. Costs and effects were discounted using an annual discount rate of 5%.

Results: In cost-effectiveness analyses considering all the costs of type 1 diabetes and its complications treatment incremental cost-effectiveness ratio (ICER) comparing CSII to MDI was 245 000 – 608 000 € per QALY. ICER from the perspective of Estonian Health Insurance Fund was in the range of 225 000 – 256 000 € per QALY depending on the type of insulin pump used. The key impact factors of cost-effectiveness were incidence of severe hypoglycaemia, time perspective considered, CSII effectiveness in preventing hypoglycaemia and CSII treatment costs. Budget impact analysis showed that in next five years (2013 – 2017) Estonian Health Insurance Fund's expenditures on CSII therapy will rise by 100 000 – 125 000 € per year.

Conclusions: Evidence suggests that CSII treatment results in slightly better glycaemic control and reduces the number of hypoglycaemias by half when compared to MDI in children with type 1 diabetes. But since the costs of CSII treatment are 2 - 4 times higher than MDI treatment costs, CSII in children with type 1 diabetes cannot be considered cost-effective in Estonia

Reference: Lutsar K, Heilman K, Simre K, Kiivet R-A. Insuliinipumpade kasutamine laste 1. tüüpi diabeedi ravis. Tartu: Tartu Ülikooli tervishoiu instituut; 2013.