

# The cost-effectiveness of continuous subcutaneous insulin infusion for patients with type 1 diabetes

## Summary

**Objectives:** To assess the clinical effectiveness and cost-effectiveness of multiple daily insulin injections (MDIs) with blood glucose (SMBG) self-monitoring by capillary blood testing (MDI + SMBG) compared with: continuous subcutaneous insulin infusion (CSII) with an insulin pump with SMBG (CSII + SMBG); CSII with integrated continuous glucose monitoring (CGM) (CSII + CGM) and non-integrated, stand-alone CSII and CGM (CSII + non-integrated CGM).

**Methods:** Literature reviews for evidence on the effectiveness, safety and cost-effectiveness of CSII and CGM were carried out in relevant databases. Cost-effectiveness analysis was performed using the CORE Diabetes Model version 9.0. The analysis was performed in two cohorts: 10 years old and 19 years old. Data for baseline cohort characteristics, effectiveness and quality of life outcomes was obtained from the published literature. Costs were calculated based on Estonian data and expert opinions. The analysis was conducted from the perspective of the Estonian Health Insurance Fund over a lifetime time horizon. Costs and effects were discounted using an annual discount rate of 5%. Results are presented in terms of costs, QALYs and cost per QALY (ICER). Additional budget impact analysis was carried out.

**Results:** In the base-case scenario, the cost-effectiveness results suggest that technologies that use CSII resulted in improved quality-adjusted life expectancy but higher mean lifetime costs. In patients whose baseline age was 10 years, the ICER was estimated at €96,838 (CSII + CGM), €105,581 (CSII + non-integrated CGM) and €40,110 (CSII + SMBG) per QALY ranging between €69,342–175,553 (CSII + CGM), €76,306–191,403 (CSII + non-integrated CGM) and €23,897–57,058 (CSII + SMBG) in sensitivity analysis. In patients whose baseline age was 19 years the ICER was estimated at €94,498 (CSII + CGM), €103,283 (CSII + non-integrated CGM) and €31,154 (CSII + SMBG) per QALY. The results were most influenced by the increased estimate of quality of life while using CGM instead of SMBG, the prices of CSII and CGMs and the mean baseline age of the cohort.

**Conclusions:** The cost-effectiveness analysis showed that improvements in glycaemic control associated with insulin pump use led to a reduced incidence of diabetes-related complications and a longer (quality-adjusted) life expectancy. Using an insulin pump with continuous glucose monitoring increases the positive effect furthermore.

**Citation:** Juus E, Volke V, Peet A, Lukka M, Kiivet R-A. *Insuliini pumpravi kulutõhusus 1. tüüpi diabeedi ravis*. Tartu: Tartu Ülikooli Peremeditsiini ja rahvatervishoiu instituut; 2017.