



Title	Clinical and Cost Effectiveness of Continuous Subcutaneous Insulin Infusion for Diabetes
Agency	NCCHTA, National Coordinating Centre for Health Technology Assessment Mailpoint 728, Boldrewood, University of Southampton, Southampton SO16 7PX, United Kingdom; Tel: +44 2380 595586, Fax: +44 2380 595639
Reference	Health Technol Assess 2004;8(43). October 2004. www.ncchta.org/execsumm/summ843.htm

Aim

To assess the clinical and cost effectiveness of continuous subcutaneous insulin infusion (CSII) compared with multiple daily injections (MDI) in the delivery of intensive insulin therapy for treatment of diabetes mellitus.

Conclusions and results

Twenty studies comparing CSII with MDI were identified. Quality was generally poor. In adults with Type 1 diabetes, glycated hemoglobin was lowered by 0.61% (95% CI -1.29 to 0.07) in longer term studies, but improvement was less when excluding a study using bovine ultralente. A reduction in insulin dose with CSII of about 12 units per day (-11.90, 95% CI -18.16 to 5.63) was found in short-term studies, with smaller differences in longer term studies. Body weight and cholesterol levels were similar between treatments. Hypoglycemic events did not differ significantly between CSII and MDI in most trials, but some found fewer events with CSII, and 1 found more hypoglycemia and hypoglycemic coma with CSII. The studies were inconsistent regarding patient preference, but progress has been made with insulin pumps and injector pens since publication of many of the older studies. No difference in glycated hemoglobin between CSII and MDI was found in pregnancy; 1 study found patients with CSII required less insulin, but 2 other studies found no significant difference. One study of adolescents found lower glycated hemoglobin and insulin dose with CSII, whereas a second study found no significant difference. In CSII, analogue insulin was associated with lower glycated hemoglobin levels than soluble insulin. No economic evaluations comparing CSII with MDI were identified. The estimated additional cost of CSII compared to MDI varies from GBP 1091 per year to GBP 1680 per year, according to the make of the insulin pump and its estimated life. These estimates include the costs for the insulin pump, CSII consumables, and the initial education for patients in switching from MDI to CSII. Consumables (eg, infusion sets) are the largest annual cost category for CSII.

Recommendations

Compared to optimized MDI, CSII shows a modest but worthwhile improvement in glycated hemoglobin in adults with Type 1 diabetes. Longer term benefits of such a difference in glycated hemoglobin have not been established, but it is expected to reduce long-term complications. More immediate primary benefits from CSII may relate to its impact on the incidence of hypoglycemic events and the dawn phenomenon, and greater flexibility of lifestyle. However, evidence is limited, and the quality-of-life information is based on testimonies from patients having a positive experience of CSII. The estimated cost to the NHS per year for CSII would be around GBP 3.5 million in England and Wales if 1% of people with Type 1 diabetes used CSII, GBP 10.5 million for 3%, and GBP 17.5 million for 5%.

Methods

Data sources included electronic databases, references of relevant articles, and contact with experts. Two reviewers used predefined criteria to assess the studies for inclusion in the systematic review. Data extraction and quality assessment were undertaken by one reviewer and checked by a second reviewer. Data on clinical effectiveness were synthesized through a narrative review with full tabulation of all eligible studies, using meta-analysis where appropriate.

Further research/reviews required

Research should focus on wider benefits of CSII, eg, flexibility of lifestyle and quality of life, and on the psychological impact of wearing a device 24 hours every day. Research into the use of CSII in children of different ages is also needed.