NATIONAL INSTITUTE FOR HEALTH AND CLINICAL EXCELLENCE

Health Technology Appraisal

Continuous subcutaneous insulin infusion for the treatment of diabetes (review)

Final scope

Appraisal objective

To review and update as necessary guidance to the NHS in England and Wales on the clinical and cost effectiveness of continuous subcutaneous insulin infusion for the treatment of diabetes,[1] which was issued in February 2003.[2]

The current guidance will remain in place unless and until any new guidance has been issued. The review will consider whether any new evidence that has become available justifies a change in the original guidance.

Background

Diabetes mellitus (diabetes) is a chronic metabolic disorder characterised by elevated blood glucose levels (hyperglycaemia) resulting from a lack of the hormone insulin or resistance to its action. If not controlled effectively, diabetes can lead to complications including kidney failure, blindness, limb amputation, coronary heart disease, stroke and damage to the nervous system, peripheral vasculature and skin.

There are two major types of diabetes. Type 1 diabetes is due to an absolute loss of insulin production and therefore administration of insulin is necessary for survival. Type 2 diabetes results from reduced insulin production and/or reduced tissue sensitivity to insulin (known as insulin resistance). In type 2 diabetes, blood glucose levels may be managed with diet and lifestyle modifications alone following diagnosis. As the condition progresses, the addition of oral glucose-lowering drugs to diet and lifestyle modifications is usually required. However, over time many people with type 2 diabetes need insulin in order to control their blood glucose levels adequately.

Approximately 2 million people in England and Wales have been diagnosed with diabetes, around 10% of whom have type 1 diabetes. It has been suggested that the true prevalence of diabetes might include a further 1 million people with undiagnosed type 2 diabetes.

[1] Original remit: To advise on the clinical and cost-effectiveness of insulin pumps in the treatment of Type 1 and Type 2 diabetes; and on the criteria for selecting patients for whom this treatment would be particularly appropriate.

[2] Current guidance: National Institute for Clinical Excellence (2003) Continuous subcutaneous insulin infusion for diabetes. *NICE technology appraisal guidance* no. 57. London: National Institute for Clinical Excellence.

Insulin is inactivated by gastro-intestinal enzymes and is therefore usually administered by injection and people with diabetes often take several injections of insulin per day. Additionally, inhaled insulin has recently been recommended as a treatment option for specific subgroups of people with diabetes[3]. It is recognised that it can be difficult for all people with diabetes to consistently achieve adequate glycaemic control with these interventions.

The technology

Continuous subcutaneous insulin infusion (CSII) devices store and deliver short-acting insulin at a programmable quantity and rate. The CSII device connects to the patient via a catheter which is fitted to a needle or cannula inserted just under the skin.

Several models are commercially available in the UK including:

- Animas Corporation R1000 Series (Animas Corporation/Johnson & Johnson Medical Ltd.);
- MiniMed (Medtronic Ltd.);
- Accu-Check Spirit, Accu-Chek D-TRONplus (Roche Diagnostics Ltd.);
- Deltec Cozmo, (Smiths Medical International).

Additionally, it is anticipated that the Starlet (Starbridge Systems Ltd.) CSII device will be awarded CE marking during this appraisal.

Insulin pump therapy has been recommended for specific groups with type 1 diabetes (NICE technology appraisal guidance No. 57, see table below).

Intervention(s)	Continuous subcutaneous insulin infusion (CSII or insulin pump therapy)
Population(s)	People with type 1 or type 2 diabetes, who require insulin therapy
Standard comparators	Insulin therapy without the use of CSII, such as multiple daily insulin injections, regimes involving injection of long acting insulin or inhaled insulin

[3] NICE Technology Appraisal guidance No. 113 - Inhaled insulin for the treatment of diabetes (types 1 and 2), December 2006

Outcomes	The outcome measures to be considered include: • Mortality • Frequency and severity of symptomatic hypoglycaemic episodes • Incidence of diabetic emergences, such as diabetic ketoacidosis, requiring hospitalisation • Measures of glycaemic control • Adverse changes in body mass index • Long term complication rates such as frequency of occlusive vascular events or microvascular complications • Adverse effects of treatment • Health-related quality of life
Economic analysis	The reference case stipulates that the cost effectiveness of treatments should be expressed in terms of incremental cost per quality-adjusted life year. Time horizon for the economic evaluation should reflect the chronic nature of the condition. Costs will be considered from an NHS and Personal Social Services perspective. Patient education, associated costs and service implications should be considered.
Other considerations	The interventions will be appraised according to their market authorisation/CE marking. If the evidence allows, the appraisal will attempt to identify the criteria for selecting patients for whom this treatment would be particularly appropriate. If the evidence allows, the appraisal may consider the role of combination devices that include continuous glucose monitoring.

Related NICE recommendations	Related Technology Appraisals: NICE Technology Appraisal guidance No. 57 - Continuous subcutaneous insulin infusion for diabetes, February 2003. NICE Technology Appraisal guidance No. 53 - Long acting insulin analogues for diabetes, December 2002. NICE Technology Appraisal guidance No. 60 - Patient-education models for diabetes, April 2003. NICE Technology Appraisal guidance No. 113 - Inhaled insulin for the treatment of diabetes (types 1 and 2), December 2006. Related Guidelines: NICE clinical guideline No. 15 - Diagnosis and management of type 1 diabetes in children, young people and adults, July 2004. Type 2 diabetes: the management of type 2 diabetes (update), Expected date of issue: February 2008. Diabetes in pregnancy: management of diabetes and its complications from pre-conception to the postnatal period, Expected date of issue: November 2007.
Current NICE guidance	NICE Technology Appraisal guidance No. 57 states: 1.1 Continuous subcutaneous insulin infusion (CSII or 'insulin pump therapy') is recommended as an option for people with type 1 diabetes provided that: • multiple-dose insulin (MDI) therapy (including, where appropriate, the use of insulin glargine) has failed; and • those receiving the treatment have the commitment and competence to use the therapy effectively. 1.2 People for whom MDI therapy has failed are considered to be those for whom it has been impossible to maintain a haemoglobin A1c level no greater than 7.5% (or 6.5% in the presence of microalbuminuria or adverse features of the metabolic syndrome) without disabling hypoglycaemia occurring, despite a high level of self care of their diabetes. 'Disabling hypoglycaemia', for the purposes of this guidance, means the repeated and unpredictable occurrence of hypoglycaemia requiring third-party assistance that results in continuing anxiety about recurrence

	and is associated with significant adverse effect on quality of life. 1.3 CSII therapy should be initiated only by a trained specialist team, which should normally comprise a physician with a specialist interest in insulin pump therapy, a diabetes specialist nurse and a dietitian. 1.4 All individuals beginning CSII therapy should be provided with specific training in its use. Ongoing support from a specialist team should be available, particularly in the period immediately following the initiation of CSII. It is recommended that specialist teams should agree a common core of advice appropriate for CSII users. 1.5 The recommendations in this guidance are also applicable to children, adolescents, pre-pregnant and pregnant women for whom MDI therapy is deemed to have failed. Because of the risks of ketoacidosis to the fetus, pregnant or pre-pregnant women who switch to CSII therapy should do so only on the advice and under the care of a specialist team (defined in Section 1.3). 1.6 CSII therapy is not recommended for people with type 2 diabetes who require insulin therapy. 1.7 Established users of CSII therapy should have their insulin management reviewed by their specialist team so that a decision can be made about whether a trial of a switch to MDI incorporating insulin glargine would be appropriate.