Insulin pump therapy: Who is it for?

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Continuous subcutaneous insulin infusion (CSII) therapy, better known as insulin pump therapy, is back in fashion. Modern insulin pumps are easier to operate and more reliable than earlier versions. The problem remains that they are a relatively expensive form of insulin delivery. Because of this the National Institute for Health and Clinical Excellence (NICE; formerly the National Institute for Clinical Excellence) recommends that their use is restricted to individuals with severe hypoglycaemia and poor diabetes control (NICE, 2003).

We have to accept that NHS resources are finite and that any treatment we use has to be cost-effective. Having said that people with diabetes must be given a choice; and if they choose pump therapy for reasons other than severe hypoglycaemia and poor diabetes control (and perhaps wish to purchase it themselves), then we must be able to support them.

This paper (see right) from King's and St Thomas' School of Medicine, London, is important because it goes beyond NICE recommendations and tells us what happened to those people that choose pump therapy for other reasons. It is an audit of care, not a prospective study with the limitations that go with it, but there are some simple messages. Insulin pump therapy is clearly beneficial to individuals outside of NICE recommendations. A careful psychological profile before initiating pump therapy may not be necessary and, in fact, people with other health problems that would not normally be regarded as contraindications can still do well with an insulin pump. The question the paper cannot answer is whether the results from a centre with a great deal of expertise in managing insulin pumps can be extrapolated to the rest of the country. The resource needed to staff and fund this service is considerable.

It is likely that setting up a service of the kind described will result in a withdrawal of diabetes services that have previously been provided by secondary care. This may be exactly what the government is telling us to do – allowing primary care to manage the day-to-day care of the majority of people with diabetes and focus secondary care services on those individuals with poor diabetes control or other specialist needs. Perhaps pump clinics are an example of what secondary care should be providing in the future.

National Institute for Clinical Excellence (NICE; 2003) *Full Guidance on the use of continuous subcutaneous insulin infusion for diabetes.* NICE, London. Available at http://www.nice.org.uk/pdf/57_Insulin_pumps_fullguidance.pdf (accessed 29.11.2005)

DIABETES CARE

Rosiglitazone safe and efficient for overweight people

Readability	✓✓✓
Applicability to practice	✓✓✓
WOW! factor	✓✓✓

1 Fifty people with type 1 diabetes with a BMI of ≥27 kg/m^2 were randomly assigned to receive either placebo or 4 mg rosiglitazone twice daily or placebo, in this double blind study.

2 The primary endpoint was to assess the safety and efficacy of rosiglitazone in overweight people with type 1 diabetes.

3 Both groups demonstrated a significant lowering of HbA_{1c} ($P<0.0001$ for the intervention group; $P=0.002$ for the placebo group) and a significant increase in weight ($P=0.008$ for the intervention group, $P=0.016$ for the placebo group).

4 The total daily dose of insulin being taken by those in the placebo group increased slightly. Systolic and diastolic blood pressures improved significantly in the intervention group. No difference in the total incidence of hypoglycaemia was observed between the study groups.

Strowig SM, Raskin P (2005) The effect of rosiglitazone on overweight subjects with type 1 diabetes. *Diabetes Care* **28**(7): 1562–7

DIABETIC MEDICINE

CSII could benefit more than just those with severe hypoglycaemia

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! factor	✓✓✓✓

1 A retrospective audit of care was conducted from notes and interviews of 40 patients in order to determine whether those who could benefit from continuous subcutaneous insulin infusion (CSII) therapy are identified correctly under current guidelines.

2 Outcomes were compared between those with and without recurrent severe hypoglycaemia (SH). All participants were from a single specialist multidisciplinary pump clinic.

3 Biomedical outcomes analysed included HbA_{1c} levels and diabetic ketoacidosis (DKA) rates to the end of the study (mean duration 20.5 months).

4 Twenty-five participants were initiated onto CSII therapy for reasons other than SH. Fifteen participants had contraindications to CSII.

5 CSII was associated with significant lowering of HbA_{1c} levels, SH and DKA rates ($P=0.011$, $P=0.034$ and $P=0.036$, respectively).

6 The fall in SH was greater for those initiated onto CSII for SH compared with those initiated for other reasons ($P=0.001$). The reduction in DKA rates was significantly greater in those with contraindications to CSII versus those without ($P=0.042$).

7 Quality of life was also measured using three validated questionnaires at study end. The authors concluded that people with type 1 diabetes initiated onto CSII in a specialist multidisciplinary clinic benefit greatly from outcomes outside of SH.

Rodrigues IAS, Reid, HA, Ismail K, Amiel SA (2005) Indications and efficacy of continuous subcutaneous insulin infusion (CSII) therapy in type 1 diabetes mellitus: a clinical audit in a specialist service. *Diabetic Medicine* **22**(7): 842–9

'For people with type 1 diabetes who are unwilling to use subcutaneous premeal insulin, the use of inhaled premeal insulin as part of a basal–bolus regimen could provide an alternative.'

DIABETES CARE

Inhaled insulin offers possible alternative to injected-only regimen

Readability	✓✓✓
Applicability to practice	✓✓
WOW! factor	✓✓✓

1 A randomised trial involving 328 people with type 1 diabetes was performed to investigate whether a basal–bolus insulin regimen (involving pre-meal inhaled, dry powder rapid-acting insulin plus twice-daily injected NPH insulin) provides a comparable level of blood glucose control to regular subcutaneous premeal insulin with twice-daily NPH insulin.

2 Participants were randomised to receive pre-meal inhaled insulin (n=163) or regular subcutaneous premeal insulin (n=165).

3 Mean HbA_{1c} levels decreased comparably, from baseline levels, in both groups: –0.3% for the inhaled group and –0.1% for the subcutaneous group.

4 Although 2-hour post-prandial blood glucose reductions were comparable between the groups, fasting plasma glucose levels declined more in the inhaled insulin group.

5 The inhaled insulin group was associated with a lower overall rate of hypoglycaemia, but with an increased rate of severe hypoglycaemia.

6 The authors conclude that, for people with type 1 diabetes who are unwilling to use subcutaneous premeal insulin, the use of inhaled premeal insulin as part of a basal–bolus regimen could provide an alternative.

Skyler JS, Weinstock RS, Raskin P, et al (2005) Use of inhaled insulin in a basal/bolus insulin regimen in type 1 diabetic subjects. *Diabetes Care* **28**(7): 1630–5

DIABETES CARE

Caffeine reduces hypoglycaemia in type 1 diabetes

Readability	✓✓✓✓
Applicability to practice	✓✓
WOW! factor	✓✓✓

1 The effect of caffeine on the frequency and severity of hypoglycaemia was investigated in 19 people with type 1 diabetes in this double blind randomised study.

2 A low-caffeine (<50 mg/day) diet was provided for all participants for 2 weeks, supplemented with either 250 mg caffeine tablets (equivalent to the average caffeine intake in the UK) or placebo.

3 A continuous glucose monitoring system (CGMS) was used to assess blood glucose levels for the last 2 days of the study.

4 All participants were swapped over to the alternative treatment arm for a further 2 weeks.

5 During the 2 days of CGMS assessment, heart rate variability was also measured using continuous Holter monitoring.

6 The duration of nocturnal hypoglycaemia was significantly lower in the caffeine group, with an average of 49 minutes compared with 132 minutes for the placebo group.

7 Heart rate variability increased in the caffeine group, although no association was found between this increase and nocturnal hypoglycaemia (P=0.62).

8 In conclusion, although caffeine increases nocturnal heart rate variability, the authors have demonstrated that it significantly reduces the mean duration of nocturnal hypoglycaemia with no correlation observed between the two.

Richardson T, Thomas P, Ryder J, Kerr D (2005) Influence of caffeine on frequency of hypoglycaemia detected by continuous interstitial glucose monitoring system in patients with long-standin type 1 diabetes. *Diabetes Care* **28**(6): 1316–20

DIABETES CARE

Differences in effect of moderate and intensive exercise and glucose control

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓

1 Blood glucose levels in seven healthy people with type 1 diabetes were tested on two separate occasions during which either 30 minutes of intermittent high intensity (IHE) or moderate intensity (MOD) exercise was performed.

2 The 30 minutes of IHE consisted of continuous moderate cycling interspersed with 4-second sprints every 2 minutes to emulate team sports. MOD consisted of continuous moderate cycling for 30 minutes.

3 Although IHE resulted in a greater amount of work being done, MOD resulted in a greater lowering of blood glucose levels (–2.9 ± 0.8 mmol/l for IHE compared with –4.4 ± 1.2 mmol/l for MOD; P<0.05) for 1 hour.

4 IHE resulted in a stabilised level of blood glucose for 1 hour after completion of exercise; when MOD was performed, blood glucose continued to decrease further (P<0.05).

5 This stabilisation after IHE was associated with a greater increase in blood lactate levels compared with MOD (P=0.011). No differences in blood concentrations of insulin, free fatty acid, glucagon or cortisol were detected.

6 The authors conclude that 30 minutes of continuous moderate exercise is more beneficial, for people with type 1 diabetes, in lowering blood glucose levels as levels continue to decrease significantly, although this type of exercise is not common during team sports. The authors do advise caution in that typical team sports last for much longer than 30 minutes.

Guelfi KJ, Jones TW, Fournier PA (2005) The decline in blood glucose levels is less with intermittent high-intensity compared with moderate exercise in individuals with type 1 diabetes. *Diabetes Care* **28**(6): 1289–94