

Technology

People on insulin pump therapy have a better quality of life



Peter Hammond,
Consultant in General
Medicine, Harrogate

There is an increasing body of evidence to support the glycaemic benefits of insulin pump therapy compared with multiple daily injections, but the evidence that this translates into quality-of-life benefits remains inconsistent.

Anecdotal reports of benefit from individual pump users can be compelling, and large surveys of pump users have confirmed perceived benefits, but such surveys are biased by the nature of the surveyed population. Randomised, controlled trials have often been too small to show significant differences in quality of life, and the study populations may not be representative of typical clinical practice. Some pump centres use potential quality-of-life gains as an indication for initiating pump therapy, so there is a need for robust evidence.

This study from the Italian EQuality1 Study Group had the advantage of using a case-control design in a large, representative clinic population. In order to allow for potential positive or negative bias within a centre between those using pump therapy and those on multiple daily injections, case-controls were recruited

from both centres using pump therapy and those not doing so.

The experiences of 481 pump users were compared with 860 case-controls using the Diabetes-Specific Quality-of-Life Scale (DSQOLS), the Diabetes Treatment Satisfaction Questionnaire (DTSQ) and the SF-36 Health Survey. On multivariate analysis, pump users had higher scores on the DSQOLS, reflecting enhanced quality of life in terms of diet flexibility, daily hassles and fear of hypoglycaemia. Pump users had greater treatment satisfaction, as measured by the DTSQ, which, interestingly, reflected a lower perceived frequency of hyperglycaemic, rather than hypoglycaemic, episodes. Overall, perceived quality of health as determined by the SF-36 did not differ between cases and controls.

Previous randomised, controlled trials showing quality-of-life benefits with pump therapy have used NPH-based regimens as the comparator. In this study, 90% of the controls were using basal-bolus regimens, so this large study not only confirms the potential quality-of-life benefits of pump therapy over multiple daily injections, but shows that this holds true when analogue-based regimens are the comparator.

EQuality1 Study Group (2008) Quality of life and treatment satisfaction in adults with type 1 diabetes: a comparison between continuous subcutaneous insulin infusion and multiple daily injections. *Diabetic Medicine* **25**: 213–20

DIABETIC MEDICINE

CSII therapy offers better QoL than MDI

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

1 This comparative, case-control study assessed quality of life (QoL) and treatment satisfaction in 1341 adults with type 1 diabetes treated with either continuous subcutaneous insulin infusion (CSII; $n=481$) or multiple daily injections (MDI; $n=860$).

2 The adults were enrolled from 62 diabetes clinics; at routine visit they completed the Diabetes-Specific Quality-of-Life Scale (DSQOLS), the Diabetes Treatment Satisfaction Questionnaire (DTSQ) and the Short-Form-36 Health Survey.

3 Participants on CSII therapy were more likely to have a longer duration of diabetes, to have microvascular complications and to self-manage their insulin doses; age, school education, occupation and HbA_{1c} were similar between groups.

4 Of the people on MDI therapy, 773 (90%) were on basal-bolus MDI regimens and 87 (10%) were on NPH-based regimens.

5 After adjusting for socio-economic and clinical characteristics on multivariate regression analysis, people on CSII treatment had significantly higher scores on the DSQOLS than those on MDI treatment for diet restrictions ($P<0.0001$), daily hassles ($P=0.01$) and fears about hypoglycaemia ($P=0.006$); people on CSII therapy also had higher scores on the DTSQ.

6 CSII treatment is associated with a lower perceived disease burden and higher treatment satisfaction compared with NPH-based MDI, and greater lifestyle flexibility, less fear of hypoglycaemia and higher treatment satisfaction compared with a basal-bolus insulin regimen.

EQuality1 Study Group (2008) Quality of life and treatment satisfaction in adults with type 1 diabetes: a comparison between continuous subcutaneous insulin infusion and multiple daily injections. *Diabetic Medicine* **25**: 213–20

DIABETES TECHNOLOGY AND THERAPEUTICS

CGMS can optimise basal insulin infusion in CSII therapy

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

1 The study aim was to optimise basal insulin infusion rates using the continuous glucose monitoring system (CGMS) to record glucose measurements in 16 adults with type 1 diabetes who were on continuous subcutaneous insulin infusion (CSII) therapy.

2 Participants kept a diary record of food intake, insulin boluses, exercise and stress.

3 After a baseline 3-day CGMS curve was obtained, and the participants' diaries were reviewed, basal insulin infusion rates were calculated for each person.

4 Participants skipped one meal each day while wearing the CGMS to determine optimum basal insulin infusion rates (maintenance of glucose levels in the range 65–120 mg/dl during fasting or between meals).

5 Each person's basal insulin infusion rates were optimised by analysing additional CGMS curves.

6 Software was used to compare the baseline CGMS area under the curve (AUC) above 110 mg/dl with the AUC obtained after optimization.

7 The AUC for glucose excursions >110 mg/dl was significantly reduced after optimization (19 ± 13 mg/dl/day) compared with the baseline AUC (50 ± 31 mg/dl/day) ($P < 0.001$); increasing the basal insulin infusion rate by 0.0027 units/kg/hour between 3–8 am improved glucose levels.

8 Using CGMS to optimise basal insulin infusion rates can improve glycaemia in people with type 1 diabetes on CSII.

Zisser HC, Bevier WC, Jovanovic L (2007) Restoring euglycaemia in the basal state using continuous glucose monitoring in subjects with type 1 diabetes mellitus. *Diabetes Technology and Therapeutics* **9**: 509–15

DIABETES TECHNOLOGY AND THERAPEUTICS

CGMS detects more hypoglycaemia

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

1 The study compared the continuous blood glucose monitoring system (CGMS) with conventional detection of hypoglycaemia (blood glucose ≤ 3.3 mmol/l) in 367 adults with type 2 diabetes on multiple daily injections of a basal insulin for 8 weeks.

2 Glucose levels were measured by CGMS and self-monitored blood glucose (SMBG) during the 72-hour CGMS measurement period after 8 weeks.

3 At end point, hypoglycaemia was experienced by 209 people according to CGMS and by only 97 people according to SMBG; nocturnal glucose levels were significantly lower with CGMS.

4 CGMS is easy to use and effective at detecting hypoglycaemia in people with type 2 diabetes.

Zick R, Petersen B, Richter M, Haug C (2007) Comparison of continuous blood glucose measurement with conventional documentation of hypoglycaemia in patients with type 2 diabetes on multiple daily insulin injection therapy. *Diabetes Technology and Therapeutics* **9**: 483–92

DIABETES CARE

CHMG is effective at achieving better glucose control

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

1 This study examined the effectiveness of continuous home monitoring of glucose (CHMG) on achieving glycaemic targets.

2 The study comprised 24 adults with type 1 diabetes who had available HbA_{1c} values and CHMG data at baseline and 12 weeks, and a matched comparison group not on CHMG.

3 There was a significant decrease in HbA_{1c} in the CHMG group ($P = 0.047$) at 12 weeks, with more people achieving HbA_{1c} <7.5% than in the comparison group ($P = 0.0234$).

4 In the CHMG group, within-target glucose readings were increased by a mean 6.5% and above-target glucose readings were reduced by a mean 5.6% at 12 weeks, corresponding with a 0.4% reduction in HbA_{1c}.

5 CHMG is effective at improving glucose control in people with type 1 diabetes without increasing hypoglycaemia.

Garg SK, Kelly WC, Voelmler MK et al (2007) Continuous home monitoring of glucose. Improved glycaemic control with real-life use of continuous glucose sensors in adult subjects with type 1 diabetes. *Diabetes Care* **30**: 3023–5

PAEDIATRIC DIABETES

CSII therapy offers an improved quality of life for children

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

1 This randomised, controlled trial compared the benefits of continuous subcutaneous insulin infusion (CSII) therapy with multiple daily insulin injections (MDI) in 16 pre-school children with type 1 diabetes.

2 HbA_{1c} was measured monthly for 6 months and glucose variability measured at baseline and at 6 months.

3 Mean HbA_{1c} levels at baseline and at 6 months remained stable and did not significantly differ between groups.

4 However, parents reported significantly less diabetes-related worry in the CSII group and more medical-related stress in the MDI group.

5 CSII therapy is comparable with MDI regimens in terms of glucose control, and also offers young children a better quality of life.

Opipari-Arrigan L, Fredericks EM, Burkhardt N et al (2007) Continuous subcutaneous insulin infusion benefits quality of life in preschool-age children with type 1 diabetes. *Paediatric Diabetes* **8**: 377–83

‘CHMG is effective at improving glucose control in people with type 1 diabetes without increasing hypoglycaemia.’