

CSII therapy: The Cardiff experience

John Alcolado, Kath Bailey,
Sarafina Cuthbert, Sue Warren

The University Hospital of Wales in Cardiff is the major teaching hospital in Wales and together with Llandough Hospital in the East of the City, provides diabetes services for a catchment population of around 500 000. Close links exist with general practice but the majority of patients with type 1 diabetes (approximately 900) are known to secondary care services and attend paediatric, adolescent, young adult, antenatal or adult diabetes clinics. Prior to 2003, a small number of patients with type 1 diabetes were using continuous subcutaneous insulin infusion (CSII) pumps. Some had moved into our area, having begun pump therapy elsewhere, and others had been started on pump therapy locally, usually as a 'last resort' measure where multiple daily insulin regimens had failed to prevent severe hypoglycaemia or recurrent admissions with ketoacidosis.

Following the publication of the technology appraisal guidance for the use of CSII in diabetes (NICE, 2003), we decided to establish a dedicated specialist clinic to support people with type 1 diabetes who might benefit from pump treatment.

The central ethos was to develop a service that would assess the suitability of patients for pump therapy, provide all the required dietetic and lifestyle support, facilitate the frequent home blood glucose monitoring required (including the use of continuous glucose sensors), and empower patients to use their pumps to achieve the best control possible with the ultimate aim of improving quality of life and reducing long-term complications. The service was to be fully multidisciplinary, subject to audit, and capable of disseminating experience and best practice to other diabetes centres in Wales.

Service provided by the CSII clinic

The CSII clinic is held in the diabetes centre once a month. Individuals and their partners, relatives or carers are seen jointly by a consultant

diabetologist, DSN and dietitian in a spacious room. The aim is to emphasise the partnership that is required if pump therapy is to be successful. At the initial meeting, an open discussion takes place regarding the relative merits and drawbacks of pump therapy, including the need for regular home blood glucose monitoring, carbohydrate counting and commitment.

Many patients referred to us have a history of poor glycaemic control and we confront issues such as adherence to lifestyle advice and insulin therapy at an early stage. In some cases it quickly becomes apparent that CSII is not appropriate and alternative approaches are suggested (increasingly, by offering a structured education programme). Suitable patients who are willing to continue with the assessment process are then seen on several occasions by the dietitian and DSN on a one-to-one basis and follow an education programme (including dietary assessment, carbohydrate counting, frequent home blood glucose monitoring and continuous subcutaneous glucose monitoring), culminating in commencement of

Article points

1. Following the publication of the technology appraisal guidance for the use of CSII in diabetes (NICE, 2003), we decided to establish a dedicated specialist clinic to support people with type 1 diabetes who might benefit from pump treatment.
2. In December 2007, we undertook an audit of the CSII clinic at the University Hospital of Wales.
3. The review by NICE of their original guidance on the use of CSII therapy is likely to see an increase in the number of patients being considered for pump treatment.

Key words

- CSII clinic
- Structured education
- Audit

John Alcolado is a Clinical Reader in Medicine at Cardiff University School of Medicine, Kath Bailey and Sue Warren are Diabetes Specialist Nurses and Sarafina Cuthbert is a dietitian all at Cardiff and Vale NHS Trust.

CSII therapy over a period of around 3 months. This length of time is deliberately chosen to emphasise the need for long-term commitment.

Pumps are provided on the understanding that their use will be reviewed after 6 months of therapy. Long-term use is advocated only where there has been a fall in $HbA_{1c} > 0.5\%$, a significant reduction in documented hypoglycaemic attacks, a reduction in the number of hospital admissions and evidence of adherence to requests for written documentation of home blood glucose monitoring and carbohydrate counting.

The CSII clinic concentrates only on pump therapy. Patients continue to visit their GP or general diabetes clinic for annual reviews. Likewise, patients who are referred to us from outside Cardiff will continue to attend their local diabetes centre. The aim is to discharge people from the CSII clinic after they have been stable on pump therapy for 6 months, although they continue to have access to our specialist support if required.

Audit results

In December 2007, we undertook an audit of the CSII clinic at the University Hospital of Wales. Of the 28 patients attending the clinic, 11 had been using pumps prior to the development of our service and 17 were established on pump therapy after attending our clinic. In addition, two patients had attended the clinic for assessment and education but had discontinued pump therapy because they were not considered suitable. All but one of the patients adhered to the NICE guidance regarding pump therapy.

Every patient attending the clinic had an improved HbA_{1c} . The mean HbA_{1c} values of all patients on insulin pump therapy reduced from 9.0% to 7.6%. When compared with values prior to insulin pump therapy, there was an improvement of 13%. This reduction in HbA_{1c} is greater than the previously published benefit of insulin pump therapy over multiple daily injection therapy (Pickup et al, 2002; Weissberg-Benchell et al, 2003; Hoogma et al, 2006) and was sustained at 3, 6, 9 and

12 months after initiating insulin pump therapy. Prior to pump therapy, only four patients had achieved the NICE HbA_{1c} target of $\leq 7.5\%$ but this increased to 13 patients after CSII therapy. This reduction in HbA_{1c} is significant because a similar decline in HbA_{1c} has been shown to reduce the risk of microvascular complications by 37% and diabetes related deaths by 21% (DCCT Research Group, 1993). Patients who had been selected and initiated on pump therapy by us had a significantly larger fall in HbA_{1c} compared with those who had initiated pump therapy prior to the establishment of the formal pump clinic service.

Three patients had documented frequent hypoglycaemic attacks of sufficient severity to limit their normal day-to-day activities prior to CSII therapy but in each case the severity and frequency of these attacks reduced after starting pump therapy, while the HbA_{1c} declined. Others have reported a similar experience (Bode et al, 1996). Interestingly, nine patients also reported improvement in hypoglycaemic awareness. Most patients reduced their total daily dose of insulin when stabilised on pump therapy, the notable exception being a patient who had several unrelated intercurrent illnesses.

Twenty-eight clinic attendees had been responsible for a total of 28 unscheduled care hospital admissions in the 12 months prior to commencing pump therapy. This fell to only two admissions once CSII treatment had started.

Concluding remarks

We believe that there are several features of our CSII clinic that have contributed to its success.

Firstly, patient selection is vital. It is interesting to note that we saw the largest fall in HbA_{1c} in those patients we identified as suitable for pump therapy and who had the opportunity to go through our education process. A scenario described as 'heart-sinking' can occur when a patient is referred with appalling control despite being on a pump and then it is discovered that they have very little idea or inclination of how to use it properly. The services of

a psychologist or motivational interviewer would be useful but we have been unable to secure funding for this provision.

Secondly, it is valuable for the multidisciplinary team to see candidates for insulin pump therapy together and to be open and frank about the commitment required. We feel CSII should not be used as a 'last resort' for patients where there is a history of poor adherence to lifestyle and insulin unless there is a willingness to change and engage in the education process.

Thirdly, it is important to get to know your patients well before giving them a pump. We do not advocate rapid conversion to pump therapy, but a gradual introduction to the principles of tight glycaemic control. Most patients have had very poor control for years and waiting a few more months to maximize their desire for change and instil realistic expectations will do little harm. Otherwise the risk is that pump therapy is seen to 'fail' and the patients feel they have nowhere else to turn.

Fourthly, it is important for the CSII pump team to build experience with the available technology. For this reason we made the decision to use a single pump manufacturer (Medtronic) and meet regularly with them to discuss new developments in insulin delivery and continuous glucose sensing.

The review by NICE of their original guidance on the use of CSII therapy is likely to see an increase in the number of patients being considered for pump treatment. The challenge will be to continue providing the same high level of care to an increasing number of patients. ■

Bode BW, Steed RD, Davidson PC (1996) *Diabetes Care* 19: 324–7

Hoogma RP, Hammond PJ, Gomis R, et al (2006) *Diabetic Medicine* 23: 141–7

NICE (2003) Guidance on the use of continuous subcutaneous insulin infusion for diabetes. Technology Appraisal Guidance No. 57: NICE, London

Pickup J, Mattock M, Kerry S (2002) *BMJ* 324: 705–7

DCCT Research Group (1993) *New England Journal of Medicine* 329: 977–86

Weissberg-Benchell J, Antisdell-Lomaglio J, Seshadri R (2003) *Diabetes Care* 26: 1079–87