Technology

Why did we need a national pump audit?

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Why did we need a national pump audit? The answer to this question depends on who is asking the question! The pump audit was commissioned by NHS Diabetes through the insulin pump therapy stakeholder group, and jointly funded by Diabetes UK, JDRF and the Association of British Clinical Diabetologists. The stakeholder group had been established to facilitate equitable implementation of the revised NICE guidance on insulin pump therapy (TA151 [NICE, 2008a]).

The primary aim of the audit was to establish, as reliably as possible, the number of pump users in the UK, and this was the question that ministers at the Department of Health were particularly concerned about. However, the opportunity to get a comprehensive picture of insulin pump services across the UK was one that everyone involved in commissioning, steering and performing the audit did not want to pass up. To this end, a service-level audit of insulin pump services in the UK was carried out in 2012, and the output of the audit has been reported by White et al, which is summarised alongside. In addition, a more ambitious project was also conceived by the audit group: to obtain patient-level data about the potential benefits and adverse effects of pump therapy. Data collection for this was completed about 12 months ago and the results were presented at the Diabetes UK annual professional conference in March this year, with an impressive dataset including almost 50% of those adults using insulin pump therapy (Weston, 2014).

The service-level audit certainly answers with considerable certainty the number of pump users in the UK. In total, 13 428 adults at the time of the audit were recorded pump users, representing an estimated 6% of all those with type 1 diabetes in the UK. This is a significantly higher estimate than previous surveys had suggested, possibly reflecting the fact that there were 2505 "new pump starters" in the 12 months prior to the audit, almost 20% of the total number of pump users. However, this falls some way short of the NICE estimate of 8–15% of adults with type 1 diabetes requiring an insulin pump (NICE, 2008b), which they based on "expert opinion", and well-behind pump usage in other Western European countries and the USA, where rates as high as 40% are reported (Pickup, 2011).

The findings from the audit suggest that the barrier towards increasing pump usage in the UK seems to be the capacity of teams to increase the numbers of new pump starters (let alone provide an adequate service to continue supporting those already on pumps). In the past, there was evidence that commissioners were reluctant to fund pump therapy or capped the number of pump users that could start therapy in a centre. However, the audit data suggest that, for almost all services, commissioners do fund pump therapy for those individuals who fulfil NICE criteria (NICE, 2008a), although half of services still have to submit individual patient requests even when NICE criteria are fulfilled. The audit also discovered that less than 20% of centres reported that the commissioners had fixed the number of annual pump starters.

What is clear from the audit is that, although the commissioners are now funding the pump therapy hardware, only 40% of staff time for pump therapy is funded. This urgently needs to be addressed with commissioners if staff capacity to support pump therapy is to be increased. A tariff for pump therapy might be one mechanism for increasing the income available for supporting the pump service.

Intriguingly, the number of pump starters per centre is not related to the staffing capacity. This suggests that in enthusiastic centres, capacity issues can be overcome. Collaboration with trainers provided by the pump companies may help to address capacity shortfall, which may be beneficial for centres that offer the full range of pumps as they will have access to a greater number of external trainers.

Overall, the audit report is encouraging as it demonstrates the significant improvements in access to pump therapy in recent years; however, it does highlight significant variation in service provision across the country. The task now is to share best practice and engage with commissioners, so that those centres that are struggling to meet the demand for pump therapy can overcome the obstacles they currently face. ■

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Diabetic Medicine

UK audit of insulin pump therapy in adults with diabetes

Readability	✓✓✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! Factor	✓✓✓✓

1 NICE published guidelines on the use of insulin pump therapy (continuous subcutaneous insulin infusion [CSII]) in 2008. An audit was carried out between April and July 2012 to determine the adherence to these guidelines and the findings were reported in this article.

2 Data were collected online using a DiabetesE formatted data collection tool from 178 of the 183 UK centres (97.3%) identified as providing CSII services to adults with diabetes.

3 In total, 13 428 adults with diabetes were using CSII therapy, giving an estimated prevalence of use of 6% (below the recommendation from NICE). However, past reports have shown that people with T2D are sometimes treated with CSII, so this figure may be an overestimate for people with T1D.

4 In total, 88% of centres had ≥1 consultant who had received formal insulin pump training, 97% had ≥1 diabetes specialist nurse (DSN) formally trained and 82% had ≥1 dietitian formally trained.

5 Of the centres that took part, 93% did not report facing any barriers to obtaining funding for people with diabetes who fulfilled NICE criteria; however, 39%, 61% and 60% of consultant-, DSN- and dietitian-delivered programmed activities, respectively, were not formally funded.

6 The prevalence of CSII use in the UK, which is below the NICE recommendation and of that seen in other Western countries and the US, may be attributed to the lack of time healthcare professionals have to identify and train new pump therapy users.

White HD, Goenka N, Furlong NJ et al (2014) The UK service level audit of insulin pump therapy in adults. *Diabet Med* **31**: 412–8

Diabetes Technol Ther

Remote glucose monitoring for nocturnal hypoglycaemia

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! Factor	✓✓✓✓

1 This study investigated the effectiveness and feasibility of remote continuous glucose monitoring (CGM) in children with T1D in a diabetes camp setting in the US.

2 Twenty campers aged from 7–21 years were enrolled in camp sessions of 5–6 days. On alternating nights, 10 campers were randomised to wear a CGM system (usual wear [control arm]) and 10 were randomised to wear a CGM system that communicated with a remote monitoring system (experimental arm).

3 The primary end-point was a decrease in the duration of hypoglycaemic episodes <50 mg/dL (<2.8 mmol/L). An alarm from the CGM system was triggered for glucose values <70 mg/dL (<3.9 mmol/L), and treatment was given for meter-confirmed hypoglycaemia.

4 In total, 320 nights of CGM data were collected, and there were 197 hypoglycaemic events.

5 All of the alarms were responded to when remote monitoring was in place, compared to 54% of alarms when remote monitoring was not used.

6 Remote monitoring significantly decreased prolonged hypoglycaemic events, eliminating all events <50 mg/dL lasting longer than 30 minutes and all events <70 mg/dL lasting more than 2 hours.

7 Remote monitoring is effective in reducing the risk of prolonged nocturnal hypoglycaemia.

DeSalvo DJ, Keith-Hynes P, Peyser T et al (2014) Remote glucose monitoring in camp setting reduces the risk of prolonged nocturnal hypoglycemia. *Diabetes Technol Ther* **16**: 1–7

Diabetic Medicine

Hypoglycaemia in early pregnancy

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! Factor	✓✓✓✓

1 Hypoglycaemia is a common complication of early pregnancy for women with T1D, especially if they have had severe hypoglycaemia (SH) the year before pregnancy.

2 Of 136 pregnant women with T1D referred to the centre, 28 had a recent history of SH. All were offered real-time continuous-glucose monitoring (CGM), and 12 accepted.

3 Among these 12 women, eight had experienced a total of 34 SH events in the year before pregnancy and nine had experienced 23 events early in pregnancy. After initiation of real-time CGM, two women experienced one event each.

4 Real-time CGM may have reduced the incidence of SH in the remaining part of the pregnancy; however, the incidence of SH was also low among women who were not using real-time CGM, which suggests other factors are at play in preventing SH.

Secher AL, Stage E, Ringholm L et al (2014) Real-time continuous glucose monitoring as a tool to prevent severe hypoglycaemia in selected pregnant women with type 1 diabetes. *Diabet Med* **31**: 352–6

Diabetes Technol Ther

Warming of infusion site for accelerated insulin absorption

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! Factor	✓✓✓

1 This study investigated the effectiveness of warming the skin around the insulin infusion site to 40°C prior to administration to accelerate insulin absorption and action.

2 Seventeen adolescents with T1D (aged 15±1 year) underwent 5-hour euglycaemic clamps on two separate occasions separated by <8 weeks with and without the warming temperature of 40°C.

3 The time to reach baseline insulin concentration occurred significantly earlier when the skin was warmed to 40°C than when it was not (P=0.04).

4 The data show warming the skin around the insulin infusion site is an effective way to accelerate absorption and action of rapid-acting insulin.

Cengiz E, Weinzimer SA, Sherr JL et al (2014) Faster in and faster out: accelerating insulin absorption and action by insulin infusion site warming. *Diabetes Technol Ther* **16**: 20–5

Diabetes Technol Ther

In silico modelling of a PLGM system in adolescents

Readability	✓✓✓
Applicability to practice	✓✓✓✓
WOW! Factor	✓✓✓✓✓

1 Predictive low glucose management (PLGM) may help to prevent hypoglycaemia by stopping insulin pump delivery based on predicted sensor glucose values. Hypoglycaemic challenges were simulated using a glucose simulator with 100 virtual patients. Then the PLGM system was used on 22 adolescents.

2 The participants exercised until the PLGM system stopped insulin delivery.

3 The PLGM system reduced hypoglycaemia (<70 mg/dL [<3.9 mmol/L]) in the virtual patients by 26.7%. In the human trial, hypoglycaemia was prevented in 80% of the successful experiments.

4 *In silico* analysis and small human study demonstrate that PLGM may reduce the severity of hypoglycaemia.

Danne T, Tsioli C, Kordonouri O et al (2014) The PILGRIM study: *In silico* modeling of a predictive low glucose management system and feasibility in youth with type 1 diabetes during exercise. *Diabetes Technol Ther* 21 Jan [Epub ahead of print]

> *"The data show warming the skin around the insulin infusion site to 40°C is an effective way to accelerate absorption and action of rapid-acting insulin."*

References from commentary

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NICE (2008b) *Diabetes - insulin pump therapy: costing template*. NICE, London. Available at: http://bit.ly/1pGe2WT (accessed 28.04.14)

Pickup K (2011) Insulin pumps. *Int J Clin Pract Suppl* **170**: 16–9

Weston P (2014) National Insulin Pump Audit: adult data. Presented at: *Diabetes UK Professional Conference*. Liverpool, UK, 5–7 March