Study suggests use of insulin pumps has improved blood sugar control in children and adolescents with type 1 diabetes

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An analysis of three large diabetes registries from the USA, Germany/Austria and England/Wales suggests that use of insulin pumps in children and adolescents with type 1 diabetes is contributing to improvements in blood sugar control.

The research, published in *Diabetologia* (the journal of the European Association for the Study of Diabetes), is by Dr Jennifer Sherr, Children's Diabetes Program, Yale School of Medicine, New Haven, CT, USA; Dr Reinhard Holl, ZIBMT, Institute of Epidemiology and Medical Biometry, University of Ulm, Germany; Dr Justin Warner, Paediatric Endocrinology and Diabetes, Children's Hospital for Wales, Cardiff, UK and colleagues.

Insulin pumps have been in use in the treatment of type 1 diabetes for around 35 years, although they have only been used on a widespread basis since the beginning of this century. The aim of insulin pump technology is to help users manage their blood glucose levels better and keep them within acceptable parameters. For those children and adolescents without access to a pump, multiple daily injections of insulin remain the standard of care.

In 2007, a joint consensus statement by leading paediatric diabetologists recommended that pump therapy should be considered in children and adolescents with suboptimal diabetes control, wide fluctuations in blood

glucose levels regardless of HbA1c, and when the insulin regimen compromised lifestyle: indications for pump use that could be met by almost every young person with type 1 diabetes. Nevertheless, variations in the support for and use of pump technology exist, even among developed western countries.

In this new study, the authors compared data from three large registries of paediatric type 1 diabetes patients: the German/Austrian Prospective Diabetes Follow-up Registry (DPV), the US T1D Exchange (T1DX) and the English/Welsh National Paediatric Diabetes Audit (NPDA). They examined differences between the registries in frequency of pump therapy based on age, sex and ethnic minority status, as well as the impact of pump use on levels of HbA1c (also called glycated haemoglobin, a standard method of monitoring blood glucose control).

The DPV cohort included 26,262 participants from 209 sites. Since the clinical characteristics and patterns of pump use were similar in Germany and Austria, data from both countries were combined for analysis. The T1DX cohort included 13,755 children and adolescents enrolled between September 2010 and August 2012 at one of the 57 registry sites that care for paediatric patients. NPDA data were collected between April 2011 and March 2012 for 14,457 participants. As for the DPV, data from both England and Wales were combined for these analyses.

The overall mean HbA1c level was higher (meaning worse blood sugar control) in the NPDA (HbA1c =8.9%) than in the DPV (8.0%) and T1DX (8.3%). Conversely, pump use was much lower in the NPDA (14%) than in the DPV (41%) and T1DX (47%). In a pooled analysis, pump use was associated with a lower mean HbA1c (pump 8.0% vs injection 8.5%). In all three registries, those with an ethnic minority status were less likely to be treated with a pump, with only 22% of minorities using pumps versus 34% of non-minorities. Additionally,

boys were treated with a pump less often (30%) compared with girls (34%).

The authors note that the rate of use of pumps in the English/Welsh registry (NPDA) was only around one third that of the other registries, which the authors believe may be due to the recommendations made by the UK's National Institute for Health and Care Excellence (NICE) limiting pump use across both adolescents and younger children, unless certain criteria are met. For example, in children aged 12 years and under a pump is recommended if multiple daily injection therapy is considered impractical or inappropriate, while for those over the age of 12, pump therapy is only recommended if an individual has disabling hypoglycaemia or HbA1c has remained high (>8.5%) on injection therapy.

The authors say: "Despite the presence of many similar clinical characteristics for participants in the three registries, the overall HbA1c level was highest in the NPDA. This difference was not entirely explained by differences in pump use in the NPDA cohort because HbA1c was higher in both injection-treated and pump-treated patients in the NPDA compared with the other two registries. The difference in HbA1c levels between injection-treated and pump-treated participants was greatest in the NPDA and smallest in the DPV."

The authors note that the rates of pump use by age differed between the registries, and suggest that future research could focus on how to assure all young people are afforded the opportunity to use pump therapy regardless of age, sex, ethnic status, and country of residence.

They conclude: "It is important to note the cross-sectional data reported in this paper primarily reflect the evolution of insulin pump therapy in paediatric care over the past 15 years rather than the current revolution in diabetes technology that is just beginning to be translated into better

care for children with type 1 diabetes. As science and technology move closer to a mechanical solution to the problems of managing children and adolescents with type 1 diabetes, it will be even more important to ensure that our paediatric patients have access to such treatment advancements."

More information: Jennifer L. Sherr et al. Use of insulin pump therapy in children and adolescents with type 1 diabetes and its impact on metabolic control: comparison of results from three large, transatlantic paediatric registries, *Diabetologia* (2015). DOI: 10.1007/s00125-015-3790-6

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