

Guidelines for type 2 diabetes - designed to help newly diagnosed children and adolescents

Warren Lee and Stuart Brink

The prevalence of childhood obesity has increased dramatically worldwide with potentially dire consequences to the health of children and to their future. Drs. Warren Lee of Singapore and Stuart Brink of the USA introduce the new American Academy of Pediatrics guidelines for newly diagnosed type 2 diabetes in children and adolescents, explaining how the evidence-based recommendations are essential for all physicians involved in the care of children.

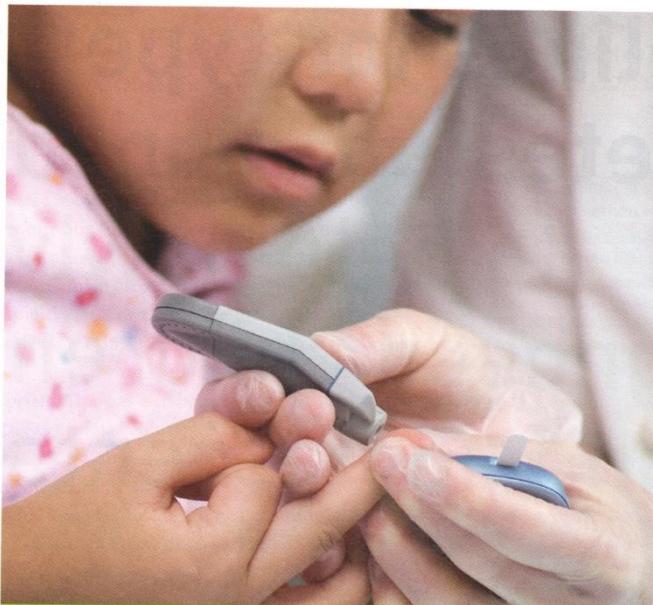
Type 2 diabetes, which previously was not typically seen until much later in life, accounts for 8% to 45% of new childhood diabetes in the USA according to the TODAY study,¹ with a disproportionate representation in ethnic minorities and occurring most commonly among those

between 10 and 19 years of age. This trend is also occurring internationally.

The American Academy of Pediatrics (AAP), an organisation representing the interests of general pediatrician and pediatric subspecialists in the

USA, has recently published a set of guidelines on the treatment of type 2 diabetes in children and adolescents (28 Jan 2013) in cooperation with the Pediatric Endocrine Society and the American Diabetes Association.² The AAP guidelines recognise how the diagnosis of type 2 diabetes in children and adolescents has become a threat in many communities and because the problem is too formidable for pediatric endocrinologists to address alone, the guidelines call for general pediatric treatment and care. With considerable weight, the guidelines advise:

'At any point at which a clinician feels he or she is not adequately trained or is uncertain about treatment, a referral to a



FEATURES OF CHILDHOOD TYPE 2 DIABETES

Consider type 2 diabetes diagnosis in a child who presents with the following features:

- overweight or obese (BMI $\geq 85^{\text{th}}$ – 94^{th} and $>95^{\text{th}}$ percentile for age and gender);
- strong family history of type 2 diabetes e.g., parent or grandparent with type 2 diabetes, gestational diabetes mellitus (GDM);
- substantial residual insulin secretory capacity at diagnosis of hyperglycaemia (e.g., normal or elevated insulin and C-peptide concentrations) even with ketoacidosis at presentation;
- insidious onset of disease;
- demonstrates insulin resistance (including clinical evidence of polycystic ovarian syndrome or acanthosis nigricans);
- lacks evidence for diabetic autoimmunity (negative for autoantibodies typically associated with type 1 diabetes);
- more likely to have hypertension and dyslipidaemia than those with type 1 diabetes

The new guidelines include a series of six action statements and a paper outlining the decision making criteria and process. These are useful and timely.

The full guidelines and an accompanying technical paper available for download here at <http://pediatrics.aappublications.org/content/early/2013/01/23/peds.2012-3494>

The ISPAD Guidelines on Diabetes in Childhood which also covers Type 2 diabetes in Childhood and Adolescence) and the Global ISPAD – IDF guidelines are both available at www.ispad.org

pediatric medical subspecialist should be made. If a diagnosis of type 2 diabetes is made by a pediatric medical subspecialist, the primary care clinician should develop a comanagement strategy with the subspecialist to ensure that the child continues to receive appropriate care consistent with a medical home model in which the pediatric partners with parents to ensure that all health needs are met.'

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The AAP guidelines have undergone extensive peer review by the American Diabetes Association (ADA), Pediatric Endocrine Society (PES), American Academy of Family Physicians (AAFP), and the Academy of Nutrition and Dietetics.

The evidence-based approach to guideline development requires that the evidence in support of each key action statement be identified, appraised, and summarized and that an explicit link between evidence and recommendations be defined. The new guidelines emphasize that insulin should be started when the distinction between type 1 and type 2 diabetes is in doubt and when the initial blood glucose is >250 mg/dl (>13.9 mmol/l) or when the HbA_{1c} at presentation is $>9\%$. This allows for quicker restoration of glycaemic control and, theoretically, may allow islet β cells to 'rest and recover'. The use of HbA_{1c} $>6.5\%$ as well as conventional blood glucose criteria (fasting glucose >126 mg/dl (>7.0 mmol/l), post prandial >11.0 mmol/l)

(>198 mg/dl) or 2 hr glucose >11 mmol/l (>198 mg/dl) is useful in certain instances when an HbA_{1c} is more practical and/or less expensive than a full 2 hr OGTT.

The use of medications (metformin and or insulin) is recommended as an initial and concurrent treatment together with lifestyle changes, namely diet and exercise. However, diet and exercise alone are effective for metabolic control in less than 10% of youths with type 2 diabetes, significantly fewer than in a comparable adult type 2 diabetes cohort, prompting the need for oral medication or insulin. Metformin is an oral medication approved for use in some children in many parts of the world and has a long safety profile compared to many newer, but more expensive, type 2 diabetes oral medications available. The guidelines recommend starting metformin at a low dose of 500 mg daily, increasing by 500 mg every 1 to 2 weeks, up to an ideal and maximum dose of 2000 mg daily in divided doses. Starting at a low dosage helps minimize the frequent nausea side effects of metformin. Moving towards a long-acting metformin also helps prevent nausea and then a slow step-up from 500 mg once-a-day to 500 mg twice-a-day and then 750 mg + 500 mg per day, then 750 mg twice-a-day, and finally 1000 mg long-acting metformin twice-a-day over several weeks allows the metformin to be better tolerated for most patients. Liquid metformin is also available for those unable to swallow tablets.

Because metformin's maximum effect may be delayed as much as four weeks, patients with substantial ketosis, ketoacidosis, or markedly elevated blood glucose levels initially should be treated with insulin. In adolescents in whom type 2 diabetes is subsequently diagnosed, 5% to 25% present with ketoacidosis, and

many also have very low serum insulin and C-peptide levels at presentation. Importantly, these guidelines give practical, worked examples of how to initiate and titrate insulin doses in youngsters with type 2 diabetes, an area with which many family physicians and pediatricians may not be familiar.

Although insulin is recommended, a dose range was omitted in the guidelines. The typical insulin requirement in young people with type 2 diabetes may be higher than in typical type 1 diabetes patients of the same age and pubertal staging; insulin requirement of 1-2.5 u/kg/day are often seen, as compared to the 0.5-1.0 u/kg/day requirements in type 1 diabetes.

For pediatricians in less resourced settings, it would be useful if the AAP guidelines provided instructions on the importance of blood glucose home monitoring and HbA_{1c} results although these tools need to be modified to suit local needs, including issues regarding availability or affordability and how often such blood glucose monitoring should be done. For example, more monitoring is required at diagnosis and in subsequent weeks when dose decisions are being made, less often for long-term follow-up.

While the AAP guidelines address treatment needs of those with diagnosed type 2 diabetes, they do not offer advice about identifying pre-diabetes states such as impaired glucose tolerance and impaired fasting glucose. It is important for experts and professional organisations to also address the issues of how one can improve case finding, the effectiveness of interventions and treatment thus hopefully delaying or preventing type 2 diabetes in childhood and adolescence. Nevertheless, the provision

of links to several web based articles on practical issues like management of hyperlipidaemia is extremely useful.

Dr Francine Kaufman, former President of the ADA on commenting on the new guidelines, noted that 'increasing numbers of paediatricians and primary care providers are doing more around identifying childhood obesity and understanding the risk of type 2 diabetes. The new guidelines on type 2 diabetes treatment essentially say to use metformin and insulin and lifestyle. There is still not much on the other medications used in type 2 in adults. More real studies need to be done.'

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