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Children with type 1 diabetes: where are we at?

Improving glycaemic control in children and adolescents presents unique problems

Type 1 diabetes affects one in 300 children and adolescents, and vascular complications remain a major cause of mortality and morbidity in adult life. Blood glucose targets have fallen since confirmation of the unequivocal relationship between glycaemic control and microvascular complications. In this issue of the Journal (page 235), Craig et al present a population-based, cross-sectional study of 1190 children and adolescents with type 1 diabetes in New South Wales and the Australian Capital Territory. Their median HbA1c level of 8.2% probably reflects some selection bias, because 571 (53%) of the population did not participate. However, this level of glycaemic control still represents a considerable improvement over the past 10 years and is comparable to levels found in international studies of children with type 1 diabetes. This trend accompanies the increasing use of intensive management in children and adolescents, but also the worrying rise in the incidence of severe hypoglycaemia.

There are compelling reasons to recommend intensive therapy in adolescents with type 1 diabetes — either multiple daily injections or continuous subcutaneous insulin infusion. The effectiveness of intensive therapy in improving and maintaining good glycaemic control is well established in adolescents under research trial conditions. More recent data also indicate that the benefits of intensive therapy and improved glycaemic control persist even when HbA1c levels later rise. After completion of the Diabetes Control and Complications Trial (DCCT), adolescents from the former intensive therapy and conventional therapy groups returned to routine care and were advised to use intensive therapy. Despite no difference in their glycaemic control for four years after the end of the DCCT, the benefits of previous better control in the intensive therapy group persisted. Their prevalence of progression to proliferative or severe non-proliferative retinopathy was reduced by 78% during the four years. Suboptimal control during adolescence appears to have a lasting harmful effect, even when better control is achieved later.

Those caring for children and adolescents with type 1 diabetes may worry about the demands on the family and child of achieving good glycaemic control with intensive therapy. However, good glycaemic control is associated with better quality-of-life scores (QOL) in adolescents and less perceived burden by their parents. The intensity of the insulin regimen does not adversely affect QOL. Clearly, the demands of achieving good control are less than the consequences of poor control.

The limiting factor of achieving ideal glycaemic control remains hypoglycaemia, excluding other problems of adherence or family functioning. Adolescents in the DCCT had rates of hypoglycaemia that their adult counterparts, despite having higher HbA1c levels. Glucagon secretion, which stimulates hepatic glycogenolysis, is blunted early in the course of type 1 diabetes, increasing the patient’s vulnerability to hypoglycaemia. Further, the blood glucose threshold level for catecholamine release in response to hypoglycaemia is lowered in patients with better glycaemic control and this counter-regulatory response is most blunted during sleep. Recently available continuous blood glucose monitoring devices have shown that nocturnal hypoglycaemia is frequent in children. However, both new insulin analogues and continuous subcutaneous insulin therapy hold promise of improving control without the attendant increased risk of hypoglycaemia. In Western Australia, children with type 1 diabetes had more hypoglycaemia in association with falling HbA1c levels until 1995, since then their control has improved further, but without increased hypoglycaemia.

Can the DCCT recommendations that adolescents receive intensive therapy be reproduced in routine care? The Hvidore Study Group has followed more than 2500 children and adolescents over three years in Europe, Canada and Japan. Despite more use of intensive therapy, glycaemic control did not necessarily improve with wide differences between paediatric centres. Intensive therapy demands intensive follow-up, education and support, as well as resources that many Australian paediatric diabetes units do not have if most patients are to be supported in this way. Most success in implementing the DCCT recommendations is reported from well-resourced units using diabetes clinical nurse consultants.

While it is recommended that adolescents with type 1 diabetes receive intensive therapy, schedules need to be individualised. For example, some schoolchildren need insulin at afternoon tea, most adolescents need longer-acting insulin before bed for night control, and many preschoolers are managed on intermediate-acting insulin in the morning with small doses of insulin analogues to cover hyperglycaemia later in the day. Insulin pumps may provide the best solution for some patients, especially those with frequent hypoglycaemia or hypoglycaemic unawareness, but without government subsidy they are not affordable for most families. None of these options are easy for children and their families and, for some, intensive therapy is not possible. Insulin omission and chronic poor glycaemic control remain problems in adolescence and require ongoing intervention.

The NSW and ACT study has demonstrated a relatively fast decline in HbA1c levels since the DCCT findings. However, glycaemic control (and risk of long term vascular complications) is unlikely to improve further in population.
studies unless multidisciplinary resources increase. It is especially relevant for more educators to be trained in the unique problems of improving control in this age group, and for their expertise to be available to all children.

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Potential pitfalls of healthcare performance indicators

The validity of use of indicators for judging performance depends on the rigour of the available data

PUBLICLY AVAILABLE REPORTS of “surgical waiting times” are, at face value, of interest to patients and referring doctors wishing to access surgical care. Such information might be expected to provide a reasonable indication of the absolute time to surgical intervention for an individual patient, and allow reasonable conclusions to be drawn on the relative performance (in terms of waiting times) of surgical services.

Surgical waiting times are a specific example of “healthcare performance indicators” (see Definition). In addition to providing information for users, such indicators are likely to inform the opinions of politicians, journalists, hospital managers and state and federal health departments on the adequacy of our healthcare system and relative hospital or regional performances. They may be used to construct “league tables” of the relative performance of surgical units — individual hospitals, surgical units or surgeons may be deemed to have “good” or even “substandard” performance. Public outcries and political pointscoring are likely to ensue.

Good indicators should be easy to understand and use by the intended audience. Depending on how these data are collected, processed and presented, reports of surgical waiting time data might or might not provide useful information to people seeking guidance on time to treatment. Reports of surgical waiting times that use different definitions of “waiting time”, or simply report on past performance, are of limited value. Waiting time data presented as the frequency within a stated time (eg, 75% treated within 4 weeks) may also fail to adequately inform patients or general practitioners as to likely delays. Few existing systems are capable of adjusting for delays before initial surgical consultation (ie, waiting time to get onto the surgical waiting list), let alone factors such as primary illness severity, comorbid-


Definition

Healthcare performance indicators: statistics or other units of information which reflect, directly or indirectly, the performance of the healthcare system in maintaining or increasing the well-being of its target population.