

## Management of type 1 diabetes

### Poor outcomes for young people with diabetes



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The care of adolescents with type 1 diabetes is challenging.

Glycaemic control and metabolic complications, such as diabetic ketoacidosis (DKA), in this population are worse compared with in adults with the same condition. Beacons of good practice exist, but they are few

and far between, and the reasons for their positive outcomes are far from clear. Various national and international studies have found significant differences in glycaemic control between centres, though treatment differences, such as the number of insulin injections, are not the explanation (see Mortensen et al, 1998; Scottish Study Group for the Care of the Young Diabetic, 2001; Scott et al, 2006).

Some of the study summaries that appear in this section of *Diabetes Digest* look at a range of successful interventions, including those that succeeded in improving transitional care from adolescent to adult services (van Wallegghem et al, 2008; see page 218), reduced DKA

admission rates (Ellis et al, 2008; see below) and improved quality of life (de Wit et al, 2008; see right). Despite these successes, it is striking that sustained improvements in HbA<sub>1c</sub> were not achieved in any of these studies.

The latest National Diabetes Audit (National Diabetes Audit Team, 2008) reported that, of the 11 000 young people (16–24 years old) with type 1 diabetes, more than 30% have an HbA<sub>1c</sub> ≥10%. These disappointing results confirm that, although we are making small but progressive improvements in other aspects of their care, much remains to be done to help young people with diabetes achieve a healthy future.

National Diabetes Audit Team (2008) *National Diabetes Audit, report for the audit period 2006–2007*. Available at [www.ic.nhs.uk](http://www.ic.nhs.uk)

Mortensen HB, Robertson KJ, Aanstoot HJ et al (1998) Insulin management and metabolic control of type 1 diabetes mellitus in childhood and adolescence in 18 countries. *Diabetic Medicine* **15**: 752–9

Scott A, Toomath R, Bouchier D et al (2006) First national audit of the outcomes of care in young people with diabetes in New Zealand: High prevalence of nephropathy in Maori and Pacific Islanders. *New Zealand Medical Journal* **119**: U2015

Scottish Study Group for the Care of the Young Diabetic (2001) Factors influencing glycaemic control in young people with type 1 diabetes in Scotland: A population-based study (DIABAUD2). *Diabetes Care* **24**: 239–44

### DIABETES CARE

#### HRQoL interventions improve well-being in adolescents with type 1 diabetes

|                           |      |
|---------------------------|------|
| Readability               | ✓✓   |
| Applicability to practice | ✓✓✓✓ |
| WOW! factor               | ✓✓✓  |

**1** The authors sought to test the effects of monitoring and discussing health-related quality of life (HRQoL) in adolescents with type 1 diabetes, traditionally a group in whom puberty-related changes seriously complicate diabetes management.

**2** In this multicentre trial, adolescents (13–17 years of age) with type 1 diabetes were randomised to HRQoL intervention ( $n=46$ ) or control ( $n=45$ ) arms. Three consultations over 12 months were scheduled for both groups.

**3** Outcomes of the Paediatric Quality of Life Inventory were discussed face-to-face during consultations with those in the intervention group. The control group received usual care.

**4** At study end, mean scores for psychosocial health and for satisfaction with care were significantly improved in the intervention group (both  $P<0.001$ , baseline versus follow-up), but not for the control group.

**5** No significant difference in improvement in HbA<sub>1c</sub> levels was seen between the intervention and control groups ( $P=0.54$ ).

**6** The results suggest that interventions to improve HRQoL among adolescents with type 1 diabetes were well received, but did not improve glycaemic control.

de Wit M, Delemarre-van de Waal HA, Bokma JA et al (2008) Monitoring and discussing health-related quality of life in adolescents with type 1 diabetes improve psychosocial well-being. *Diabetes Care* **31**: 1521–26

### DIABETES CARE

#### Behavioural therapy reduces DKA-related hospital admissions

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|---------------------------|------|
| Readability               | ✓✓✓✓ |
| Applicability to practice | ✓✓✓✓ |
| WOW! factor               | ✓✓✓✓ |

**1** Multisystemic therapy (MST) is an intensive home-based behavioural therapy that improves metabolic control (MC) in those for whom MC is chronically poor.

**2** This study was undertaken to determine whether MST could reduce diabetic ketoacidosis (DKA)-related hospital admissions among young people. It also examined the potential cost savings associated.

**3** While concurrently receiving standard medical care, 127 young

people (10–17 years of age) with chronically poor MC (HbA<sub>1c</sub> ≥8%) were randomised to MST or control groups.

**4** The authors found that young people receiving MST had significantly fewer hospital admissions for DKA than the control group ( $P=0.019$ ).

**5** The reduction in hospital admissions for the MST group persisted from baseline to 6-, 12- and 18-month follow-ups ( $P=0.004$ , 0.021 and 0.046, respectively).

**6** Taking into account the cost of providing MST, a substantial cost offset was seen as hospital admissions were reduced during the study period.

**7** Intensive behavioural interventions for young people with type 1 diabetes experiencing chronically poor MC led to reduced admission for DKA in a lasting way.

Ellis D, Naar-King S, Templin T et al (2008) Multisystemic therapy for adolescents with poorly controlled type 1 diabetes. *Diabetes Care* **31**: 1746–7

**“A system navigator service was found to improve medical surveillance among young people transitioning to adult care, but did not improve short-term medical outcomes.”**

## DIABETES CARE

### Systems navigator service aids transition to adult diabetes care

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|---------------------------|------|
| Readability               | ✓✓✓✓ |
| Applicability to practice | ✓✓✓✓ |
| WOW! factor               | ✓✓✓✓ |

**1** Whether the transition to adult care for young people with type 1 diabetes could be facilitated by implementation of a systems navigator service (SNS: an

administrative tool to maintain email and telephone contact with young people and coordinate follow-up with healthcare professionals) was evaluated.

**2** Based on age, participants were assigned to receive SNS for 12 months during their transition to adult care ( $n=84$ ; 18 years of age), or were transferred without initial support ( $n=64$ ; 19–25 years of age).

**3** The SNS was found to improve medical surveillance, but did not improve short-term medical outcomes.

van Wallegghem N, Macdonald CA, Dean HJ (2008) Evaluation of a systems navigator model for transition from paediatric to adult care for young adults with type 1 diabetes. *Diabetes Care* **31**: 1529–30

## ARCHIVES OF PEDIATRIC & ADOLESCENT MEDICINE

### Age, sex influence HRQoL in young people with diabetes

|                           |     |
|---------------------------|-----|
| Readability               | ✓✓  |
| Applicability to practice | ✓✓✓ |
| WOW! factor               | ✓✓  |

**1** This population-based study examined associations between age, sex, metabolic control, treatment regimens and health-related quality of life (HRQoL) in young people with types 1 and 2 diabetes (T1D; T2D).

**2** Demographic and medical history data were collected for 2445 participants (8–22 years of age) who completed the Paediatric Quality

of Life Inventory.

**3**  $HbA_{1c} \geq 9\%$ , an injected (rather than pump delivered) insulin regimen and more comorbidities were associated with worse HRQoL in participants with T1D.

**4** For participants with T2D, injecting insulin  $\geq 3$  times/day was associated with better HRQoL than use of oral or no diabetes medications ( $P=0.03$ ).

**5** An interaction was found between age and gender: HRQoL was lower for older girls but higher for older boys with T1D ( $P=0.004$ ).

**6** The authors suggest that HRQoL interventions for people with diabetes should take into account the sex and age of the target population.

Naughton MJ, Ruggiero AM, Lawrence JM et al (2008) Health-related quality of life of children and adolescents with type 1 or type 2 diabetes mellitus. *Archives of Pediatric & Adolescent Medicine* **162**: 649–57

## BIOMEDICAL PAPERS OF THE UNIVERSITY PALACKÝ

### Pre-meal bolus algorithms lower risk with high-GI food consumption

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|---------------------------|-----|
| Readability               | ✓✓✓ |
| Applicability to practice | ✓✓✓ |
| WOW! factor               | ✓✓  |

**1** This study used continuous glucose monitoring (CGM) in people with type 1 diabetes to assess the efficiency of pre-meal bolus algorithms in managing glycaemic control during exposure to high

glycaemic index (GI) foods.

**2** Six participants fitted with insulin pumps consumed a diet of high-GI foods for three 1-week periods. Participants were asked to adjust their insulin boluses prior to mealtime, according to specified empirically defined algorithms.

**3** The effect of 1 week of high-GI meals on average glucose levels was found to be negligible, suggesting that the algorithms used limit the risk of hyperglycaemia associated with high-GI foods in people with type 1 diabetes.

Lippaiova N, Pallayova M, Kuzmina G, et al (2008) Safety of new algorithms for premeal insulin boluses in high glycaemic index meals in persons with type 1 diabetes mellitus using insulin pumps. *Biomedical Papers of the Medical Faculty of the University Palacký* **152**: 439–41

## DIABETOLOGIA

### Adequate basal-prandial insulin substitution is associated with better glycaemic control

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|---------------------------|------|
| Readability               | ✓✓✓✓ |
| Applicability to practice | ✓✓✓✓ |
| WOW! factor               | ✓✓✓✓ |

**1** This multicentre study surveyed the use of continuous subcutaneous insulin infusion (CSII) in a paediatric population, and real-life conditions, relating data to outcomes.

**2** People aged 0–18 years with type 1 diabetes using CSII (pump memory of at least 90 days) were recruited into this study ( $n=1041$ ).

**3** Data recording  $HbA_{1c}$ , number of boluses and total daily bolus amount for a 90-day period were downloaded from each participant's pump during a routine clinic visit.

**4** Preschool ( $\leq 6$  years old) children achieved significantly better  $HbA_{1c}$  levels than did adolescents (girls  $>11$  but  $\leq 18$  years old; boys  $>12$  but  $\leq 18$  years old) ( $P<0.0001$ ).

**5** A significantly lower  $HbA_{1c}$  was achieved by participants using  $>6.7$  boluses per day (odds ratio 2.53 [95%CI 1.94–3.31]).

**6**  $HbA_{1c}$  levels among participants whose basal insulin constituted  $<50\%$  of total daily insulin were found to be significantly lower than those with a higher proportion of basal insulin in their daily regimen ( $P<0.01$ ).

**7** This study shows that CSII frequently allows achievement of glycaemic targets, particularly in young children. The results also highlight that better  $HbA_{1c}$  levels are associated with adequate substitution of basal and prandial insulin.

Danne T, Battelino T, Jarosz-Chobot P et al (2008) Establishing glycaemic control with continuous subcutaneous insulin infusion in children and adolescents with type 1 diabetes: Experience of the PedPump Study in 17 countries. *Diabetologia* **51**: 1594–601