13th National Paediatric Diabetes Audit shows progress but variations in care

The 13th National Paediatric Diabetes Audit of care processes and outcomes for England and Wales has a familiar ring to it. Diabetes care improved overall for children and young people in 2015/16 compared with previous years but performance still lagged behind that of some of our European counterparts.1

Steve Chaplin here reports on the audit’s latest key findings pinpointing areas of success and of need.

Only one-third of children and young people (CYP) received all the care processes recommended by NICE and the challenges posed by deprivation persist. For the first time, type 2 diabetes (T2D) is included as a separate section (formerly all diabetes was pooled); though accounting for only 2% of patients, this acknowledges the emerging impact of childhood overweight and obesity and the differences in management and outcomes for T1D and T2D.

The incidence of type 1 diabetes (T1D) has increased annually since 2013/14, a period in which the NHS has struggled to meet the health needs of the people whose taxes fund it. It is testament to the efforts of everyone involved in diabetes care that the service is doing as well as it is.

Conduct of the audit
The audit included all 173 paediatric diabetes units (PDUs) in England and Wales and involved CYP with diabetes aged ≤24 who were in paediatric care from 1 April 2015 to 31 March 2016. For the first time, clinical leads at each unit confirmed the completeness and accuracy of their data submission – something that should improve the quality and validity of the audit. NICE introduced a new guideline in 2015 (NG18), recommending that cholesterol screening should not be mandatory for T1D (but it remains so for T2D); thyroid screening is included in the seven essential health checks for T1D; and screening for coeliac disease is mandatory only at diagnosis of T1D. The audit reflects these changes.

Patient characteristics
The audit included 28,439 CYP – an increase of 757 on the previous year; 52% were male. Of the 96% who had T1D, 40% were aged 10–14, 31% were 15–19, and 22% were aged 5–9. Children up to four years old accounted for 6%; only 24 young people aged up to 24 were included.

<table>
<thead>
<tr>
<th>Age bands</th>
<th>Type 1 diabetes</th>
<th>Type 2 diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>For all:</td>
<td>• HbA1c  &lt;br&gt;• Body mass index  &lt;br&gt;• Thyroid screening</td>
<td>• HbA1c  &lt;br&gt;• Body mass index  &lt;br&gt;• Cholesterol screening  &lt;br&gt;• Blood pressure  &lt;br&gt;• Urinary albumin</td>
</tr>
<tr>
<td>For over 12s:</td>
<td>• Blood pressure  &lt;br&gt;• Urinary albumin  &lt;br&gt;• Eye screening  &lt;br&gt;• Foot examination</td>
<td>• Eye screening  &lt;br&gt;• Foot examination</td>
</tr>
</tbody>
</table>

Table 1. NICE recommended care processes

Figure 1. Type 1 diabetes: proportion of children and young people receiving NICE-recommended care processes in England and Wales, 2014/2015 and 2015/16. (Copyright © Royal College of Paediatrics and Child Health)

<table>
<thead>
<tr>
<th>All ages (n=412 for England and Wales)</th>
<th>Aged 12+ (n=390 for England and Wales)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1c</td>
<td>BMI</td>
</tr>
<tr>
<td>97.3%</td>
<td>94.4%</td>
</tr>
</tbody>
</table>

Table 2. Type 2 diabetes: proportion of children and young people receiving NICE-recommended care processes in England and Wales, 2015/16. (Data not reported separately in previous years)
There were 621 CYP with T2D; 15 (2.4%) were aged 5–9, 39% were 10–14 and 58% were 15–19. The remaining patients had monogenic types, diabetes related to cystic fibrosis or unspecified diabetes. Many older teenagers and young adults would have transitioned to adult services, so numbers in the older age groups do not fully represent the national population.

The prevalence of T1D is increasing among all age groups in girls but only in 5–9 year-olds among boys. The incidence of T1D increased with age from 17.0/100 000 at 0–4 years to 27.2/100 000 at 5–9 and 35.0/100 000 at 10–14. Incidence was higher among boys than girls (26.6 vs 24.7/100 000 at age 0–15) due to a greater frequency at age 10–14 (37.3 vs 32.1/100 000).

Information about ethnicity was available for 87% of patients with T1D. Of the total audit population, 74% were white, 46% were Asian, 31% were black and 2.3% were of mixed ethnicity. Distribution between the five quintiles of deprivation was approximately even.

Two-thirds of CYP with T2D were female; 36% were white, 28% were Asian and 11% were black (ethnicity was not reported for 20%). Distribution by deprivation was unequal, with 46% from the most deprived quintile, 25% from the second most deprived and 15% from the third most deprived. London and the South East accounted for a higher proportion of patients with T2D than T1D (31% vs 23%), as did the West Midlands (17% vs 11%).

Care delivery

Age-specific processes

NICE recommends that CYP should receive seven care processes at least annually (Table 1). Implementation of these processes for those with T1D is improving but inconsistent, and only a minority receive all that they should (Figure 1). Overall performance was better in Wales than England (51% vs 36% received all seven processes). Within England, it was worst in London and the South East (21%) and best in the East and West Midlands (50% and 45%, respectively). Of those who completed a full year of care, HbA1c was measured ≥4 times in 48%, three times in 29%, and twice in 16%.

Only 17% of CYP with T2D received all seven care processes (Table 2). Fewer had frequent measurement of HbA1c (30% ≥4 times).

Smoking status was assessed in about 80% of children with T1D or T2D and psychological needs were assessed in 70% and 60% respectively.

Drug treatment

Most with T1D used either ≥4 insulin injections per day (54%, inter-regional range 49–60%) or an insulin pump (28%, 26–33%). The use of pumps has been increasing for the past four years; 42% of 0–4 year-olds were prescribed a pump (vs 54% who use ≥4 injections), whereas the figures for 15–19 year-olds were 25% and 72%. Increasing deprivation was associated with a lower prevalence of pump use (35% least deprived, 24% most deprived) and greater use of multiple injections (61% vs 73%). Median HbA1c was lower with pump use than ≥4 insulin injections per day (62.2 vs 66.0 mmol/mol).

Statistics on medication are missing for 17% of CYP with T2D. Of the remainder, 16% did not use insulin, 11% used insulin, 39% used oral drugs, and 18% used insulin and oral drugs combined.

Structured education

The proportion of children receiving structured education in 2015/16 appears to have increased over the previous year for both T1D (71% vs 58%) and T2D (58% vs 40%); (note that 2014/15 excludes those without a full year of care whereas 2015/16 includes all patients). There were marked differences between the regions in delivery to patients with T1D: England did better than Wales (72% vs 44%) but within England figures ranged from 46% in the South West to 84% in the North West. There was a similar pattern for T2D, with only 29% of patients receiving structured care in the South West.

Treatment targets and outcomes

Glycated haemoglobin

Median HbA1c for all CYP was 64.5 mmol/mol (interquartile [IQ] range 18.2), representing the sixth successive year in which glycaemic control improved over the preceding year. There was little difference between regions. HbA1c for those with T1D was similar to the overall figure but lower and more variable for T2D (median 51.0 mmol/mol; IQ range 30.5).

More CYP with T1D achieved targets for glycaemic control in 2015/16 (Figure 2) but there were wide differences between regions. The proportion having HbA1c ≤48 mmol/mol ranged from 5.2% in West Midlands to 9.1% in East Midlands and the proportion at or below 53 mmol/mol ranged from 12% to 19% in the same regions. ‘Considerable variability’ between paediatric units remained after adjustment for case mix. Glycaemic control was better in younger people and in males, with the greatest difference between sexes at age 20–24 (mean HbA1c 84.6 vs 69.3 mmol/mol). HbA1c increased with deprivation, rising from 64.8 to 71.6 mmol/mol from the least to the most deprived. Ethnic minority groups had worse glycaemic control; mean HbA1c was 70.9 mmol/mol in
black and 75.1mmol/mol in Asians compared with 67.8mmol/mol among whites and 69.4mmol/mol in those of mixed ethnicity, and this was reflected in the proportions achieving treatment targets.

For those with T2D, glycaemic control was markedly worse for the most (mean HbA1c 62.4mmol/mol) and second most deprived quintiles (59.4mmol/mol) but similar for the others (55.5–56.2mmol/mol). Mean HbA1c was highest among black CYP (69.9mmol/mol) and lowest among whites (56.8mmol/mol) and Asians (58.7mmol/mol).

**Small vessel disease**

Statistics on albuminuria are available for 61% of the cohort with T1D who were aged over 12. The proportion with microalbuminuria or macroalbuminuria was 9.7%, down from 12% in 2014/15. Prevalence in Wales was half of that in England (5.1% vs 10%) and figures for the regions ranged from 5.5% in South Central to 13.4% in East of England. Prevalence increased with age (7.9% at 12 years to 14% at 18) and deprivation (9.0% in lowest deprived areas vs 11% in the most deprived). Figures are available for only 42% of patients with T2D, of whom 15% had microalbuminuria or macroalbuminuria.

Information from retinopathy screening is available for about 90% of CYP with T1D. The proportion with abnormal results was 14% (8.6% in Wales) but the figures for the regions ranged from 11% in South Central to 19% in Yorkshire and Humber. Increasing age and deprivation were again associated with higher rates, with a three-fold variation from 12 to 17 years old (6.4% to 21%) and a small gradient from least (15%) to most deprived (16%). Data are missing for 13% of those with T2D; of the remainder, 5.4% had an abnormal result.

**Cardiovascular risk factors**

About a quarter of young people with T1D had high blood pressure and in about one-fifth total blood cholesterol was above 5mmol/L. There was little regional variation in the proportion of people with high cholesterol but the proportion in the 90th to 98th centile for blood pressure ranged from 28% in North East and North Cumbria to 41% in South West. The proportion above the 98th centile ranged from 23% to 31% (in the same regions).

The situation was worse in CYP with T2D, of whom 40% had high blood pressure and 25% had high cholesterol. Wales did worse than England on both outcomes.

Table 3 shows the distribution of body mass index for type 1 and type 2 diabetes in England and Wales, 2015/2016.

<table>
<thead>
<tr>
<th>Diabetes type and age bands</th>
<th>Underweight (&lt;5th centile BMI)</th>
<th>Healthy weight (5th to 85th centile BMI)</th>
<th>Overweight (85th to 95th centile BMI)</th>
<th>Obese (&gt;95th centile BMI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1: 0–11 years</td>
<td>1.5%</td>
<td>63%</td>
<td>16%</td>
<td>17%</td>
</tr>
<tr>
<td>Type 1: ≥12 years</td>
<td>2.8%</td>
<td>54%</td>
<td>18%</td>
<td>21%</td>
</tr>
<tr>
<td>Type 2</td>
<td></td>
<td>6.9%</td>
<td>7.3%</td>
<td>79%</td>
</tr>
</tbody>
</table>

**Smoking**

The proportion of CYP recorded as smokers was 3.1% for T1D (range 2.0–4.4% between regions) and 2.1% for T2D.

**Autoimmune disease and psychological assessment**

Among those with T1D, 3.5% were being treated for thyroid disease and 4.0% were on a gluten-free diet.

Information about psychological assessment was available for about two-thirds of CYP with T1D. This shows that about 60% did not need a referral and 30% had been referred and seen; 61.1% had been referred but there was no evidence they’d been seen. Far fewer referrals were recorded in Wales than in England (14% vs 31%) and regional performance varied widely, ranging from 17% referred and seen in North East and North Cumbria to 49% in East Midlands. The overall figures for T2D were similar; these were based on 54% of the cohort and no regional breakdown was made.

**Conclusion**

The report concludes that, compared with the audit’s findings almost a decade ago, the latest figures demonstrate ‘considerable improvements in diabetes care leading to improved outcomes’. There has been a reduction in mean HbA1c of 8.5mmol/mol over the last six years. Extrapolating from evidence in adults with diabetes, the report estimates that an 11mmol/mol reduction would lower the risk of long-term complications by half. It will take several years for this to become apparent in the statistics but ‘it will clearly reduce the burden on patients, families and the NHS’.

Meanwhile, diabetes care for CYP must overcome a problem shared with many specialties in our national health service. There is large variation in service delivery and outcomes between regions and between England and Wales. Case mix probably contributes to some aspects but is not the whole story. It would be useful to know how staffing, resources, structural problems and population change affect these differences so that investment could be targeted where it’s most needed. Deprivation stands out as a major influence on outcomes: mean HbA1c was 7mmol/mol lower among those with T1D in the most deprived quintile compared with the least deprived – almost wiping out the national improvement over recent years. This is something that should not be tolerated in 21st century Britain.

**Steve Chaplin, BPharm, MSc, Medical Correspondent**

**Reference**