Paediatric weight management programme for children with diabetes: a pilot study

Raphaella McEwan
Paediatric Diabetes Specialist Dietitian, Heart of England NHS Trust, Nutrition and Dietetics, Heartlands Hospital, Birmingham, UK

Niamh Gilligan
Paediatric Dietitian, Royal Manchester Children’s Hospital, Manchester, UK

Correspondence to:
Raphaella McEwan, Paediatric Diabetes Specialist Dietitian, Heart of England NHS Trust, Nutrition and Dietetics, Heartlands Hospital, Birmingham B9 5SS, UK; email: raphaella.mcewan@heartofengland.nhs.uk

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Abstract
The purpose of this pilot was to develop a curriculum and teaching plan for weight management for children with diabetes.

Session aims and objectives were discussed with the diabetes multidisciplinary team. The programme was entitled ‘Stepping Stones’ and divided into a junior (4–10 year olds) and senior (11–15 year olds) programme.

The Heart of England NHS Trust cares for 408 paediatric patients with diabetes. For pilot purposes Stepping Stones took place at one hospital site (n=148). For the juniors programme 35 patients were invited (n=7 were due to attend sessions, n=5 actually attended). For the seniors programme 56 patients were invited (n=6 were due to attend sessions, n=0 attended). For the pilot, it was decided that the programme would run once-weekly for four weeks. Each session was 1 hour and held at the Education Centre at the hospital.

Overall, the attendance at the group sessions was disappointing and meant that the results achieved from the juniors programme were not necessarily representative of the patient group. Only 40% (n=2) of the attendees were actually overweight but one of the participants successfully lost some weight and managed to move a centile line in weight while the other continued to track the same centile line for weight. On evaluation of the programme, all children felt that the Stepping Stones programme was helpful and 60% felt that it has improved their diabetes knowledge. All participants who attended the initial session did come to each of the following sessions as well, which demonstrated good attrition rates. Copyright © 2016 John Wiley & Sons.

Key words
overweight; diabetes; weight management programme; paediatrics; adolescents

Introduction
The National Institute for Health and Care Excellence recommends the following: ‘Offer children and young people with type 1 diabetes dietetic support to help optimise body weight and blood glucose control,’ and ‘At each clinic visit for children and young people with type 1 diabetes measure height and weight and plot on an appropriate growth chart.’

A variety of weight management programmes have been previously trialled in the general paediatric population including programmes such as MEND (mind, exercise, nutrition and diet) and Alive N’ Kicking, both of which appear to have positive physical and psychological results that are further enhanced with appropriate family support and strategies. While there are a variety of community-based weight management programmes for type 2 adults, there do not appear to be any nationally-accepted weight management programmes for children with type 1 or type 2 diabetes. With ongoing improvements in the recording of key data including weight, height and body mass index for National Paediatric Diabetes Audit (NPDA) and peer review purposes, the sheer scale of overweight and obese children is now better known. The current article focuses on a centre in Birmingham, West Midlands, and therefore the following data represent that region.

The NPDA data shown in Tables 1 and 2 highlight the extent of weight concerns in the paediatric population and, as expected, older children are more likely to be obese than their younger counterparts partly due to increased independence, peer pressures and inactivity. The NPDA results highlighted that the West Midlands returned poorer statistics than the national average and, following observation and informal audits in paediatric diabetes clinics, the paediatric dietitians of the Heart of England NHS Trust decided to pilot a new weight management programme; this they called Stepping Stones.
Why worry about children being overweight?

While children with type 2 diabetes tend to be more associated with being overweight and obese, the most recent NPDA results demonstrate that children with type 1 diabetes are also likely to be overweight. A variety of factors can impinge on a child with diabetes and affect their ability to maintain a healthy weight including treatment of hypoglycaemia, exclusion from certain sports, overestimating carbohydrate values, low mood and social isolation. The diabetes team need to support individuals in achieving a healthy weight and need to have open and frank discussions about this before children utilise insulin avoidance to control their weight and thus worsen their glycaemic control. While Lawrence et al. discussed that dieting, fasting and using diet pills were more common in young people with type 2 diabetes, it did not mean that their type 1 peers were not utilising these as well.

Complications of obesity in the total population are well known and Daniels concluded that obesity in childhood can affect virtually every organ system in an adverse manner and, while more research is needed into certain pathophysiological mechanisms, the impact on psychosocial wellbeing is apparent with key studies showing that quality of life in obese individuals is reported to be as low as that in children being treated for cancer. Diabetes is also associated with lower quality of life scores, and therefore a combination of diabetes and obesity results in a depressing situation and one that urgently needs addressing. The role of psychologists within the multidisciplinary team has never been so paramount and the following weight management programme was discussed with psychologists in the team, but unfortunately due to lack of funding they have been unable to be physically present in the sessions thus far.

Weight management in practice

The following report by no means presents a perfect programme but highlights different factors influencing successes of such a programme, thus creating discussion and hopefully provoking the development of such programmes on a regional and national scale using the paediatric diabetes networks as an appropriate forum.

Pilot purpose

The intended purpose of this initial pilot was to develop an appropriate curriculum and teaching plan for children with diabetes. Initially, the programme was held at one of the hospital sites with the intention of rolling it out to other hospital sites within the trust. While certain patients were targeted on a one-to-one basis, the whole patient group (for that site) was invited with the aim of having well-motivated individuals to help evaluate

<table>
<thead>
<tr>
<th>Session no.</th>
<th>Introduction/ice breaker (children came up with these)</th>
<th>Education (intended learning outcomes)</th>
<th>Activity</th>
<th>Weekly project and prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Tell the group 3 things you did over the summer holiday. Game of Duck Duck Goose</td>
<td>Why is food important? Role of different foods within diabetes</td>
<td>Game of Fruit and Veg Bingo</td>
<td>Make a version of the Eatwell Plate – best plate wins a pot of crayons</td>
</tr>
<tr>
<td>Two</td>
<td>Order yourselves in terms of height/birthday/surname order</td>
<td>What is exercise? Why is exercise important? How do we manage blood sugars with exercise?</td>
<td>The Name game – the group have to guess what diabetes related word is on forehead</td>
<td>Keep an exercise and blood sugar diary – prize for everyone who has completed it</td>
</tr>
<tr>
<td>Three</td>
<td>Grandmother’s Footsteps</td>
<td>Eatwell Plate and recognising carbohydrates using food models/pictures</td>
<td>Carbohydrate counting pairs games</td>
<td>Carbohydrate counting poster – winner gets a prize and poster to be displayed in outpatients</td>
</tr>
<tr>
<td>Four</td>
<td>Diabetes themed Stop the Bus and Fruit Bowl games</td>
<td>Brain-storm what we have learnt over the last 3 weeks. What can we do in the future to keep healthy?</td>
<td>Duck Duck Goose game with diabetes related words</td>
<td>Prize for poster and all participants receive carbohydrate counting workbooks and Disney recipe books – courtesy of Lilly</td>
</tr>
</tbody>
</table>

Table 1. Body mass index for children (aged 4–11 years) with type 1 diabetes. Data taken from National Paediatric Diabetes Audit (2013/2014)

<table>
<thead>
<tr>
<th>Region</th>
<th>Underweight</th>
<th>Healthy weight</th>
<th>Overweight</th>
<th>Obese</th>
<th>Missing data</th>
</tr>
</thead>
<tbody>
<tr>
<td>England and Wales</td>
<td>1.4%</td>
<td>61.8%</td>
<td>18.5%</td>
<td>18.1%</td>
<td>0.3%</td>
</tr>
<tr>
<td>West Midlands</td>
<td>0.8%</td>
<td>60.7%</td>
<td>19.2%</td>
<td>18.6%</td>
<td>0.7%</td>
</tr>
</tbody>
</table>

Table 2. Body mass index for children (aged 12+ years) with type 1 diabetes. Data taken from National Paediatric Diabetes Audit (2013/2014)

<table>
<thead>
<tr>
<th>Region</th>
<th>Underweight</th>
<th>Healthy weight</th>
<th>Overweight</th>
<th>Obese</th>
<th>Missing data</th>
</tr>
</thead>
<tbody>
<tr>
<td>England and Wales</td>
<td>1.7%</td>
<td>54.2%</td>
<td>20.7%</td>
<td>23.2%</td>
<td>0.1%</td>
</tr>
<tr>
<td>West Midlands</td>
<td>1.7%</td>
<td>53.2%</td>
<td>20.9%</td>
<td>23.8%</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

Table 3. Session plans
Paediatric weight management programme for children with diabetes

Prior to setting up the curriculum, it was decided that the programme would run once-weekly for four weeks. A suggested duration for the session was 1 hour and the location was a meeting room in the education centre at the hospital. Table 3 outlines the session plan.

**Session structure**

For the pilot, it was decided that the programme would run once weekly for six weeks at the education centre. Six participants signed up and unfortunately only one came to the first session despite all receiving a reminder telephone call/email the day before. After this first session, participants were contacted and all informed us they had other commitments and were unable to attend. We therefore took the decision to cancel the seniors programme as we felt for that one individual it may negatively affect their opinion on group sessions and they were more likely to achieve something with the use of one-to-one home visits instead.

**Participant evaluation**

A simple evaluation form was completed by the children (older ones assisted the younger ones to try and reduce user bias) on the final session; the feedback obtained is shown in Table 5.

**Seniors programme**

The seniors programme (11-15 year olds) was planned to run weekly for six weeks at the education centre. Six participants signed up and unfortunately only one came to the first session despite all receiving a reminder telephone call/email the day before. After this first session, participants were contacted and all informed us they had other commitments and were unable to attend. We therefore took the decision to cancel the seniors programme as we felt for that one individual it may negatively affect their opinion on group sessions and they were more likely to achieve something with the use of one-to-one home visits instead.

**Anthropometric data**

The anthropometric measurements for five participants are shown in Table 4. Note: the initial cohort comprised seven participants but two did not attend the initial two sessions and were therefore advised against attending the third and fourth sessions.

**Participant no. and details**

**Baseline measurements**

**Final measurements**

<table>
<thead>
<tr>
<th>Participant no. and details</th>
<th>Baseline measurements</th>
<th>Final measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>One (5yr 10mo at start) Healthy weight</td>
<td>18.1kg (25th centile) 109.5cm (9th–25th centile)</td>
<td>17.9kg (9th–25th centile) 109.6cm (9th–25th centile)</td>
</tr>
<tr>
<td>Two (8yr 4mo at start) Healthy weight</td>
<td>29.0kg (50th–75th centile) 136.1cm (75th–91st centile)</td>
<td>29.8kg (50th–75th centile) 136.3cm (75th–91st centile)</td>
</tr>
<tr>
<td>Three (5yr 1mo at start) Healthy weight</td>
<td>17.4kg (25th–50th centile) 107.4cm (25th centile)</td>
<td>17.6kg (25th–50th centile) 107.4cm (25th centile)</td>
</tr>
<tr>
<td>Four (9yr 2mo at start) Overweight</td>
<td>45.6kg (98th–99.6th centile) 134.2cm (50th–75th centile)</td>
<td>46.0kg (98th–99.6th centile) 134.2cm (50th–75th centile)</td>
</tr>
<tr>
<td>Five (9yr 6mo at start) Overweight</td>
<td>50.9kg (&gt;99.6th centile) 138.9cm (50th–75th centile)</td>
<td>50.6kg (99.6th centile) 138.9cm (50th–75th centile)</td>
</tr>
</tbody>
</table>

**Table 4. Anthropometric measurements for participants**

<table>
<thead>
<tr>
<th>Question</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you feel attending stepping stones has been helpful?</td>
<td>• 100% – Yes, very much so • 0% – Kind of • 0% – Not so much</td>
</tr>
<tr>
<td>Do you think attending Stepping Stones has helped improve your knowledge of diabetes?</td>
<td>• 60% – Yes, very much so • 40% – Kind of • 0% – Not so much</td>
</tr>
<tr>
<td>What did you enjoy most about Stepping Stones?</td>
<td>• Playing games (x 5) • Making new friends and meeting other children with diabetes (x 3) • Making posters and doing crafty stuff (x 2)</td>
</tr>
<tr>
<td>What have you learnt:</td>
<td>• 100% said yes, 0% said no • 80% said yes, 20% said no • 80% said yes, 20% said no</td>
</tr>
<tr>
<td>– I know what diabetes is</td>
<td>– I know how exercise affects my blood sugars – I feel more confident carbohydrate counting</td>
</tr>
<tr>
<td>Is there anything you would change about Stepping Stones?</td>
<td>• Longer sessions (x 1) • More activities with flip chart paper and pens in groups (x 1) • Nothing (x 3)</td>
</tr>
</tbody>
</table>

**Table 5. Participant evaluation**

and evolve the initial programme before making it more targeted for future cohorts.

**Team consultation**

Session aims and objectives were discussed with the diabetes nurses, consultants, psychologists and dietitians. The aims were also discussed electronically with paediatric diabetes dietetic colleagues in different regions across the UK for further support. By agreement the programme was entitled Stepping Stones and was divided into a junior (4–10 year olds) and a senior (11–15 year olds) programme.

**Juniors programme**

Prior to setting up the curriculum, one-to-one ad hoc informal consultations took place with a selection of patients (4–11 year olds; n=10) to ask for ideas around topics and session plans and what they would hope to get from the sessions.

**Patient cohort**

The Heart of England NHS Trust cares for 408 paediatric patients with diabetes. For pilot purposes Stepping Stones took place at one hospital site (n=148). For the juniors programme, 35 patients were invited (n=7 were due to attend sessions; n=7 actually attended). For the seniors programme, 56 patients were invited (n=6 were due to attend sessions; n=0 actually attended).

**Session structure**

For the pilot, it was decided that the programme would run once-weekly for four weeks. A suggested duration for the session was 1 hour and the location was a meeting room in the education centre at the hospital. Table 3 outlines the session plan.

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**Participant evaluation**

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been more useful, including text messaging, Skype or social media – formats which are becoming more widely used following successes across the country. Use of different forums and social media in helping to engage adolescents certainly warrants further research.

**Discussion**

Overall, the attendance at the group sessions was disappointing and meant that the results we did achieve from the juniors programme were not necessarily representative of the patient group, particularly as the group of individuals who did attend came from well-motivated families. Only 40% (n=2) of the attendees were actually overweight and one of these participants successfully lost some weight and managed to move a centile line in weight while the other continued to track the same centile line for weight. The ongoing plan is to take anthropometric measurements again after six months (May 2016), and to see if results have been consistent and monitor long-term growth.

Patients’ parents were involved in the sessions at the end when there were informal discussions around what was discussed and they helped with projects in between weeks. It may also have been useful for them to attend one of the sessions to give some appropriate education and to meet other parents as well. Parents were also informed of local Paediatric Diabetes Network activity days which they were welcome to attend with their children to offer more support and an opportunity to socialise with other families affected by diabetes.

The use of projects in between weeks and prizes for them were well received. It helped to keep parents motivated in between sessions and also to consolidate their new knowledge. All participants who actually attended the initial session did come to each of the subsequent sessions as well which demonstrated good attrition rates compared to alternative weight management programmes.

Skelton and Beech 6 evaluated paediatric weight management programmes and found high rates of attrition, varying between 27% and 73%. While some of the studies they looked at found a relationship between high attrition rates and racial/ethnic minorities, the economically disadvantaged and those with higher rates of obesity, other studies did not.

The most consistent reasons for families not attending sessions related to scheduling issues and programmes not meeting family needs or expectations. Therefore, for future programmes it may be useful to hold focus-group sessions with a small group of patients and their parents to discuss key learning objectives. In addition, when advertising the programme, it may be beneficial to provide a brief overview of the curricula as well as an incentive for attending at least the initial session. It may also be helpful to move the sessions away from a hospital environment and this, along with the incentives, could well be funded either by the parent support group or through drug representatives.

Moving away from weight management, it is also interesting to note that 40% of the juniors programme had coeliac disease. Goh and Banerjee 7 estimated that 4.8% of the diabetic paediatric population have coeliac disease. The effect of a chronic, lifelong disease, whereby each meal is thought about on top of having to avoid gluten, means there can be a lack of adherence to the gluten-free diet. While evidence appears to contradict itself, Saadah et al.8 highlight the positive benefits on appropriate growth and glycaemic control when a gluten-free diet is followed. As a result of discussion with the participants with coeliac disease and their parents, a Coeliac Cookery Session is now being planned with the support of Coeliac UK and aims to invite the coeliac diabetic paediatric population across the trust for a 3-hour cooking and awareness session. The results of this programme will then be shared with the Regional Paediatric Network.

Future plans for Stepping Stones include using a focus group to roll out the programme at other hospital sites and inviting dietitians and other members of the paediatric diabetes multidisciplinary team from other paediatric networks to plan and observe the sessions in order to consolidate a valuable and validated education programme. This process supports recommendations from the NPDA which suggests that regional diabetes networks should explore options for developing regional and national structured education programmes to help eliminate postcode variability and to help ensure that patients receive optimal care wherever they live.3

**Declaration of interests**

There are no conflicts of interest declared.

**References**

1. NICE. Diabetes (type 1 and type 2) in children and young people: diagnosis and management. NG18. NICE, 2015.