

# Basal–Bolus Conversion Groups: Delivery of structured patient education

Kate Marsden, Jean Munday,  
Jeanette Head, Anita Thynne

## Article points

1. A group of diabetes professionals devised a new structured education programme called Basal–Bolus Conversion Groups (BBC Groups).
2. The BBC Group programme is structured and time-efficient. It provides consistent information, dietetic input, carbohydrate-counting skills, and regular healthcare professional contact.
3. During the course of the programme, glycaemic control, the burden associated with living with diabetes and general wellbeing were all seen to improve.

## Key words

- Structured group education
- Basal–bolus insulin conversion

Kate Marsden and Anita Thynne are Diabetes Specialist Nurses, Jean Munday is a Diabetes and Endocrine Specialist Nurse and Jeanette Head is a Diabetes Specialist Dietician. All are based at the Portsmouth Hospitals NHS Trust, Portsmouth.

The Department of Health's National Service Framework for diabetes and the NICE guidance on the use of patient education for diabetes both highlight the importance of structured self-management education programmes in assisting people with diabetes to self-care. This article describes a structured education programme that has been developed for people with diabetes wishing to convert to a basal–bolus insulin regimen. The development of the programme, the content of the group sessions, and participant experiences and outcomes are discussed.

Historically, DSNs within the authors' institution have met people with diabetes converting from other management strategies to a basal–bolus insulin regimen on a one-to-one basis to assist them with the transition. These appointments usually lasted 30–60 minutes, during which time it was often difficult to explore carbohydrate-counting and dose-adjustment skills in any detail. Furthermore, there were found to be inconsistencies between DSNs as to when, and how often, people with diabetes who had converted to a basal–bolus insulin regimen were being followed-up, and many people were found not have received input from a specialist diabetes dietitian.

Having recognised problems in the existing system, a small group of diabetes professionals devised a new structured

education programme designed to assist people with diabetes in the transition to a basal–bolus insulin regimen. These Basal–Bolus Conversion Groups (BBC Groups) began in January 2006, with 8–12 BBC Groups now being run annually.

## Participants and session content

Participants are referred to the BBC Group programme by doctors, DSNs and specialist dietitians at the diabetes centre, Queen Alexandra Hospital, Portsmouth. The programme consists of four 2-hour sessions over a period of 6 months. A DSN, a dietitian, or both, facilitate each group, and up to six people with type 1 or type 2 diabetes (and their partners) are allowed to attend at a time.

People referred must meet certain criteria to be eligible: (i) they must not be insulin

naive; (ii) they must be able to attend all four group sessions; (iii) they must be willing to intensively monitor their blood glucose levels, using finger-stick devices, during the programme.

The areas covered in each of the four sessions are detailed in *Box 1*. The first three sessions are run at fortnightly intervals and session four is held 6 months after the person

with diabetes converts to a basal–bolus insulin regimen. Occasionally, participants decide, during or after the first session, that they no longer wish to change their insulin regimen. Reasons for this have included not being made fully aware of what changing to a basal–bolus regimen would entail by the referring clinician, or (more commonly) realising, as a result of attending the first session, that there were changes that they could make, while remaining on their existing insulin regimen, to better manage their blood glucose levels. It is made clear from the outset that people will be supported should they reach this decision.

There is a strong focus on carbohydrate awareness, carbohydrate counting (*Figure 1*), blood glucose monitoring and insulin dose adjustment in all four sessions. Participants calculate the initial amount of bolus insulin they will administer for every 10 g of carbohydrate consumed using the equation:

$$\frac{\text{current total daily insulin dose}}{50}$$

Their initial basal insulin dose is calculated by the DSN, and is based on one-third to one-half of their current total daily insulin dose.

### Session delivery

The concept of self-efficacy – the confidence to carry out behaviour necessary to reach a desired goal – is central to self-management. According to the Department of Health (DH, 2001) self-efficacy is enhanced



*Figure 1. Members of a Basal–Bolus Conversion Group and their facilitator during a carbohydrate counting activity.*

Box 1. Content covered during each of the four Basal–Bolus Conversion (BBC) Group sessions.	
Session	Content covered during the session
1	Welcome and introduction to the course; participants complete PAID and WHO-5 questionnaires; explore problems with current regimen and reasons for wanting to change; establishment of goals; explain normal insulin profile and what a basal–bolus regimen is; introduce carbohydrate awareness using food models; body weight and HbA <sub>1c</sub> level data are collected; discuss blood glucose monitoring; participants are provided with a BBC Group manual and carbohydrate reference book.
2	Discuss participants' experiences since completion of session 1; recap the basal–bolus regimen; discuss the differences between soluble and analogue insulins; discuss using extra doses for snacks; inform participants that the initial basal dose will be calculated for them; discuss blood glucose monitoring and dose adjustment; recap carbohydrate awareness using food models; assist participants in calculating the insulin requirement per 10 g of carbohydrate; group work looking at individual meals and calculating insulin doses; distribution of insulin, GP letters.
3	Discuss participants' experiences since completion of session 2; group problem solving using individual examples or prepared case studies; recap dose adjustment information; further detail on hypoglycaemic events, their management and rebound hyperglycaemia; discuss sick-day rules; summary, ensuring all questions have been answered; provide blood test forms for an HbA <sub>1c</sub> level check to be conducted 2 weeks prior to session 4.
4	Welcome back the group; participants weighed; complete PAID and WHO-5 questionnaires; look at participants' original goals to assess whether they feel they have achieved them; group discussion around what is going well and what they are struggling with; group problem-solving; ensure all questions are answered through group participation; completion of course evaluation form.

PAID = Problem Areas In Diabetes questionnaire; WHO-5 = World Health Organization's 5-item Well-being Index.

when people are actively involved in negotiating, agreeing to, and owning, their goals. Furthermore, success in solving identified problems promotes self-efficacy (Bodenheimer et al, 2002). When conducting BBC Group sessions, facilitators attempt to promote self-efficacy among the participants.

At the start of the first session, participants share any frustrations they might have with their current insulin regimen, and identify what they hope to achieve by changing to a basal–bolus insulin regimen. Reasons given by some participants for wanting to change their insulin regimen are shown in *Box 2*.

Once the reasons behind the move to a basal–bolus insulin regimen have been established, the facilitator assists participants in setting specific and realistic goals.

Each participant's body weight is recorded, and facilitators ensure that all participants have had their HbA<sub>1c</sub> level measured within the preceding 2–3 months. Participants are asked to complete two questionnaires: the Problem Areas In Diabetes (PAID) questionnaire (Welch et al, 1997), and the World Health Organization's (WHO's) 5-item Well-being Index (WHO-5; WHO, 1998). The PAID score provides a measure of how an individual is affected on a day-to-day basis by their diabetes, using a Likert-type scale (higher scores being suggestive of diabetes "burn-out"). The WHO-5 assesses an individual's quality of life (higher scores being indicative of a higher quality of life). The information regarding frustrations, goals, HbA<sub>1c</sub>, body weight and PAID and WHO-5 scores is recorded on a spreadsheet, and participants are given a copy of their own data for reference.

At the end of the programme (session four), PAID questionnaire, WHO-5, body weight and HbA<sub>1c</sub> values are collected for comparison with the baseline data. Participants are asked to revisit their original goals during the fourth session, and assess how close they feel they are to achieving them. To quantify this process, an "achievement line" feedback form (a Likert-type scale with "not achieved" at 0 and "goal

achieved" at 10) was introduced. Participants are asked to complete an achievement line for each goal set during the first session.

### Results

Between January 2006 and June 2008, 134 people with diabetes were referred to the BBC Group programme, of whom 67 completed all four of the sessions. Seven people failed to attend the first session, and so subsequent sessions were cancelled. Seventeen people decided not to convert to a basal–bolus insulin regimen after attending the first session. Four people failed to attend the third session and 14 people failed to attend the fourth session. One person died prior to completing the fourth session. At the time of writing, 24 people were enrolled but had not yet completed the programme. The data presented relate only to the 67 people who completed the programme.

#### Glycaemic control

Although improving glycaemic control was not the primary goal for 40% (27/67) of participants, 69% (46/67) of participants improved their HbA<sub>1c</sub> level during the course of the programme. Mean HbA<sub>1c</sub> at commencement of the programme was 9.2% (standard deviation [SD]±1.5%, range 6.1–14.1%). On completion of the programme, mean HbA<sub>1c</sub> had dropped to 8.6% (SD±1.6%, range 5.9–13.7%). The mean improvement in HbA<sub>1c</sub> was 0.6% (SD±1.2%). This improvement was statistically significant ( $P=0.0001$ ). Data are currently not available on whether this improvement has been maintained post-completion of the programme.

#### Weight change

Of the 67 participants who completed the programme, body weight data were missing for three individuals. For the remaining 64 people, the mean change in body weight was a statistically significant increase of 0.9 kg ( $P=0.0349$ ). Thirty-seven people gained weight, 24 people lost weight and three people's body weight was unchanged.

**Box 2. Reasons given by some participants in the Basal–Bolus Conversion Group programme for wanting to convert to a basal–bolus insulin regimen.**

"To lower my blood glucose levels."

"To reduce the number of hypoglycaemic events that I am having."

"To enable me to eat when I want to, rather than when I have to, as I am trying to lose weight."

**Box 3. Post-completion feedback from participants in the Basal–Bolus Conversion Group programme.**

“Before I attended the group I would have said that I preferred individual appointments, but now I feel I have learned more from a group situation.”

“I could not have changed without the support of the group”

“It has been good to share experiences.”

“Listening to other people’s experiences has helped greatly, as has hearing other people’s problems and views.”

It is important not to assume that weight gain is a wholly negative outcome in this context as it may be attributable to the intensification of insulin therapy (Nathan et al, 2006), and therefore associated with improved glycaemic control. In this study, glycaemic control was improved for all but eight of the 37 people who gained weight (78%).

#### Questionnaire responses

The PAID questionnaire and the WHO-5 were introduced to the BBC Group programme in June 2008. Complete questionnaire data are available for 47 participants.

Prior to commencement of the programme, the mean PAID score was 28.0 (SD±13.5, range 1–64), out of a possible 80. On completion of the programme, the mean PAID score was 13.0 (SD±10.4, range 0–37). The mean improvement was 14.0 points (SD±13.1). Because of the overall variance, this improvement was not statistically significant. However, among those who completed the questionnaire, 90% improved their PAID score by programme end, suggesting that their diabetes had become less of a burden after conversion to a basal–bolus insulin regimen and BBC Group attendance.

Results of the WHO-5 also showed an improvement in wellbeing in 68% of BBC Group participants. The average WHO-5 score at commencement of the programme was 13.0 (SD±4.9, range 5.0–25.0), out of a possible 25.0, which improved to 15.0 (SD±4.9, range 5.0–25.0) by programme end. The mean WHO-5 score improvement (2.0, SD±4.7) was statistically significant ( $P=0.007$ ). Only one participant demonstrated a deterioration in both measures.

#### Achievement of goals

Unfortunately, as the achievement line feedback form was only introduced in June 2008, the data have not yet been collated for analysis. However, a preliminary review of the forms indicates that the majority of participants felt they had achieved the goals they set during the first session. This appeared to be particularly true for those

who had aimed to achieve more flexibility in their insulin regimen, and those who aimed to lose weight.

#### Evaluation

For the healthcare professionals involved in the development and review of this programme, the results have been extremely encouraging. The team identified the following strengths of the programme:

- Structured delivery of patient education.
- Consistent information.
- Dietitian input and carbohydrate counting for all participants.
- Time efficiency.
- Regular healthcare professional contact.
- BBC Groups are a source of audit data for measurement of outcomes.

Participants were asked to evaluate the programme at the final meeting of their BBC Group. The feedback has not yet been collated, but anecdotally the responses have been positive, with several people who were initially reluctant to attend group education sessions becoming advocates of the programme. Some comments are shown in *Box 3*.

Unfortunately, with the data available, it was not possible to determine whether the reduction in diabetes burden, improvement in wellbeing and improvement in glycaemic control relate to the commencement of a basal–bolus insulin regimen or to the support and information people received from attendance of the BBC Groups, or a combination of the two. Evidence from controlled, clinical trials suggest that programmes teaching self-management skills are more effective at improving clinical outcomes than information-only patient education (Bodenheimer et al, 2002). However, according to Anderson and Funnell (2005), when concerned people interact with skilled educators using almost any theory or method, there are positive outcomes. The current authors suggest that the achievements seen are the result of a combination of change in insulin regimen and the education and support received as part of the programme.

Page points

1. The Basal–Bolus Conversion Groups (BBC Groups) have a patient-centred philosophy, and provide a detailed curriculum.
2. There has been a consistent demand for the BBC Group programme since its commencement and it is hoped that the service can be made available directly to people with diabetes being treated in primary care.
3. Participants have been assisted to achieve their goals, improve their glycaemic control, reduce the burden of living with diabetes and improve their general wellbeing as part of the BBC Group programme.

Conclusion

A joint DH, National Diabetes Support Team and Diabetes UK (2006) report on structured patient education for people with diabetes identified five key criteria that should be met by education programmes to fulfil NICE requirements (NICE, 2003):

- A patient-centred philosophy.
- A structured curriculum.
- Trained educators.
- Quality assured.
- Auditable.

The authors' diabetes centre is striving to achieve these criteria for all structured education programmes offered. The BBC Groups have a patient-centred philosophy, and a detailed curriculum. More DSNs and dietitians are currently being trained to facilitate the groups, and the programme will be quality-assured internally.

There has been a consistent demand for places on the BBC Groups since the programme's commencement. In the future, it is hoped that the service can be made available directly to people with diabetes being treated in primary care. A review is planned to determine whether the improvements in biomedical outcomes are maintained beyond the conclusion of the programme.

The BBC Group programme has benefited people with diabetes converting to a basal–bolus insulin regimen. Participants have been assisted to achieve their diabetes-related goals, improve their glycaemic control, reduce the burden of living with diabetes

and improve their general wellbeing as part of this programme that fulfils the NICE requirements for structured education. ■

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