ORIGINAL ARTICLE

A pilot study of motivational interviewing in adolescents with diabetes

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Aims: To obtain preliminary data on the impact of motivational interviewing, a counselling approach to behaviour change, on glycaemic control, wellbeing, and self-care of adolescents with diabetes.
Methods: Twenty two patients aged 14–18 years participated in motivational interviewing sessions during a six month intervention. The effects of the intervention on HbA1c and a range of psychological factors were assessed.
Results: Mean HbA1c decreased from 10.8% to 9.7% during the study and remained significantly lower after the end of the study. Fear of hypoglycaemia was reduced and diabetes was perceived as easier to live with. There were no other significant changes in the psychological measures. By contrast no reduction in HbA1c values was observed in a comparison group who did not receive the motivational interviewing intervention.
Conclusion: The findings of this pilot study indicate that motivational interviewing may be a useful intervention in helping adolescents improve their glycaemic control. A larger, longer term randomised controlled study is indicated to clarify the mechanisms and extent of these benefits.

Adolescence is a time of increasing independence. However, attempts to emancipate from one's parents and establish important bonds with peers may prove difficult while coping with a diabetes treatment regimen.[1] As an age group, adolescents have been found to be the least likely to perform adequate self-care.[2] Puberty, which usually coincides with adolescence, is associated with increased insulin resistance, making it increasingly difficult to obtain good blood glucose control.[3] Although it is recognised that improved glycaemic control reduces the risk of microvascular complications,[4] there is little clear guidance on effective, behavioural interventions which enhance self-care.

Motivational interviewing[5] is a counselling approach, originally developed in the alcohol addiction field, which aims to help patients with behaviour change. The style of questioning is non-confrontational and the method has a practical focus, using the techniques of problem solving and goal setting from cognitive-behavioural approaches.[6] The patient is encouraged to identify aspects of their behaviour related to their condition that they would like to change and to articulate the benefits and difficulties of making that change. The clinician's role is to facilitate this process, help the patient think of ways to overcome the difficulties, and set realistic targets for change in their behaviour.

Previous randomised controlled trials of motivational interviewing, primarily in the alcohol addiction field, have shown that motivational interviewing can yield positive outcomes in a variety of clinical settings,[7] and motivational interviewing has been used in recent years within adult diabetes services.[8 9] In a study with women with type 2 diabetes,[9] the addition of three sessions of motivational interviewing to a standardised obesity intervention enhanced adherence to the programme and improved glucose control.

While transferring an approach from adult to paediatric care is not always appropriate, in motivational interviewing the methodology is consistent with the developmental stage of adolescence. The patient is in charge of change, selecting their own goals and the process by which they are achieved, reflecting the adolescents' emerging independence in self-care.

Given the problems often associated with teenage diabetes and the lack of practical interventions to enhance self-care, this pilot study aims to provide preliminary data on the impact of motivational interviewing on the wellbeing and self-care of adolescents with diabetes.

RESEARCH DESIGN AND METHODS

Participant selection

Patients were invited to take part in the study if they were aged between 14 and 18 years and had been diagnosed with diabetes at least 12 months previously. Patients were excluded from the study if they were subject to a care order or receiving other intervention from social services, if they had learning disabilities, were undergoing psychiatric treatment, or had other serious medical conditions such as cystic fibrosis.

Phase one

Potential participants and their parent(s)/guardian(s) were sent details of the study. Patients also received a copy of the Diabetes Readiness to Change Questionnaire. Designed specifically for this study, this questionnaire was based on the Transtheoretical Stages of Change Model.[10] This model postulates that the cessation of high risk behaviours such as smoking, and acquiring behaviours with a benefit to health such as exercise, involves the progression through five stages of change. These stages are often described as degrees of "readiness to change". Those patients at the "pre-contemplation" stage are giving no thought to change whereas at "contemplation" they are considering making change at some point in the future. Those at the "preparation" stage are making plans for change soon. In the "action" stage the patient is in the process of making changes, and in the "maintenance" stage they are continuing to implement changes already made. The Diabetes Readiness to Change Questionnaire assesses individuals' stage of readiness to change in relation to eight aspects of diabetes self-care, including blood glucose monitoring, diet, and exercise. A parents' version of the questionnaire, looking at their view of their child's readiness to change, was also sent out.

Phase two

Respondents were divided into one of three groups based on their scores on the Readiness to Change Questionnaire. Pre-contemplators' responses indicated that they were not ready to make any changes to their diabetes self-care.

Maintainers' responses indicated that they were maintaining their diabetes self-care in line with the recommendations of the diabetes team. Those respondents whose scores put them in these two groups were excluded from the study. The third group, including those at contemplation, preparation, and action stages, were classified as contemplators; those in this group were invited to participate in the intervention.

Intervention

Researcher training

The same researcher (VS) met with all participants. The initial training in motivational interviewing took place over a three month period using a combination of workshop, training videos,[11] role play, and individual supervision. The weekly supervision, using audiotapes of the sessions, continued throughout the intervention. Consideration was given to the need to adapt motivational interviewing for teenagers, but no specific changes were felt to be necessary.

Structure

Each participant was responsible for deciding the location and frequency of appointments, as well as the presence of others, such as parents or partners during the sessions. Appointments continued until the participant expressed a wish to discontinue or until the six month intervention phase ended, whichever came first.

Content of sessions

The motivational interviewing sessions included:

- *Awareness building*. In motivational interviewing a central activity for the clinician is to help the patient articulate their simultaneously held but conflicting beliefs about behaviour change. In making decisions about changing behaviour, individuals weigh up the benefits of making the change against the personal costs which may be social, emotional, or financial. Their ambivalence about making that change reflects the balance of those benefits and costs. For example, a young person with diabetes who has high blood sugar concentrations may recognise that it would benefit their health if they stopped eating sweets. However, they may also believe that doing this would make them feel different to their friends, leave them vulnerable to teasing, and make them feel restricted. There will be times, possibly in clinic or when they feel unwell, that they might consider that the benefits of change outweigh the disadvantages and they are more ready to contemplate change. However, when they are with their friends, the disadvantages of making the change have more impact on their behaviour. In a motivational interviewing session, through the use of reflective listening[12] and questioning the clinician aims to elicit these costs and benefits and increase the patient's awareness of them. They may also integrate objective assessments such as blood tests into the discussion.
- *Alternatives*. Once the patient is more aware of the costs and benefits of their behaviour, alternatives to the current behaviours are considered (for example, not going to the sweet shop, making a different choice of snack, or telling friends they are not eating sweets).
- *Problem solving*. Having identified alternative behaviours, the costs and benefits of the different options are discussed (for example, not going to the shop would mean the patient would not be tempted by sweets, but the cost would be that they would feel isolated from their friends).
- *Making choices*. The selection of an alternative behaviour to implement rests with the patient as motivation is enhanced by the perception that a course of action has been chosen without significant external influence.[13]
- *Goal-setting*. Once the alternative behaviour has been chosen, the clinician and patient set a goal that is realistic and achievable in the time between appointments (for example, over the following four weeks to go to the shop after school three days out of five and buy just one item).
- *Avoidance of confrontation*. One of the central tenets of motivational interviewing is avoidance of confrontation, to reduce resistance and argumentation. Instead the style is eliciting, using open ended questions to encourage participants to articulate their concerns and goals.

A more comprehensive review of the techniques of motivational interviewing can be found elsewhere.[5]

Measures

Prior to intervention

During the first visit a series of self-administered questionnaires were completed. These were all standardised, quantitative measures of wellbeing (Wellbeing Questionnaire[14]), diabetes knowledge (Diabetes Knowledge Scale A[15]), self-care behaviour (Summary of Diabetes Self-care Activities[16]), participants' personal models of diabetes (Personal Models of Diabetes Questionnaire[17]), family process (Family Adaptability and Cohesion Evaluation Scales[19]), and management of diabetes in the family (Diabetes Family Behaviour Scale[18]). The family measures were also completed by participants' parent(s)/guardian(s).

Post-intervention

During their final appointment participants completed the same measures as they had done initially and a copy of the Post-Intervention Satisfaction Questionnaire was left, to be returned by post once completed. This measure was developed to assess the participants' experience of the intervention, including the number of positive and negative changes made to their self-care regimen.

Parent(s)/guardian(s) completed copies of the Parental Readiness to Change Questionnaire, the Diabetes Family Behaviour Scale, and Family Adaptability and Cohesion Scale.

HbA1c measurement

Data relating to serum HbA1c concentrations were obtained from routine clinic measurements. Within the clinic guidelines, the patient would be seen every three months and HbA1c measured. No additional measures of glycaemic control were taken for this pilot study.

The HbA1c data were analysed for three time periods: before, during, and after the intervention. As HbA1c measures glycaemic control over the previous eight weeks, the three time periods of the study needed to be demarcated by two eight week "washout" periods. Therefore the three time periods were; (1) the 12 months prior to the initial contact regarding the study ("before"); (2) from eight weeks after the start of the intervention until the end of the intervention phase ("during"); and (3) between eight weeks and six months after the end of the intervention phase ("after"). Using the clinic data, mean serum HbA1c concentrations for each participant were calculated for these three time periods. The number of measurements within each of the time periods varied between participants because of individual differences in the length of the intervention and clinic attendance.

Although the study design did not include a control group there was a group of young people who were contacted in the initial stages of the study but who did not participate and whose HbA1c results were available. This comparison group of 25 patients was comprised of those who decided not to take part (n = 11), those who initially agreed to participate but did not arrange any visits (n = 4), and those who were classified as "maintainers" and were therefore excluded (n = 10).

Data analysis

The questionnaires produced ordinal data, and given the relatively small number of participants, the data were analysed

Table 1 Mean HbA1c results before, during, and after the intervention period for the intervention and comparison groups

	Mean HbA1c results								
	Intervention group						Comparison group		
	Whole group			Subgroup with complete data set					
Time period	Mean	SE	n	Mean	SE	n	Mean	SE	n
Before	10.8	0.38	22	10.9	0.51	11	10.1	0.28	25
During	9.7*	0.48	11	9.7*	0.48	11	9.9	0.29	20
After	10.0*	0.45	17	9.9*	0.42	11	9.9	0.35	8

*p<0.05 compared with mean before the intervention.

using non-parametric statistical tests, the Wilcoxon signed rank test, and Spearman rank correlations. The HbA1c results were analysed using *t* tests.

RESULTS

The patients

Of the 52 patients who were eligible for the study, 50 completed the Diabetes Readiness to Change Questionnaire; 40 were classified as "contemplators" and invited to participate in the intervention. Of those 40, 25 agreed to take part in the study. Three participants did not complete the post-intervention questionnaires so their data have not been included in the analyses. The age range of participants was 14.0–18.6 years (mean age 15.8 years); they had been diagnosed with diabetes for a mean of 5.1 years.

The number of visits arranged with the researcher ranged between one and nine with a mean of 4.7. Fifteen of the 22 participants chose to remain in the study for the duration of the intervention (six months); the mean intervention period was 18.6 weeks.

Changes in serum HbA1c concentrations

There was a significant reduction in mean serum HbA1c concentrations both during and after the intervention period (table 1). There were 11 participants whose HbA1c was obtained during the intervention. Mean HbA1c was 9.7%, a reduction of 1.1% from the mean HbA1c at the start of the study. There were 17 participants whose HbA1c was available in the follow up period after the intervention was completed. The average follow up time (from the end of intervention to HbA1c being obtained) was 13.6 weeks; mean HbA1c was 10.0%, a reduction of 0.8% from the start of the study. Because of the reliance on clinic attendance for HbA1c data, there were only 11 participants for whom there were measurements during each of the three time periods. Separate analysis of this subgroup showed a similarly significant reduction in HbA1c (table 1) and no significant differences in HbA1c concentrations between those with data for three time periods and those with missing data.

By contrast there was no significant change in the mean HbA1c of the comparison group who did not participate in motivational interviewing over the duration of the study (table 1).

Psychosocial measures

On the Personal Models of Diabetes Questionnaire there was a significant reduction in fear of hypoglycaemia score ($p = 0.03$) and the living with diabetes score, indicating that diabetes was easier to live with ($p = 0.03$). There were no significant changes on the psychosocial measures of wellbeing, diabetes self-care, family behaviours, family process, or diabetes knowledge.

On the Diabetes Readiness to Change Questionnaire, 39% of scores had changed. The median number of changes across the eight behaviours for each individual was 3 (range 1–5), showing that their scores had changed on three of the eight activities. Of the changes in score, 64% indicate a movement towards action (that is, the score suggested that the person had become more active in their pursuit of change). Twenty seven per cent of score changes indicated a reduced readiness to change; 9% were accounted for by those patients who indicated at the start of the study that they did not smoke but by the end of the study were admitting to smoking but were not ready to consider change in this behaviour.

Of the 22 participants, 19 (86%) returned the Post-Intervention Satisfaction Questionnaire. On a seven point scale, 15 (79%) rated the helpfulness of the visits at 6 or 7. Most respondents ($n = 17$) reported having made one or more positive changes (median 2) and all except one were pleased to have taken part in the study. The fact that the researcher was separate from the clinic was seen as being useful by 13 of the respondents.

DISCUSSION

In summary, the main findings of this pilot study were that the mean serum HbA1c concentration was reduced during and after the intervention. There was a significant reduction in the fear of hypoglycaemia scores and participants reported that their diabetes had become easier to live with. The majority of participants reported having made at least one positive self-care behaviour change during the intervention period as measured by the Post-Intervention Satisfaction Questionnaire. This was supported by the Readiness to Change Questionnaire results, but the changes were not identified by the Summary of Diabetes Self-Care Activities Questionnaire.

The reduction in serum HbA1c concentration results is clearly an important finding of the study. However, this finding should be interpreted with care. This pilot study relates to a relatively small sample, and although the sample size requirements of this study were met, there were missing data because of failure of participants to attend clinic. It is not clear whether any changes can be attributed to the method of motivational interviewing rather than the placebo effect of regular contact with the researcher or simply the passage of time. While there was no randomised control group, the HbA1c data of the comparison group did not show any significant changes over time, and their initial HbA1c values were not significantly lower than the intervention group.

There were two main inconsistencies in the results: the reduction in serum HbA1c concentrations when most of the psychological measures suggested little had changed; and the contrast between reported improvements in self-care and the results of the Summary of Diabetes Self-Care Activities. The link between health behaviour and health status is known to be complex. Changes in self-care are often seen as the key influence on serum HbA1c concentrations, but it has been established in some studies[20] that improved self-care per se does not necessarily lead to better glycaemic control. Numerous other factors are thought to mediate the relationship,

including physiological changes, psychological states, the treatment regimen, social support, and stress.

It may well be the case that there were no significant changes in self-care or, given the sample size of this pilot study, there may have been inadequate power to show the behavioural changes. However, it is also possible that the Summary of Diabetes Self-Care Activities may not have been sensitive enough to detect any behavioural changes that took place. For example, changes that lasted up to five months would not be picked up by this measure which looks at behaviour in the previous seven days. Difficulties in interpreting the study data suggest that a more intensive assessment of change throughout the intervention would have been preferable. In addition behavioural markers of self-care behaviours could have been included. However, it should be noted that these measures, such as food diaries and 24 hour recall interviews, are also prone to bias.

The significant changes indicating that diabetes had become easier to live with and a reduction in fear of hypoglycaemia suggest that the intervention may have had a positive impact on the emotional aspects of having diabetes. This is supported by the results of the Post-Intervention Satisfaction Questionnaire. Respondents described how they had come to think about their diabetes more positively over the duration of the study. They also welcomed the opportunity to discuss how diabetes fitted into all aspects of their lifestyle.

In conclusion, despite the limitations of this pilot study, the results suggest that motivational interviewing has the potential to improve glycaemic control in adolescents with diabetes. This merits further investigation using a larger, longer term, randomised controlled study design, with more detailed monitoring to clarify the mechanisms by which motivational interviewing may produce improvements and whether such improvements can be maintained in the longer term.

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