Reprint

Discovering diabetes: achieving target blood glucose control through a behavioural approach to insulin and food self-management

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Abstract

Physiological approaches to diabetes therapy can make excellent control possible while protecting patients' lifestyle choices. This paper describes a diabetes programme that employs a teaching method which promotes patient-centred values while pursuing optimal metabolic control. Discovery learning is an experience and inquiry-based method of instruction. It is used in the programme described herein to guide individuals with both type 1 and type 2 diabetes to make informed self-care decisions such as 'writing their own diets', and adjusting insulin doses, if appropriate, based on their blood glucose results and experience.

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Key words: diabetes education, diabetes self-care, empowerment, insulin self-management, type 1 diabetes, type 2 diabetes.

Introduction

Educational theorist and innovator Seymour Papert could have been talking about diabetes education when he said "*You can't teach people everything they need to know. The best you can do is position them where they can find what they need to know when they need to know it.*" Discovery learning takes place when the learner gains insight, 'discovers' concepts or devises strategies through experience, inquiry, and reflection. This paper describes how discovery learning is applied in a comprehensive diabetes self-management programme called Discovering Diabetes™.[1]

Discovery learning has appeared as part of the educational theories of many philosophers including Rousseau, Pestalozzi and Dewey.[2] It was Dewey who observed that "*There is an intimate and necessary relation between the processes of actual experience and education.*" Though no direct research of its application in diabetes or health behaviour has been conducted, discovery learning has been an object of research in the academic subject of education since the early 1960s. Through its experiential and inquiry components, discovery learning is related to both motivational interviewing[3] and the patient empowerment counselling model described by Anderson and Funnell *et al.*,[4] both of the latter approaches being more familiar in the health education arena.

Table 1. Content outline of class series

Week 1
- Understanding the Team Approach: Who's In Charge?
- Acceptance and Feelings About Diabetes
- Dispelling the Diabetes Myths
- Understanding Diabetes: An Overview by Type
- Diabetes Pills and Insulin – Finding the Right Type for You
- Monitoring Blood Sugar: Your Tool of Discovery
- "Don't change a thing!" – the Discovery Learning Process

Week 2
- Continuing the Discovery – Learning from Last Week's Records
- Healthy Eating for Everyone
- How Different Foods Effect Blood Sugar
- "Carb Budget" or "Carb Counting" for BG control
- Reading the Food Label
- More Discovery Homework

Week 3
- Continuing the Discovery – Learning from Last Week's Records
- More Healthy Eating – Fats and Fibre
- Eating Out and Special Occasions
- Decreasing Your Risk for Heart Disease
- Exercise: Benefits, Precautions and Getting Started
- Low Blood Sugars: What They Mean and What To Do
- More Discovery Homework

Week 4
- Continuing the Discovery – Learning from Last Week's Records
- High Blood Sugar and Sick Days
- Over-the-counter Medicines
- Preventing Foot Problems and Other Long-range Concerns
- Securing Ongoing Support
- Keeping Diabetes in Control: What You Can Do
- Setting Goals for the Future

Programme description

The Discovering Diabetes™ Program uses discovery learning to help participants develop personally relevant self-management

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Table 2. Discovering Diabetes Record Keeping Form, Partial

Date	Fasting BG	Meds taken	Meal Foods and portions	After meal BG	Meds taken	Before meal BG	Meal Foods and portions	After meal BG

The actual patient record keeping form is 8.5" X 14" and accommodates 1 full week of food and blood sugar records, with space for food records, medication doses, nocturnal tests and exercise records.

Adapted from B Brackenridge and K Swenson, 2003 pp 78–79[5]

skills, such as the management of food choices and insulin doses, when appropriate, to control blood glucose. The primary component of the intervention is a four-part series of small-group classes (see table 1) delivered over a one month period and followed by a minimum of two months of individual follow-up. Class groups are limited to 10 persons with diabetes and are facilitated by two diabetes educators. Participants are encouraged to bring a 'significant other' to class with them. Classes are separated by type of diabetes. Classes were selected as the primary intervention format for the programme for two main reasons: 1) to add the benefits of group interaction and support to the learning environment, and 2) to increase the efficiency and cost effectiveness of service delivery.

The four two-hour outpatient classes are scheduled at one-week intervals, rather than on consecutive days. This allows participants sufficient time between classes to gather personal data and to experiment with what they have learnt in class. Although programmes with similar goals have been offered as residential programmes, we believe that it is important for people to learn how to manage their diabetes in the 'real world', dealing with the actual challenges and problems their own lives present. Food and blood sugar records are reviewed individually and in the group at each class meeting with the primary goal of helping patients identify effective strategies to control blood glucose while eating their normal foods and living their usual lives. The same process is used for all participants, regardless of type of diabetes and form of treatment, but obviously patients' options for dealing with problems vary with their specific treatment tools; e.g., only patients using bolus insulin have the option of adjusting insulin doses to match changing food intake.

At the first class session, participants receive a blank record-keeping form with spaces for one week of records. A section of the form is shown in table 2: Discovering Diabetes Record Keeping Form, Partial. Humour is used in exploring common diet-related myths[5] and food-related guilt feelings. The central idea communicated is that if people learn to manage their blood glucose when eating the foods they normally eat, there will be no diet to 'go off of', resulting in more consistent and lasting blood glucose control.

'Don't change a thing'

The distinct types of information provided by pre- and post-meal blood glucose values are explained; i.e., pre-meal blood glucose values reflect the adequacy of background insulin and post-meal values reveal the match of food with available meal-related insulin, whether endogenous or injected. Target values for pre- and post-meal blood glucose values are presented. Then people are encouraged to go out and 'live' their diabetes for the coming week, changing nothing about their usual schedules, food choices, or other practices. They are asked to use the record keeping form to log as much information regarding food, medicines, and blood glucose values as they feel will be helpful. Undoubtedly, most individuals alter food choices and portions to some degree in spite of the request to eat normally. The process of focusing on food intake and recording the results is highly likely to impact actual choices. However, even if participants are eating somewhat differently than usual, the programme's goals have been met if they feel free to bring in accurate information. A great learning opportunity is lost if worries about being criticised or judged for eating certain foods result in participants not sharing actual or complete information.

This record keeping and review activity is repeated each week of the class series. The intention is to focus learning around each participant's personal experience, eliminating as much theoretical or curriculum-defined detail as possible. For example, participants learn the carbohydrate values of the foods on their own food records, not of foods on a prepared list.

During the self-care education programme, educators communicate closely with referring providers to promote optimal pharmaceutical management and timely titration of doses to achieve maximum results. Communication, in the form of brief faxed notes, inform the provider of changes in patient status or request agreement with educator-recommended changes in therapeutic agents or doses. In addition to impacting clinical control, this critical programme component promotes patient confidence and motivation by assuring that they experience a measurable benefit for the effort they exert during the class programme.

Table 3. Sample questions used to review records

- Do you have any questions about what you observed this week?
- Did anything surprise you?
- What foods/meals seem to work well for you?
- What foods/meals concern you?
- Have you come to any conclusions?
- What do you think might help that?
- How did that (insulin) dose work for you?
- Have you made any changes because of what you saw? Tell me about it

A question-based counselling approach

Educators use questions as necessary to engage people in the discovery process, reflect on what they have observed and develop personal insights and plans. The focus on questioning also helps the educator limit directive or didactic observations and advice. Examples of the types of questions used in reviewing food, medicine and blood sugar records are shown in table 3.

Blood glucose monitoring as the client's tool

The effectiveness of the discovery learning approach depends on having adequate pre- and post-meal blood glucose data to provide objective feedback on factors such as insulin doses, exercise events, and food choices. To encourage sufficient testing, blood testing is presented as the patient's tool, not the physician's or educator's. The power of the objective information obtained from testing to help improve control while protecting personal choice is emphasised. Judgemental terms such as 'good' or 'bad' blood sugars are avoided. The term blood glucose 'targets', instead of 'goals', is used together with the observation that no one hits the target all the time with today's diabetes treatment tools. Participants are encouraged to decide for themselves when to test, based on what they want to know. No judgement is placed upon participants who return to class with few blood glucose values. All effort is acknowledged positively, not for the glucose value itself but for the effort made to obtain it. An atmosphere of curiosity, acceptance, and experimentation is fostered.

The goal of these techniques is to help participants learn to personally value blood testing. Educators position blood test results as helpful data, rather than as measures that a provider might use to judge and, perhaps, criticise self-care efforts. In our experience, the combination of these procedures and attitudes promotes sufficient testing to fuel the discovery learning process. Table 4 shows the self-reported frequency of blood glucose testing at programme entry, during the class series and at two years post-programme for 150 randomly selected programme participants.

Nutrition

Healthy eating principles are presented in the programme. In addition, principles of carbohydrate management are taught. The specific carbohydrate management approach is dictated by the individual's pharmacologic therapy. Some individuals learn to 'count carbs' to set mealtime boluses of rapid-acting insulin. Participants on other forms of therapy learn to derive a 'carb budget' based on their food and blood sugar results. Options for correcting out of range blood glucose patterns are discussed by the educators with individual participants at the beginning of each class. Participants use their own records to examine personal food choices relative to overall health concerns.

Table 4. Self-reported frequency of blood glucose monitoring

Diabetes	At programme entry		Highest level during class series		2 years post-programme	
	N	Mean tests/wk	N	Mean tests/wk	N	Mean tests/wk
Type 1	18	17.6±6.3 Range 2–49	16	41.4±3.9 Range 19–48	14	31.6±3.4 Range 21–53
Type 2	132	4.3±2.4 Range 0–21	125	32.4±4.6 Range 14–39	119	18.9±3.9 Range 12–33
All	150	5.9±2.5 Range 0–49	141	33.4±3.8 Range 14–48	133	20.2±2.6 Range 12–53

Table 5. HbA_{1C} data

At programme entry			Three months after programme entry			22–26 months after programme entry		
N	Range	Mean	N	Range	Mean	N	Range	Mean
150	5–14.4%	9.3%	141	5.1–8.6%	6.2%	123	5–8.5%	6.6%

Observed outcomes

The Discovering Diabetes Program has been offered at two different sites in the metropolitan Phoenix, Arizona area, beginning in 1994. It was most recently delivered as a model programme at a free-standing outpatient diabetes centre with a referral base of 164 primary care providers. The programme completion rate during the four-year duration of the model programme exceeded 90%. In addition, the programme resulted in a significant reduction in mean HbA_{1C}. The effect was fairly stable over time with little ongoing follow-up. Table 5 details HbA_{1C} data at programme entry, and at three-months and two-years post for the same 150 randomly selected participants for whom blood glucose monitoring rates were described earlier.

Summary

The Discovering Diabetes Program differs from most US group format programmes in its primary reliance on the discovery learning approach. It is also distinguished by the active role that educators take in promoting timely optimisation of pharmaceutical

Key messages

- Each person with diabetes is the primary caregiver for their condition
- Patient self-management skills can be learned through experience, feedback and reflection
- The empowerment philosophy applies equally to the clinician and the patient. For the patient to take on an active ('empowered') role in care, the clinician must relinquish efforts to retain control over the patient's choices
- Blood glucose monitoring provides objective feedback
- Objective information can be used to make informed choices about optimal diabetes self-management
- For the patient to receive full benefit from his or her self-care efforts, clinicians must provide optimal pharmaceutical management

treatment. Although clinical outcomes look promising, this combination of a behavioural approach to education with team co-operation to optimise diabetes medications needs to be tested in other settings, with other patient populations and when delivered by different educators.

The tools and techniques of this programme are tangible and practical expressions of the principles of patient empowerment and relationship-centered care. They bridge the gap between believing in the patient's central role in care and expressing that belief through the design of care and education. Clinicians routinely gather objective outcome data to understand, inform and enhance their practice. Likewise, people with diabetes can benefit from gathering objective data regarding their self-care behaviours and developing in that way a personally acceptable and clinically effective strategy for living with their disease. That is the goal and process of discovery learning and of the Discovering Diabetes Program.

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