Review Article

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Review the Evidence for Structured Education in Diabetes Management

Sumon Rahman Chowdhury [1] , Sultana Ruma Alam [2], Rezaul Haider Chowdhury [3], Shangkar Barua [4]

1. Senior Medical Officer, Chittagong Diabetic General Hospital, Chittagong, Bangladesh

2. Associate Professor, Institute of Applied Health Sciences, Chittagong, Bangladesh

3. Consultant Internist, Chittagong Diabetic General Hospital, Chittagong, Bangladesh

4. Assistant Professor, Department of Endocrinology, Cox's Bazar Medical College, Cox's Bazar.

***Correspondence:**
Dr. Sumon Rahman Chowdhury
email: sumonrahman79@yahoo.com,
Cell: 01670393031

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Abstract

Structured Education is of detrimental importance for the management, counseling, and prevention of complications in diabetic patients. Different structured education programs exist that significantly improves the quality of life in diabetic patients as well as improves psychosocial outcomes by enhancing self-empowerment and self-motivation. Improvements have also been noted in bio-medical outcomes as a result of structured education most significantly in HbA1C, total cholesterol and frequency of hypoglycemia.

In order to ensure patient satisfaction and improve outcomes related to complications, it is very important to identify and support patients whose psychosocial situations and reactions to the diagnosis may affect their ability to adjust or take adequate responsibility for self-care early in the course of the disease.

In this review, we will discuss and highlight the evidence that support the benefits, limitations, and cost effectiveness of structured education in diabetes management.

Keywords:

Diabetes, Structured education, Management

Introduction

Structured education is at the forefront of diabetes management and prevention along with diet and exercise. Conventional diabetes management approaches involved just treating the blood glucose values with insulin or oral hypoglycemic agents, but structured education brings a new insight into diabetes management by adjusting the insulin doses with the recommended carbohydrate intake, achieving greater glycaemic status and patient satisfaction. Different structured education programs exist that significantly improves the quality of life in diabetic patients as well as improves psychosocial outcomes by enhancing self-empowerment and self- motivation. Improvements have also been noted in bio-medical outcomes as a result of structured education most significantly in HbA1C, total cholesterol and frequency of hypoglycemia.

In this review, we will discuss and highlight the evidence that support the benefits, limitations, and cost effectiveness of

structured education in diabetes management.

Search Strategy:

Available studies and abstracts were identified through Pub Med and Medline data bases (From 2002-2010) and Cochrane data bases. Key search terms were structured education and diabetes. All available studies and abstracts describing the relationship between structured education and diabetes management were included. The reference list of review articles was also searched.

Discussion:

Overview of The Types of Structured Education in Diabetes Management

- **Dose Adjustment for Normal Eating (DAFNE)**

DAFNE was the first structured education program for type1 diabetes patients combining dietary freedom with insulin adjustment.[1] Participants were enlisted to attend a 5-day immediate training course (immediate DAFNE) or attend "Delayed DAFNE" training after 6 months duration.[2] Bio-medical and psychosocial outcomes were measured most notably HbA1C, cardiovascular risk, self-reported hypoglycaemic awareness, diabetes impact on quality of life (ADDQoL), weight, severe hypoglycaemia frequency. The values were recorded prior to DAFNE and after 1 year.[2]

This study demonstrated that a structured training course (designed to maintain glucose control while enabling dietary freedom) teaching self-management skills to patients with type 1 diabetes was effective over the short term in a British healthcare setting. After 6 months the impact of diabetes on dietary freedom was significantly improved in immediate DAFNE patients compared with delayed DAFNE patients, as was the impact of diabetes on overall quality of life.

Skills training promoting dietary freedom improved quality of life and glycaemic control in people with type 1 diabetes without worsening severe hypoglycaemia or cardiovascular risk. This approach has the potential to enable more people to adopt intensive insulin treatment.

Patients can fit diabetes into their lives rather than their lives into diabetes improve quality of life and glycaemic control in the short term. The DAFNE approach has the potential to reduce the incidence of microvascular complications and thereby protect quality of life in the long term, as well as the short term[2].

Table 1: The table below outlines the 5-day DAFNE course timetable:

DAFNE Timetable

Monday	Tuesday	Wednesday	Thursday	Friday
09.15-09.45 Introduction 09.45-10.45 What is diabetes?	09.15-10.30 Discussion: Individual blood glucose levels	09.15-10.30 Group discussion: Glucose levels	09.15-10.30 Group discussion: Glucose levels	09.15-10.30 Group discussion: Glucose levels
10.45-11.00 Coffee	10.30-10.45 Coffee	10.30-10.45 Coffee	10.30-10.45 Coffee	10.30-10.45 Coffee
11.00-12.30 Nutrition 1 • Identify carbohydrates	10.45-12.30 All about insulin	10.45-12.30 Hypoglycaemia	10.45-12.30 Nutrition 4 • Alcohol • Eating out • Healthy eating / weight control	10.45-11.45 Sick day rules 11.45-12.30 Social aspects (Contraception and pregnancy - optional)
12.30-13.30 Lunch	12.30-13.30 Lunch	12.30-13.30 Lunch	12.30-13.30 Lunch	12.30-13.30 Lunch
13.30-15.00 Self monitoring	13.30-15.00 Nutrition 2 • Putting carbohydrate estimation into practice	13.30-15.00 Nutrition 3 • Food packaging • Recipes	13.30-15.00 Annual review and screening	13.30-14.30 Quiz 14.30-15.30 Evaluation and follow up arrangements
15.00-15.15 Coffee	15.00-15.15 Coffee	15.00-15.15 Coffee	15.00-15.15 Coffee	Close
15.15-17.00 New insulin regime and individual targets	15.15-16.15 DAFNE insulin adjustment 16.15-17.00 Discussion: Individual blood glucose levels	15.15-16.15 Managing physical activity 16.15-17.00 Discussion: Individual blood glucose levels	15.15-16.15 Questions for the Doctor 16.15-17.00 Discussion: Individual blood glucose levels	

- **Diabetes Education and Self-Management for On-going and Newly Diagnosed (DESMOND)**

DESMOND is an educational module specifically designed for type2 diabetes patients or those with pre-diabetes. Currently there are 4 educational modules available:

- For the newly diagnosed type2 diabetes patients.
- Foundation course for those with established diabetes.
- BME course delivered in Bengali, Urdu, Punjabi, and Gujarati.
- "Walking Away from Diabetes" course for patients with pre-diabetes.

It is a group activity design. Participants with or at increased risk of type2 diabetes are taught about the various food choices, medications, physical activity, given a thorough knowledge about diabetes and ways to implement practical skills that will assist them in managing their diabetes.

Bio-medical outcomes like HbA1C, BP, weight, lipid profiles; as well psycho-social factors like quality of life, smoking status, illness beliefs, depression and impact of diabetes contributing to the patient's emotional status were measured at baseline and the preceding 12 months.[3]

Individuals attending a diabetes education and self-management for ongoing and newly diagnosed (DESMOND) program in 12 Primary Care Trusts completed questionnaire booklets assessing illness beliefs and quality of life at baseline and 3-month follow-up, metabolic control being assessed through assay of HbA1c.

Data indicate the DESMOND program for individuals newly diagnosed with Type 2 diabetes changes key illness beliefs and that these changes predict quality of life and metabolic control at 3-month follow-up. Implicated on practice that Newly diagnosed individuals are open to attending self-management programs and, if the program is theoretically driven, can successfully engage with the true, serious nature of diabetes[3].

➢ X-PERT Program

The X-PERT program is a structured education module that involves patients to indulge in self-empowerment and self-discovery skills, helping them to manage their diabetes by making the appropriate changes in their lifestyle (diet and physical activity), understanding the complications of diabetes and ways to prevent them, getting an overview of the quantity and quality of carbohydrates and how to manage their weight and understanding balanced nutrition principles. The patients were selected for 6 two hourly group sessions of self- management education.[4]

Table 2: The table below outlines the X-PERT program: Other courses like the CASCADE, BERTIE, Insight, and Jigsaw etc. have also been designed to allow type1 diabetes patients to effectively self-manage their diabetes.

	The X-PERT Program
Topic	Description
Week 1: What is Diabetes?	Explore what happens to food when we eat it; self-monitoring of diabetes; diabetes treatments; feelings about living with diabetes. Dispel myths by using visual educational materials.
Week 2: Weight Management	Examine the 'balance of good health' model and use food models to distinguish between food containing protein, fat and carbohydrate. Inform about sensible eating whilst exploring barriers in doing so. Advise about the benefits of exercise and give practical examples including information about local exercise-on-prescription schemes.
Week 3: Carbohydrate Awareness	Perform a group task, developed to show the effect of quantity and quality of carbohydrate food on blood glucose levels. Use ping-pong ball models and laminated food pictures to dispel the myths surrounding glucose, sucrose and starch.
Week 4: Supermarket Tour	Address some common confusion surrounding dietary fat, sugar and food labelling. Encourage a diet that is enjoyable, variable and balanced whilst dispelling the concept of 'good' and 'bad' foods.
Week 5: Complications & Prevention	Discuss how to reduce the risk of developing longer-term complications through lifestyle changes, treatment and regular monitoring. Use visual educational aids to explore medical conditions in layman terms such as nephropathy, retinopathy, arteriosclerosis, neuropathy and blood pressure.
Week 6: Evaluation & Question time	Play "Living with diabetes", a board game to bring the X-PERT program to a close in a relaxed manner, reinforcing the main messages whilst encouraging participants to reflect on how much they have learnt.
Goal Setting: Last 20 minutes each week	The final 20–30 minutes each week involves the goal setting component of the empowerment model. Participants obtain and examine their health results, the implications of them and acceptable ranges. If participants make an informed decision to work on improving any of their health results, they work through the five step empowerment model. Psychosocial aspects of diabetes i.e. fitting diabetes into life rather than fitting life into living with diabetes. An important aspect of the empowerment model is to respect the decisions made by some of the participants not to goal-set.
Patient Manual	Resource manual given to participants at the beginning of the course. Background reading, health results and goal setting material added each week as appropriate.

Statistically significant improvements were shown in the X-PERT patients compared with the control patients for body weight, body mass index (BMI), waist circumference, total cholesterol, self-empowerment, diabetes knowledge, physical activity levels, foot care, fruit and vegetable intake, enjoyment of food and treatment satisfaction.

At 14 months to have led to improved glycaemic control, reduced total cholesterol level, body weight, BMI and waist circumference, reduced requirement for diabetes medication, increased consumption of fruit and vegetables, enjoyment of food, knowledge of diabetes, self-empowerment, self-management skills and treatment satisfaction[4].

Evidence for The Benefits of Structured Education in Diabetes Management

The DAFNE course resulted in significant improvements in HbA1C after 6 months in the immediate DAFNE as opposed to the delayed DAFNE (8.4%vs9.4%). Patients were encouraged for frequent blood glucose monitoring, achieved better satisfaction to the treatment modalities, quality of life was improved significantly, and patients adopted intensive insulin with more flexibility. There was no risk of cardiovascular disease or severe hypoglycaemia episodes in the context of increased dietary freedom.[2]

The X-PERT program improved biochemical parameters related to improved glycaemic status (~0.6% reduction in HbA1C), reductions in weight (~0.5 kg), total cholesterol (~0.3 mmol/l) and medication requirements (16%). There was an increased consumption of fruits and vegetables, enhancement of diabetes knowledge and self-empowerment and self-management skills after 14 months. It was also found to be cost-effective.[4]

The DESMOND program resulted in significant weight loss (~1.26kg weight reduction) along with smoking cessation and improved psychological well-being as depression was reduced and patients developed positive beliefs towards their illnesses after 12 months. The program was also cost-effective (£209 lifetime cost per person).[5]

Such a diversified model of structured education needs quality assessment and extensive resources to be effective.

The NICE have implemented the following quality standards for structured education in diabetes:

➢ Evidence based programs which suits the individual needs of the patient should be implemented. Specific aims must be set with appropriate learning objectives. Self-management of diabetes for the learner plus his/her family will

enhance the skills of the diabetic person.

- A structured curriculum program that is evidence-based, effective in resources and theory- driven should be implemented.
- Trained educators who are experienced and trained in the relevant educational theory appropriate to the age and needs of the learners should run these educational programs.
- Quality assured programs should be enforced and reviewed by trained, competent and independent assessors.
- Regular auditing of program outcomes should be done.[6]

Limitations of The Structured Education Program in Diabetes Management

- The DAFNE course resulted in only modest improvements in glycaemic status and most patients were above the target values (>7.5%).
- It was perceived to be an expensive course and requires the services of a qualified staff, teaching materials and regular audits.
- Patients on flexible insulin regimen, patients with disability and those with language barriers are not benefitted from the course.
- Most people are not equipped or lack the basic arithmetic knowledge for intensive insulin regimens with flexible diets.
- The program is not accessible to the general population due to limited centres.7

Conclusion

Structured education enhances the quality of life of diabetic patients by improving the patient's self-management and self-empowerment skills.

Patients have more freedom to make their own healthy food choices (more consumption of fruits and vegetables) and adjust their insulin doses accordingly. This improves the overall treatment.

Satisfaction and general outlook regarding diabetes management. The patients are less physician- dependent and more self-reliant. Depression is reduced as a result of positive attitude towards illness beliefs as well bio-medical parameters like HbA1C, weight, BMI, lipid profiles, episodes of severe hypoglycaemia and hypoglycaemic unawareness, acute and chronic complications are all significantly reduced. The need for diabetic medications and the treatment costs were reduced as a result of such interventions.

Such educational modules should be implemented into the regular diabetes care management services. Physicians and patients should be enrolled into the training programs with the help of government funding or third party (insurance companies) to ensure effective and patient centred management strategies to decrease the rate of diabetes complications and enhance psychoanalytical thinking of the patients. This can help patients better understand and manage the complications of diabetes more effectively.

Future Perspectives and the Role of the Clinician

- A clinician needs to show empathy and use a multi-disciplinary approach wherever possible.
- He/she should allow time for diagnosis and its associated complications to sink in.
- Focus on most crucial short-term aspects to begin with - such as avoiding hypos, measuring home BMs and avoiding ketoacidosis.
- Providing a contact number - understanding regarding disease, leaflet to read, patient support group, useful website address. More complex needs can be dealt with during follow up visit, once there is more acceptance of the diagnosis.

Competing Interests

The authors declared no competing interests regarding the publication of the paper

Authors Contributions

S.R.C. and S.R.A were involved in data collection and drafted the manuscript. R.H.C. conceived the study. S.R.C and S.R.A. wrote the manuscript with input from all authors. S.R.A., R.H.C. and
S.B. critically revised the final manuscript. All authors approved of the final manuscript for publication.

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