



Development of the web-based type 2 diabetes education programme: DIEP

E Heinrich,* NC Schaper, NK de Vries

Introduction

Education is an essential component of the care of patients with type 2 diabetes, and understanding the condition is a prerequisite for adequate self-management.^{1,2} Patient education is described as 'the process of providing the person with diabetes with the knowledge and skills needed to perform self-care, manage crises, and make lifestyle changes required to successfully manage this disease'.¹

The importance of education is acknowledged worldwide. Although national and international standards for diabetes education have been set,^{3,4} the content of education is very variable. Different healthcare providers (HCPs) use different materials, distributed by different organisations and companies. Materials are

Abstract

Background: Education is an essential part of diabetes care. However, in The Netherlands, no education programme was available for everyone at any time and adaptive to users' specific needs.

Aim: To describe the structured development and final content of a type 2 diabetes web-based education programme.

Methods: A web-based education programme – the Diabetes Interactive Education Programme (DIEP) – was developed using intervention mapping and involved collaboration between programme planners, Dutch diabetes organisations and potential users (patients and healthcare providers). DIEP incorporates information, multimedia and tools to support self-reflection, goal setting, problem solving and active patient participation.

Results: www.diep.info consists of seven chapters with basic and additional information, a dictionary, self-management checklists and a workbook for goal setting and preparation for consultations. The information included is mostly spoken text supported by headlines, images, video and patient experiences. Adoption, implementation and evaluation plans have been made. Outcomes of the process and effect evaluation will be reported in the future.

Conclusions: DIEP is a unique education programme, based on theory and planned development, which is supported by diabetes organisations. By using multimedia and incorporating different functionalities, DIEP attempts to meet the current practice requirements. DIEP aims to meet the needs of multiple, specific patient groups in the future, and has already been adapted for use in different countries (eg Belgium).

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Key words

Patient education; knowledge; self-management; type 2 diabetes; internet; intervention mapping; development

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mostly written leaflets that address specific topics (eg hypoglycaemia). However, to our knowledge, no programme within The Netherlands could be used by all HCPs and patients. Nothing could provide information and tools for self-management at individuals' convenience, adapted to their specific needs. Therefore, we aimed to develop a new education programme for patients recently diagnosed with type 2 diabetes. The programme is based on national guidelines, and was developed in close

co-operation with all partners in diabetes care.

During intervention development, careful planning and the use of theory-based strategies increases the probability of effectiveness, programme adoption and implementation.⁵ Intervention mapping (IM)⁶ provides programme developers with a framework for decision making. Accordingly, we conducted a needs assessment, formulated objectives, selected theory-based methods and practical strategies, developed the programme, formulated



Diabetes background	
Date:	
<input type="checkbox"/> What is diabetes? <input type="checkbox"/> Why me? <input type="checkbox"/> How do I know I have diabetes?	
[more specific info]	
<input type="checkbox"/> How does insulin work? <input type="checkbox"/> Diabetes, a growing problem <input type="checkbox"/> Hereditary factors	
Which of the following questions are still difficult for you, after reading this chapter?	
<input type="checkbox"/> What caused your diabetes? <input type="checkbox"/> Which risk factors are relevant to you? <input type="checkbox"/> How did you follow up the advice given with regard to weight loss and/or increasing exercise?	
Remaining questions or things you want to discuss:	
Discussed with:	

Figure 1. Example of a workbook page for patients to complete

an adoption and implementation plan, and generated an evaluation plan. Furthermore, the developers of IM explicitly emphasise the importance of stakeholder participation during all planning phases.⁶ This approach enables collaboratively developed user-relevant programmes, and facilitates programme adoption and implementation.

Inspired by an education programme developed at the University of Warwick, and based on IM, the Diabetes Interactive Education Programme (DIEP) was developed in The Netherlands to offer a nationwide, uniform, education programme for the large and rapidly growing group of patients with type 2 diabetes. This article describes the structured development and content of DIEP.

The development process was managed by the following: a

planning group (three employees of Maastricht University for developmental guidance and research, three employees of the University Hospital Maastricht for programme content and research advice, and one project manager for logistical and financial support); a linkage group (representatives of relevant Dutch diabetes organisations who supported the planning group by intensive communication through meetings, e-mail and telephone contact); and a pilot group of patients with type 2 diabetes. The tasks of these groups are described below.

Needs assessment

A needs assessment (NA) was undertaken to analyse the target group and its problems, and to understand 'what is' compared with 'what is more desirable'.⁶ We achieved this by reviewing literature and conducting focus-group

interviews (FGIs) among potential programme users.

Our literature review confirmed that patients experience difficulties with self-management.^{1,7} Furthermore, we identified the following factors associated with improving self-management: active patient participation;^{2,8–10} informed decision making;² motivating patients for behaviour change by setting concrete, realistic goals;^{8,11} and education.^{12,13} Although knowledge alone is not enough to improve self-management, it is necessary to enable problem solving, patient participation and informed decision making.^{1,8,11}

Additionally, four FGIs were carried out to examine the target population's experiences and needs:^{14–16} one involved HCPs (n=8) and three involved patients with type 2 diabetes (total n=25). No ethical approval was obtained for these interviews, but all participants provided written informed consent. Participants' responses were recorded and fully transcribed. The content analysis was based upon Morgan's qualitative research methods.¹⁷ Data from HCPs and patients were analysed separately.

One of the most difficult tasks reported by HCPs was to motivate patients for behaviour change. HCPs commented that optimal treatment outcomes are often impossible to achieve. Therefore, treatment goals should be personalised and related to the possibilities for each individual. Furthermore, HCPs argued that many patients have insufficient understanding of their disease in order to participate as equal conversation partners, to share responsibility and to formulate goals. It was mentioned that patients' free choice is often the last option, if counselling based upon advice by HCPs does not work.



Concerning education, a need for a univocal education tool adapted to the population became apparent. HCPs felt that formulating achievable goals with the patient would be beneficial.

Patient FGIs revealed that patients felt little need for further education: they reported sufficient levels of information. However, patients kept asking the moderator and assistant questions, such as *'How do you get diabetes?'*, or *'Why are carbohydrates so important?'*. Furthermore, patients said that they received large quantities of very general information, which was not always directly applicable to their personal situation. Often, the reasons for making recommendations remained unexplained, and patients felt a need to look at the information again at home. Most patients said that they just listen to recommendations made by the HCPs; none of the patients reported that they had ever been asked what they wanted. According to patients, goal setting was undertaken, but only in general terms, eg *'Lose some pounds'*.

A comparison between the outcomes of our literature review and the FGIs identified possible gaps in current practice, thereby revealing the needs of HCPs and patients with type 2 diabetes. When the outcomes were presented, all members of the linkage group subscribed to the findings, supported by their own experiences.

Objectives

Based on our NA, the following goals for our education programme were set:

- To increase understanding of type 2 diabetes
- To support communication between HCPs and patients, and stimulate active patient participation
- To provide tools to support adequate self-management.

Date of appointment: Current status	Goals
Weight: Length: Body mass index: Waist circumference:	Weight reduction? Yes/No If yes, how much a week? How? More physical activity/ eat less/both
Do you smoke? Yes/No If yes, what? How much a day?	Do you want to quit smoking? Yes/No If yes, how?
What physical activity do you perform? a. Strenuous physical work b. Brisk walking c. Cycling d. Something else: Does your daily physical activity last at least half an hour a day? Yes/No	More physical activity? Yes/No If yes, how? How much extra time per day or per week?
What do you eat on an average day? Breakfast: Lunch: Dinner: Snacks: How many? What?	Eat less or differently? Yes/No If yes, what do you want to change? Breakfast: Lunch: Dinner: Snacks:
What do you drink on an average day? Soft drinks: Alcohol:	Drink less? Yes/No If yes, what do you want to change? Soft drinks: Alcohol:
Discussed with:	

Figure 2. Goal-setting sheet, for healthcare professionals to use during patient consultations

Methods and strategies

Based on the previous steps, the following strategies were considered:

- To increase understanding of type 2 diabetes and to improve self-management, the website should contain useful information
- To prevent an overload of information, patients should not be

exposed directly to all content

- Multimedia should be used to increase the probability of a better understanding of information provided¹⁸
- To stimulate self-reflection and understanding of type 2 diabetes and self-management, questions about the patient's specific situation should be included

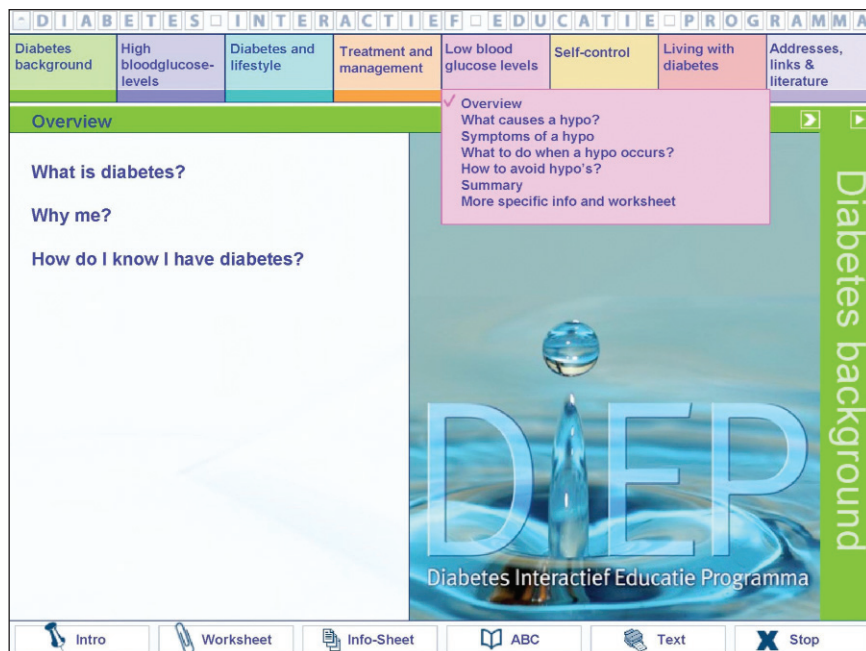


Figure 3. Example page from www.diep.info

- To further support self-management and problem solving, goal-setting forms and checklists that give advice for specific situations should be incorporated into the website
- To support active patient participation and communication between HCPs and patients, tools that enable patients to prepare for consultations should be included so that patients can participate actively in agenda setting.

A website was chosen as the delivery method because it is easy to update when new diabetes care guidelines are produced, and it is available for every HCP and patient at every moment. Furthermore, the number of people using the internet to seek health-related information is growing.¹⁹ Of internet users in Europe, 71% are searching for health information.²⁰ In The Netherlands, the penetration of the internet exceeds 90%.²¹

Results

Programme development

DIEP gives an overview of type 2 diabetes in seven chapters covering:

background information about the disease; hyperglycaemia, diabetes and lifestyle; disease management; hypoglycaemia; blood glucose monitoring and living with diabetes. Each chapter provides basic information (a simple description of a topic, *eg* where insulin is produced) and additional information (more detailed and with the use of medical terms, *eg* the relationship between insulin and blood glucose). Each chapter closes with questions for the patient, such as 'What is your strategy to prevent hypoglycaemia?.'

The information is mostly presented in spoken language, supported by headlines, images, video (*eg* a demonstration of insulin injection) and patient experiences. The navigation options and page design are adapted to the target population. Each chapter has a workbook to record information that has already been discussed with a patient (Figure 1), and a goal-setting sheet that enables plans for improved self-management to be discussed by the HCP and patient (Figure 2). In addition, the patient can prepare for

HCP consultations, by writing down questions or remarks. Furthermore, the programme contains a dictionary of relevant concepts and links to relevant paragraphs. Additionally, three patient information leaflets about foot care, travelling and sickness can be printed out and used as checklists.

The planning group developed the final programme, working in association with a multimedia company that specialises in education. However, every suggestion for content, functionality and characteristics was discussed with the linkage group until an agreement was achieved. After developing three chapters, a test version was shown to the pilot group to gain feedback from potential users. This collaborative effort led to a web-based education programme – www.diep.info (Figure 3) – which is endorsed by all members of the linkage group.

Adoption and implementation plan

Among patients, DIEP is promoted by advertisements on diabetes websites and in diabetes magazines, and by leaflets available from general practices. However, HCPs are the main channel for promotion. We hypothesised that implementation will succeed if HCPs use DIEP as their education tool during consultations, and if they recommend that patients use DIEP at home. Therefore, a prerequisite for the use of DIEP by patients is to embed it into standard care.

Among HCPs, DIEP is promoted through publications in specialist journals, presentations and demonstrations at congresses, and during personal visits by representatives of the diabetes care industry. In addition, to stimulate optimal use of DIEP, training for HCPs has been developed (DIEP@work).

The linkage group was highly important for realising this plan.



By involving representatives of relevant Dutch diabetes organisations, we created support and thereby gained opportunities to promote DIEP.

Evaluation plan

We developed an online questionnaire to study to what extent DIEP is effective in improving knowledge about type 2 diabetes in a randomised controlled trial with pre-test/post-test design. The intervention consists of two weeks' access to DIEP for the experimental group; the control group is only permitted access after the post-test.

A process evaluation is carried out using an online questionnaire that assesses the quality of DIEP (including satisfaction with content and user-friendliness), the functionality and the use of the website as a supportive educational tool. Additionally, semi-structured one-to-one interviews are held to obtain more detailed user information, addressing quality aspects of online education materials and the opportunities and aims of DIEP. Furthermore, we observe DIEP users while working with the programme.

The evaluation outcomes are beyond the scope of this article but will be reported in the future.

Discussion

DIEP is a unique education programme, created using theoretical models and planned development strategies, and supported by diabetes organisations in The Netherlands. While other web-based education programmes merely offer text (eg www.diabetes.org or www.diabetes.dvn.nl), DIEP uses multimedia and different functionalities, thereby attempting to meet the needs of current practice. This programme is available for anyone at any time. In 2006, DIEP

received the Dutch quality award for diabetes care. Further implementation of DIEP and future research is needed to examine whether our objectives have been achieved.

A shortcoming of our developmental process may be that we adapted the steps of IM to suit what was feasible within our time and budget. However, we followed the main IM steps and, during the whole developmental process, collaboration between programme planners, implementers and users was ensured.

To guarantee ongoing programme development and improvement we have established the DIEP foundation. Currently, DIEP is targeted at patients who have recently been diagnosed with type 2 diabetes. Future developments may extend the programme to different target groups or adapt the content to users' characteristics (eg age or knowledge). Furthermore, DIEP can be adopted by other countries. In fact, Belgium has already adapted the programme. Such developments enable DIEP to become an international programme that is usable by different HCPs and different patient groups.

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Conflict of interest statement:

None

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