A brief office-based intervention to facilitate diabetes dietary self-management

R.E. Glasgow, D.J. Toobert, S.E. Hampson and J.W. Noell

Abstract

There is a pressing need for brief, practical interventions that address diabetes management. We have developed an office-based intervention to prompt both patients and providers to focus on behavioral issues relevant to dietary self-management that is being evaluated in a randomized trial. The intervention is designed to be broadly applicable to the majority of adult diabetes outpatients during medical visits; uses touchscreen computer assessment to provide immediate feedback on key issues to patients and providers just prior to their interaction; and provides goal setting and problem-solving assistance to patients following their meeting with the physician. Follow-up components include phone calls and videotape or interactive video instruction as needed. The program is described, and demographic and behavioral characteristics of participants are presented for the first 95 patients randomized. Initial process results suggest success in producing modest, targeted behavior changes among a broad cross-section of patients. If the long-term results are equally positive, this intervention could provide a prototype for a feasible, cost-effective way to integrate patient views and behavioral management into office-based care for diabetes.

Introduction

The complications and societal costs of diabetes are well-documented and likely to continue to increase as the percentage of older persons in our population rises (American Diabetes Association, 1993). Diabetes complications also markedly affect the quality of life experienced by patients (Revicki, 1990; Cox and Gonder-Frederick, 1992). Fortunately, the results of the recently concluded landmark Diabetes Control and Complications Trial have shown that tight control of diabetes can markedly reduce the incidence of many of these complications (DCCT, 1993). If these results are to be translated into clinical practice, however, both patients and providers will need assistance in addressing the numerous and complex issues involved in diabetes self-management (Glasgow, 1991; Goodall and Halford, 1991; Johnson, 1993; McCulloch et al., 1994; Rubin and Peyrot, 1994).

To date, diabetes education efforts have focussed predominantly on either newly diagnosed patients, especially if they are insulin dependent (Brown, 1990), or on patients who are sufficiently motivated and able to attend a series of intensive and broad-based diabetes education classes. These programs are costly in terms of patients' time and instructor expertise (Kaplan and Davis, 1986). In particular, diabetes dietary self-management and weight control programs have been found unsuccessful unless they are very intensive and continued over long periods of time (Wing, 1985; Perri et al., 1988). Moreover, diabetes education programs generally fail to reach the majority of established patients who have considerable difficulties with lifestyle management (e.g. Wilson et al., 1986; Glasgow...
et al., 1991), especially if they are non-insulin treated Type II patients (Harris, 1985). Further, the patients who participate in diabetes education programs may not be representative of other patients. Non-participants tend to be older and in poorer health (Glasgow et al., 1991).

From a broader perspective, there is growing interest in management of chronic diseases through efficient clinical triage systems, and patient self-care education for the purposes of improving patient outcome (Greenfield et al., 1994), standardizing and improving clinical practice (Kritchevsky and Simmons, 1991), and reducing inappropriate use of the health care system. This paper describes a behavioral intervention program that could be integrated into usual outpatient care. Through the use of computer-assisted and interactive video procedures, patient views and behaviors related to diabetes care and self-management are assessed and immediately summarized on user-friendly feedback forms for both patients and providers. During regular office visits, patients are assisted in setting specific, personalized dietary intervention goals and in developing problem-solving strategies for anticipated problem situations. Follow-up phone contact and later office visits provide the support and continuity presumed necessary to make lasting behavioral changes.

This intervention is being evaluated to assess its impact on dietary self-care in a randomized clinical trial compared with usual care, which includes the same assessment procedures. The trial will eventually randomize approximately 200 patients; at present, baseline data are available on 95. Dietary self-care was chosen as the initial endpoint to evaluate because it is the self-management area with which diabetes patients report the greatest difficulty (Wilson et al., 1986; Glasgow, 1991), and it is a common need across a variety of chronic diseases (Pang, 1994). Moreover, one of the objectives of Healthy People 2000 is to 'increase the proportion of primary care providers who provide nutrition assessment and counseling and/or referrals' (USDHHS, 1990).

Our intervention is based upon a combination of social learning/social cognitive theory (Glasgow and McCaul, 1982; Bandura, 1986) and systems approaches (Anderson and Jenkins, 1994; Mazze, 1994) to diabetes self-management. The intervention also results from our previous research experience in identifying social learning theory factors that influence diabetes self-management (Glasgow et al., 1989) and developing interventions which target these factors (Glasgow et al., 1995). The primary hypothesis being tested in the present study is that this office-based intervention will be superior to usual care in enhancing dietary self-management (in particular, low-fat eating patterns), reducing serum cholesterol, and improving glycemic control at both short- and long-term follow-ups (3 months and 1 year).

The purposes of this report are to (1) describe this brief, office-based intervention which is being tested as a supplement to usual diabetes care, and (2) present descriptive data on the first 95 participants.

**Methods**

**Subject recruitment and characteristics**

The intervention is being evaluated in the offices of two internists who are part of a large medical group. The male physician, an endocrinologist, has the largest caseload of diabetes patients in the local area. The female internist, who has recently joined the practice, specializes in diabetes and approximately 70% of her patients have diabetes.

Inclusion criteria are: (1) having Type I or Type II diabetes, (2) being 40 years of age or older and (3) being primarily responsible for one's own diabetes diet self-management (e.g. not institutionalized). Approximately 3 weeks prior to their appointment, patients with upcoming quarterly or annual visits who meet the inclusion criteria, as well as patients who have called to schedule appointments for other reasons, receive a letter from their physician describing the project and encouraging their participation. Enclosed with the letter are an informed consent statement, a 4-day food record form and the short form of the General Health Survey (Stewart et al., 1988). A project
the small percentage of patients who do not have any diet-related problems and, thus, for whom the intervention would not be appropriate. Patients are excluded if they have none of the following: (1) weight 120% or more of ideal; (2) cholesterol level above 200 mg/dl; (3) glycated hemoglobin above 9%; (4) dietary intake of more than 30% of calories from fat; or (5) summary score on the FHQ above 2.5. Thus far, fewer than 5% of patients have been excluded at this stage.

Patients in the Usual Care condition are thanked for their participation, see the physician for their appointment as usual and are reassessed at their regularly scheduled 3 month follow-up (see Figure 1).

**Intervention**

Special Intervention subjects complete one additional touchscreen computer assessment to determine barriers to dietary self-care and then enter into the sequence of activities outlined in Figure 1. Barriers to dietary self-care are an expanded list of 30 questions adapted from the Barriers to Self-Care instrument (Glasgow, 1994). This instrument is automatically scored by the computer, which calculates average scores on three subscales: eating...
Brief diabetes self-management intervention

Staff member calls the patients a few days later to answer questions and determine if the patient wishes to participate. Thus far, 60% of eligible patients have agreed to participate. The most frequent reasons given for non-participation have been wanting to first talk personally with their physician (8%; these patients may later participate); being too ill to participate (7%); not feeling they have a problem with diabetes self-management (6%); feeling that the procedures would take too much time (6%); or being too busy or stressed (5%).

Table 1 summarizes the characteristics of the first 95 participants to complete baseline assessments. Due to clinic confidentiality rules, we do not have information on patients declining participation. As can be seen, a heterogeneous group of patients is participating. The ‘average’ participant is female, has had Type II diabetes for several years and is approximately 65 years of age. About two-thirds of the patients are prescribed insulin, and the strong majority of participants are overweight and have elevated cholesterol levels. Most patients also have been diagnosed with one or more other chronic diseases (e.g. hypertension, arthritis, heart disease). Fifty-nine percent have one or two other diseases and 24% reported three or more other chronic diseases.

Table 1. Characteristics of initial participants in medical office intervention to facilitate diabetes self-management (n = 95)

<table>
<thead>
<tr>
<th>Patient characteristic</th>
<th>Mean (SD) or percent of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic and medical history variables</td>
<td></td>
</tr>
<tr>
<td>age</td>
<td>64.1 (10.6)</td>
</tr>
<tr>
<td>years diagnosed</td>
<td>15.5 (13.9)</td>
</tr>
<tr>
<td>percent female</td>
<td>62%</td>
</tr>
<tr>
<td>percent Type II diabetes</td>
<td>77%</td>
</tr>
<tr>
<td>percent on insulin</td>
<td>66%</td>
</tr>
<tr>
<td>Baseline physiologic indices</td>
<td></td>
</tr>
<tr>
<td>mean glycated hemoglobin</td>
<td>7.6 (1.6)</td>
</tr>
<tr>
<td>(normal = 5 or less)</td>
<td></td>
</tr>
<tr>
<td>mean cholesterol</td>
<td>215 mg/dl (33)</td>
</tr>
<tr>
<td>over 200 mg/dl cholesterol</td>
<td>64%</td>
</tr>
<tr>
<td>mean weight</td>
<td>190.2 lb (41)</td>
</tr>
<tr>
<td>percent of ideal weight</td>
<td>122% (23)</td>
</tr>
</tbody>
</table>

Procedures

Assessment

Prior to their visit, patients agreeing to participate are asked to complete the short form of the General Health Survey to assess general quality of life and a 4-day food record. Detailed instructions for completing the food record are provided, including the importance of not altering usual food consumption patterns, but conscientiously recording all foods eaten and of including at least one weekend day in the record. These records are mailed to Oregon Research Institute and analyzed using the Minnesota Nutrition Data System database (Nutrition Coordinating Center, 1992). As part of routine lab work completed shortly before or during the first part of the visit, glycated hemoglobin assays (Abbott Diagnostics automated affinity chromatography method; Kisner, 1993) and cholesterol assays are performed.

When patients arrive in the clinic, instead of sitting in the waiting room, they are escorted to an exam room to complete baseline assessments, which takes 15–20 min. After reviewing the project and answering questions, a research staff member has patients complete the computerized assessment via a touchscreen color monitor. The monitor and computer are on a portable cart that can be moved from room to room as needed. Variables assessed for all patients include dietary stage of change (Curry et al., 1992), the Summary of Diabetes Self-Care scale (Toobert and Glasgow, 1994) and brief three- or four-item scales to assess three aspects of personal models of diabetes. Scales measuring beliefs about seriousness of diabetes and importance of treatment are derived from longer scales reported in Hampson et al. (1990, 1995). Desire for participation in diabetes management is assessed by the shared control scale of the Multidimensional Desire for Control Scales by Anderson et al. (1989). Subjects are weighed, have their height measured, complete the Food Habits Questionnaire (FHQ) (Kristal et al., 1990) and, if eligible, are randomly assigned to either Special Intervention or Usual Care conditions. Eligibility criteria at this stage are included simply to exclude
away from home, eating at home (poor eating or food preparation habits) and food purchasing. The computer then prints out a one-page feedback form for the patient, summarizing the area in which the patient is likely to have the most frequent barriers over the next 3 months, as well as a list of the four barrier items rated as occurring most frequently. This sheet is briefly reviewed with the patient, while a brightly colored one-page summary form for the physician is printed. Patients are told that this area is the one on which we would recommend focusing for the next 3 months, invited to add other barriers to the print-out and asked to consider this area while they are waiting for the doctor.

The physician feedback form, designed to be easily reviewed in a few seconds, provides summary information to the physician on four issues. As shown in Figure 2, these issues are: (1) the diabetes self-management issue or question the patient would most like to discuss at that visit (reported verbatim from patient statements); (2) summary information on the patient's dietary intake (average Kcalories per day, percent of calories from fat and dietary fiber) and weight; (3) a condensed summary of the key barriers to dietary adherence reported by the patient; and (4) a visual analog scale indicating the patient's standing on four key dimensions of their personal models of diabetes: readiness to engage in dietary change,

**Fig. 2. Diabetes self-care assessment summary form.**
seriousness of diabetes, importance of diabetes management and desire for participation in diabetes management decisions (see Figure 2).

The physician feedback form is attached to the front of the patient's chart, which accompanies the patient to the meeting with the physician. The physician is asked specifically to attend to three issues that have asterisks on the form: the self-management issue the patient would most like to discuss, the patient's average percent of calories from fat and their desire for participation in diabetes self-management (see Figure 2). Providers are free to use this information as they see best, but are asked to comment on the patient's current dietary intake and to recommend that the patient meet briefly with research staff immediately following the medical consultation to plan strategies to address these dietary issues. The patient–provider interaction is audiotaped for both Special Intervention and Usual Care patients, and later coded using a modification of the Roter coding system (Roter, 1991).

![PERSONALIZED DIABETES SELF-CARE PLAN FOR: John Smith

Date: 6/20/93

Goal: To Avoid fat as seasoning

When Eating at home

Specific Actions to Achieve this Goal:

1. Try non-fat sour cream instead of butter on baked potato. Season sour cream with lemon juice.

2. Try low-sugar fruit spread on toast instead of butter.

3. Dilute 2% milk with 1% milk and gradually switch to skim milk.

Resources for Achieving this Goal:

1. Refer to Fat Counter for fat and calorie content of foods.

2. Review list of likely BARRIERS to self-care.

3. 

John Smith

Signed: 1/8/94

Date to Review

<table>
<thead>
<tr>
<th>Days</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Met goal...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did not meet goal...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doesn't apply...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 3. Personalized diabetes self-care plan.
During the time the patient is meeting with their physician, the research staff member completes scoring of the FHQ. Based upon the combination of the FHQ eating behavior area in which the patient reports the greatest difficulty, and the setting in which the patient expects to most frequently encounter barriers to dietary adherence, the staff member prepares a draft of the Personalized Diabetes Self-Care Plan (see Figure 3). Strategies discussed with the patient to achieve these goals are drawn from (1) a list of recommended intervention techniques within each of the 15 cells of the resulting 5 (eating behavior) × 3 (dietary barriers) matrix and (2) information gathered from the patient and the food record.

Potential goal areas (e.g. 'avoiding fats as seasoning when eating out', 'replacing and substituting for high fat foods when eating at home', 'purchasing more fruit and vegetables') and specific intervention strategies to achieve this goal are negotiated with the patients (see Figure 3). The patient receives a copy of the goal setting form and is told that the research staff member will call in about a week to see how they are doing. They are then asked to complete a single item, 100-point self-efficacy scale to indicate how confident they are that they will be able to achieve the goal that has been set. Patients scoring 85 or less are scheduled to see an interactive video focused on low-fat eating in the settings where they have reported encountering barriers most frequently. Patients scoring greater than 85 receive a 'take-home' (non-interactive) copy of the video in the mail the following week.

Before patients leave, they receive a packet of materials containing (1) a pocket-sized fat counter (Pope-Cordle and Katahn, 1991) and accompanying daily log sheets; and (2) Lean Toward Health (American Diabetes Association Foundation, 1993), a 23-page pamphlet containing suggestions for ways to reduce fat intake. Patients are helped to select goals for grams of fat intake that represent modest reductions (e.g. using non-fat yogurt instead of sour cream) from their current level, encouraged to monitor their fat intake for at least a couple days (longer if they wish) and referred to the section of the Lean Toward Health pamphlet on low-fat shopping, cooking or dining that most applies to them.

**Video**

The interactive video is designed to present information compatible with patient's stage of dietary change (Curry et al., 1992; Prochaska et al., 1993) and focuses on barriers to dietary self-management that the patient is most likely to encounter. There are six different interactive videos, which focus on either eating away from home, eating at home or food purchasing. Within each of these areas, there is an interactive video designed for patients in the precontemplation or contemplation stage, and another for those in preparation, action or maintenance.

The videos for precontemplation/contemplation provide motivational messages and testimonials on the benefits of dietary change and illustrate how other patients have achieved success in changing their dietary practices. The videos emphasize that it is the patients' choice as to whether or when they will work on dietary change and feature simple, straightforward behavior change strategies. The action/maintenance videos are somewhat longer, present more complex strategies and have more emphasis on relapse prevention. Despite these differences, there is a moderate amount of overlapping material across videos and all videos use a common format, as well as the same narrator. The video opens with the narrator assuring the viewer that 'we understand how hard it is, in our society, to follow a healthy diet, and we want to share information that has been gathered from people like you who have diabetes and who have successfully coped with these challenges'.

The videos present solutions and behavioral strategies to overcome specific barriers rather than didactic presentation of dietary information. In this respect, the video programs are similar to the anchor-based problem-solving instruction interactive video program developed by Pichert et al. (1993) for adolescents. For each problem area, there are both testimonials from and interactions between models who are similar to the patients in
age (40 and over) demonstrating solutions and strategies. Many of the scenarios are filmed in naturalistic locations such as grocery stores, restaurants and family kitchens. Within each video, there are multiple choice points for patients, allowing them to choose (by touching the monitor screen): (1) issues on which they would most like information, (2) strategies about which they would like to learn and (3) what information they would like to have included on a personalized printed list. Depending on the choices patients make, the interactive video sessions take between 17 and 32 min.

**Follow-up contacts**

Maintenance issues are addressed via phone call follow-ups, mailed take-home videos and written materials, and by repeating the above process at regularly scheduled quarterly office visits. Phone calls are made 1 and 3 weeks following the patient’s appointment by the research staff member who met with the patient at the office visit. Follow-up calls are generally from 5 to 12 min in length and are focused on the extent to which patients have achieved their goals since last contact. Patients are reinforced or assisted in problem-solving additional strategies as appropriate.

Once patients have seen the interactive video or appear to be meeting goals without needing to schedule an in-person video session, they are sent a ‘take home’ video that is theirs to keep. This video is a 1/2 in VHS copy of the entire interactive video on the barriers issue and stage of change most relevant to that patient and includes all possible options. Patients are asked to play this video periodically to refresh their repertoire of possible dietary behavior strategies. If patients do not have a home VCR player, they are also sent a coupon for free VCR rental at a video store convenient to them.

Once patients report achieving their goals at least 80% of the time, they are also mailed a four-page pamphlet developed for this project entitled *Planning Ahead: Preventing and Responding to Slip-Ups*. The above intervention procedures are repeated at a 3 month follow-up visit, essentially as described above if the patient scores highest on a new dietary barriers area. If the patient still scores highest in the same dietary barriers area, but has achieved his or her goals, they are encouraged to set more ambitious goals. If they have not achieved their goals, they are helped to review what has worked and to develop new problem-solving strategies for situations with which they have not coped successfully. A 6 month follow-up phone call is made to reinforce progress and prevent relapse and at 9 months patients receive additional written materials about coping with diabetes.

**Baseline eating behaviors and beliefs**

Data are reported for the first 95 participants completing baseline assessment. Results are collapsed across Usual Care and Special Intervention conditions since there were no significant differences between conditions at baseline on any of the variables below. The 4-day food records suggest that participants consumed, on average, 2000 calories per day and that approximately 38% of these calories were from fat. Scores on the FHQ revealed that subjects had the greatest difficulty with ‘replacing and substituting’ for high fat foods (39% of participants). Scores from the FHQ correlated well with percent of calories from fat calculated from 4-day food records (e.g. correlations between subscores from the FHQ correlated $r = 0.31$–0.51 with percent of calories from fat calculated from 4-day food records, all $P's < 0.01$).

Patients’ personal models of their diabetes were assessed by six questions with responses on five-step Likert-type scales ($1 = \text{less}, 5 = \text{more}$). There were three questions assessing each of two constructs: (1) Seriousness (perceived seriousness of diabetes) and (2) Treatment Effectiveness (perceived effectiveness of recommended treatment). The mean score for the Seriousness composite was 3.3. Thus, these patients showed concern about the gravity of their diabetes and its threat to their future health. However, they also believed in the value of treatment for diabetes. The mean for the Treatment Effectiveness construct was 4.5. Beliefs
about the value of treatment were stronger than beliefs about the seriousness of one's disease.

We were surprised by the high level of desire for shared control/participation in diabetes management. Mean scores on seven-point scales concerning the extent to which subjects agreed (1 = strongly disagree; 7 = strongly agree) with the following statements were: 'My health care team and I should be equal partners in establishing treatment goals' ($M = 6.2$, $SD = 1.5$); 'My health care team and I should make decisions about my medical care together...' ($M = 6.4$, $SD = 1.1$); 'My health care team and I will supervise my treatment program together' ($M = 6.5$, $SD = 1.2$).

**Process data**

Data from the 1 and 3 week follow-up phone calls to intervention subjects ($n = 51$) revealed that they were generally able to both remember and achieve the specific behavioral goals that they established. Ninety percent of intervention subjects reported that they achieved their goal at the 1 week follow-up and 96% did so at the 3 week follow-up. A somewhat lower, but still encouraging 77% of subjects reported having read the written material they were given.

**Discussion**

In light of spiralling health care costs and the fact that patients with diabetes account for a disproportionate amount of health care expenditures (American Diabetes Association, 1993), there is a pressing need for cost-effective interventions to control these costs. Preventive, self-management interventions in health care settings seem like particularly promising methods to address this issue (Fries et al., 1993), especially given the recent results of the DCCT (1993). It will, however, be important to demonstrate both efficacy and cost-effectiveness (Flay, 1986) of such interventions, so that developers, such as ourselves, do not 'promise more than we can deliver' (Becker, 1993).

Although very preliminary, the initial results from this brief office-based application are encouraging. The intervention is relatively brief and seems acceptable to a broad cross-section of patients, including older patients with no previous experience with computers. Efficient interventions that employ portable technologies and data collection systems (Noell, 1994) offer considerable potential for helping both patients and providers to cope with the difficult and complex task of diabetes management.

We chose to focus initially on dietary intervention, but such a system could readily be expanded through inclusion of an initial computerized health risk appraisal system, to identify personal risks and self-management areas that each patient could most benefit from changing. Dietary behavior is also likely to be equally or more challenging and complex as other behavior change areas (Wilson et al., 1986; Glasgow, 1991). Similar promising approaches involving personally tailored interventions (Pang, 1994) and computer-driven expert systems (Campbell et al., 1994) have recently been developed for both dietary management and other health behaviors (Curry et al., 1991; Skinner et al., 1994; Rimer et al., 1995).

We were surprised to find that patients were so enthusiastic about being involved in the management of their diabetes. Fortunately, these desires are congruent with trends among progressive diabetes clinicians and educators which are increasingly moving toward patient empowerment (Anderson et al., 1991). Unfortunately, we were not able to collect data on the desire for involvement in management among those who declined participation. Although we feel that our initial 60% participation rate is higher than most diabetes education studies, we will continue to search for ways to increase this rate.

We are committed to the concept of personalized instruction, which has proved efficient and effective in other areas of health promotion (Prochaska et al., 1993; Skinner et al., 1993; Noell, 1994). In this study, we tailored intervention based on four factors: barriers to dietary adherence, the FHQ, patient stage of change and self-efficacy. Others will develop expert systems and tailoring algorithms based upon different factors. Regardless of the specific tailoring dimensions, we feel that
such automated systems, capable of providing immediate printed feedback to both patients and providers, has great potential. Computer-assisted expert systems also offer an additional advantage of automatically storing data for later analyses and patient outcomes research (Greenfield et al., 1994).

This investigation does have limitations. The results presented are baseline and self-report process data, and we do not yet have outcome data on program effectiveness. Some aspects of the intervention, such as the 4-day food records, may not be practical to collect in some outpatient office practices. However, the FHQ correlates relatively highly with food records and might be substituted for the food record in offices not having access to nutritional expertise (Pang, 1994). Also, the intervention was monitored and the problem-solving portion administered by research staff rather than regular medical office staff. Given that this is an initial ‘prototype’ study and many procedures are being tested for the first time, we felt this appropriate. Later research will have to test the effectiveness (Flay, 1986) of the intervention using more completely automated procedures and regular office staff (e.g. nurses, dieticians or diabetes educators) as interventionists.

Some readers may conclude that this intervention is impractical or too expensive for widespread use. We will later conduct cost-effectiveness analyses, but note that (1) the costs of even the interactive video, which is by far the most expensive component of the intervention, are not great when spread over hundreds or thousands of patients (Noell, 1994); and (2) a dissemination model for this intervention would likely train existing office staff, rather than research staff, to deliver the person-to-person aspects of the intervention (or possibly automate additional aspects of the intervention once more experience is gained with the brief goal setting and problem-solving intervention). Other than the touchscreen computer assessment (and interactive video, if indicated) which can be conducted without staff present, the program requires approximately 20 min of staff time during the visit in addition to usual care, and another 20 min of phone follow-up. Equipment and personnel costs for the intervention will be justified if they prove successful in altering complex lifestyle behaviors such as eating patterns.

We are optimistic about the potential of this and similar interventions (e.g. Campbell et al., 1994; Pang, 1994) to improve the quality of diabetes self-management. Future research on such programs should be conducted to determine their long-term efficacy and to understand the processes through which they work. Additional research is also needed to evaluate the impact of automated systems and feedback on patient–provider interactions and to evaluate the cost-effectiveness of alternative modes of intervention delivery (e.g. office staff versus computer versus interactive video versus phone counseling). Finally, it will be important to assess the generalizability of this approach to other provider settings, multiple risk factor interventions, and other chronic diseases.

Acknowledgements

Appreciation is expressed to Drs David Calder and Jane Farmer, of the Oregon Medical Group, their assistants and reception staff for integrating the study into their complex schedules with patience and efficiency. Thanks also go to Jane Brown and Rae Crenshaw for their dedicated and skilled interactions with patients, to Independent Video Services for their collaboration and creative ideas in developing the video, and to Ginny Osteen for her tireless and skilled work on computer programming for the project. This research is supported by grant DK35528 from the National Institute of Arthritis, Diabetes, Digestive, and Kidney Diseases. Generous support was also provided by the Diabetes Research and Education Foundation (DREF Grant E17/I-92) and the Diabetes Action Research and Education Foundation (Application 052).

Notes

1. Readers wanting more information about the intervention, touchscreen or video applications, or assessment instruments, should contact Ginny Osteen, Diabetes Self-
References


Diabetes Care, 17(Suppl. 1), 5-11.
Nutrition Coordinating Center (1992) Minnesota Nutrition Data System (NDS) Software. University of Minnesota, Minneapolis, MN.

Received on January 1, 1994; accepted on December 10, 1994