An Interactive CD-ROM for Nutrition Screening and Counseling

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A B S T R A C T

Objectives. The goal of this project was to develop an interactive CD-ROM for nutrition screening and counseling, designed to produce dietary behavior change in fat and fruit and vegetable intake.

Methods. The design was based on principles of relevance to the learner, readiness for change, feedback, individualization, facilitation of skills, and goal setting. It was tested in community settings such as libraries, senior centers, and Women, Infants, and Children clinics.

Results. Nearly 80% of the respondents (n = 284), including numerous low-income persons, reported learning something new about nutrition and health or their own dietary habits. More than 50% of those recontacted 2 to 4 weeks later had put some of their dietary goals into practice.

Conclusions. This program is useful for dietary screening, feedback, skill building, and motivation in settings in which in-person counseling by nutrition professionals is not feasible. (*Am J Public Health*. 2000;90:781–785)

The importance of addressing prevention activities to all persons, before the onset of signs of disease risk, is repeatedly emphasized by the US Preventive Services Task Force. The *Guide to Clinical Preventive Services*[1] specifies primary prevention directed to all persons: "Clinicians should emphasize proven measures for the primary prevention of coronary disease in *all* patients"[1(p10)] (emphasis added), including "counseling . . . to limit dietary intake of fat . . . and emphasize foods containing fiber (i. e., fruits, vegetables, grain products)."[1(p625)] Furthermore, "*All* adults . . . including those with normal cholesterol levels, should receive periodic counseling regarding dietary intake of fat and saturated fat and other measures to reduce the risk of coronary disease."[1(p30)] Such services are needed both at the clinical level and at the community level. The benefits are not in doubt: "Data suggest that coronary heart disease mortality rates in the U.S. could be lowered by 5–20% if all Americans restricted their fat intake to less than 30% of total calories."[1(p627)]

In this report, we describe the development of an interactive, multimedia program to provide nutrition screening and counseling in settings in which time or fiscal constraints do not permit in-person counseling by a dietitian.

Methods

The Food and Nutrition Service of the US Department of Agriculture sponsored the development of interactive software for nutrition education, with special focus on low-income persons. The goal of this project was to create a tool that would result in changes not only in nutrition knowledge but also, and especially, in nutrition behavior. The development of the instrument was guided by several principles: (1) program flexibility so that respondents could choose topics of interest to them, (2) nutrition screening of the respondent's current dietary patterns and immediate feedback, (3) tailored messages based on readiness for change and respondent lifestyle, and (4) individual goal setting. All of these principles are critical to the successful achievement of behavior change.[2,3] In addition, the instrument was developed to be self-administered by people not necessarily familiar with computers and to be relatively brief.

Users Choose What They Want to Learn About

The instrument has 2 modules that focus on (1) dietary fat intake and (2) fruit and veg-

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This brief was accepted December 14, 1999.

etable intake. Users may start with either module, switch to the other at any time, and complete 1 or 2 modules. After a module is selected, later menus provide the user the opportunity to learn about topics of his or her choosing. Such flexibility retains user interest and permits the time during use of the program to be spent on the subjects of most interest and relevance to the user.

Assessments Guide Tailored Messages

Dietary intake assessments. General messages that "Americans should lower their fat intake" or "increase their fruit and vegetable intake" are likely to be ineffective if they are not perceived by individuals as directly relevant to themselves.[4] Each of the 2 modules has a brief dietary intake questionnaire to assess the quality of that particular user's intake of fat or of fruits and vegetables. These screening instruments have been validated by comparison with more extensive detailed methods, including a full-length dietary questionnaire[5] and multiple 4-day dietary records,[6] and were found to have an excellent ability to rank individuals with regard to these 2 dietary areas and to provide good estimates of intake. For example, the fat screener correlated at approximately $r = 0.7$ with the fat estimate from a full-length dietary questionnaire[5] and at $r = 0.67$ with a 4-day dietary record (A. Dowdy, MS, RD, G. Block, PhD, unpublished data, March 1994).

After completing the screening instruments, the user is given immediate feedback about his or her intake and how it compares with dietary guidelines. Such immediate feedback serves both as a reward for undertaking the CD-ROM program and as an incentive for continuing with the educational components of the program. Subjects who find that their intake of fat is acceptable have the opportunity to return and start the fruit and vegetable module, and vice versa.

In addition to providing immediate feedback on intake, the fat screener identifies the 4 foods contributing the most fat in that respondent's diet and offers suggestions about lower-fat alternatives that could be chosen. For example, if potato chips are identified by the screening questionnaire as a substantial source of fat in the user's diet, alternative snacks such as pretzels and alternative behaviors such as snacking on fruits and vegetables are suggested. This kind of screening, when followed by immediate, personalized counseling, provides personal relevance and learning efficiency. We do not waste time emphasizing low-fat salad dressing if people do not use salad dressing, and we do not tell people to eat fewer french fries or to switch from whole milk to low-fat milk if the former are not present in their diets.

Readiness for change. Evidence indicates that achievement of dietary behavior change can be improved through consideration of the learner's stage of change.[7–10] A brief stage-of-change assessment is conducted, which places users broadly into precontemplation/contemplation, preparation, and action/maintenance stages.[11–13] There is little point in spending users' time teaching them how to prepare low-fat meals if they are in precontemplation and have no interest in or motivation to change. Such users are given the information about why a low-fat diet is desirable but are offered only general tips about how to achieve it. Conversely, there is little point in explaining why a high fruit and vegetable diet is desirable if they are already actively trying to increase their fruit and vegetable intake; their time with the CD-ROM is better devoted to learning information and techniques that will help them achieve a goal they already have adopted.

Lifestyle and eating patterns. Because relevance to the learner is critical for learning, the program asks users to identify various aspects of their lifestyle and then directs them to topics of interest for persons with that lifestyle. For example, recipes and cooking tips are given to those who say they love to cook and need not be chosen by those who rely on convenience foods and restaurants. Persons who say they eat out a lot are directed to modules with ideas and approaches for eating less fat and more fruits and vegetables, even in fast-food restaurants.

Food sufficiency. Users are asked if they ever do not have enough money for food or for the right kinds of food. Those who indicate that this is so are shown the telephone number of their local food stamps office (which is entered in a set-up process at each site).

Goal-Setting and Individual Commitment Improve Behavior Change

After completing either module, the user is presented with a list of possible goals. The choices offered are guided in part by options that the user has chosen throughout the program. The emphasis is on small, practical steps that will move the user in the direction of a lower-fat or higher fruit and vegetable diet, consistent with recommendations in the *Guide to Clinical Preventive Services:* "Suggest small changes rather than large ones. By achieving a small goal, the patient has initiated positive change. . . . [Structure] interventions so that people are likely to experience success."[1(p lxxviii)]

Users are encouraged to choose 1 or 2 of the goals and to try them for just 2 weeks. If a printer is available, a certificate is printed that shows the goals they have chosen and includes a place for them to sign a commitment to try those goals for 2 weeks. This approach also follows suggestions in the *Guide to Clinical Preventive Services:* "Get explicit commitments from the patient. . . . The more specific the commitment from the patient, the more likely it is to be followed"[1(p lxxix)] (see also references 14 and 15). This increases self-efficacy and improves the likelihood of undertaking further efforts.[14] The certificate also shows the scores on the dietary screeners and additional tips and recipes and is suitable for posting on the refrigerator as a reminder and incentive for behavior change.

Program Evaluation

Formative Evaluation

After a "first draft" of the CD-ROM was completed, it was placed in several locations, and users were interviewed about their satisfaction with the program, areas that needed improvement, and so forth. Graduate students in nutrition observed subjects self-administering the program; noted difficulties, confusions, and questions that were asked; and conducted exit interviews. In addition, several nutrition consultants reviewed the program and provided feedback and suggestions. This resulted in considerable modification to the program to improve clarity and increase the counseling opportunities on nutritional topics.

Effectiveness Evaluation

After the revisions were completed, the program was tested in 6 different locations: a WIC center (Special Supplemental Nutrition Program for Women, Infants, and Children); a canned food store used by many low-income shoppers; a public library and a senior center in low-income neighborhoods; a YMCA; and waiting rooms and the lobby at the Oakland Kaiser Permanente Hospital. Laptop computers were set up in these locations, and people were invited to try the program at no charge.

Results

Demographic data about persons completing the evaluation are shown in Table 1. Almost 300 persons used the program, including a wide range of age and ethnic groups. Approximately one third of the respondents were White, one third were Af-

TABLE 1—Demographic Characteristics of Persons Completing the Little-by-Little Program (N = 281[a]): California, 1997

	n	Proportion of All Participants, %
Age, y		
<20	19	6.8
20–29	37	13.2
30–39	43	15.3
40–49	66	23.5
50–59	46	16.4
60–69	31	11.0
≥70	39	13.9
Sex		
Male	85	30.2
Female	196	69.8
Ethnic group		
White	112	39.9
African American	101	35.9
Hispanic	16	5.7
Asian	25	8.9
Multiple	14	5.0
Native American	3	1.1
Other	9	3.2
Missing	1	0.4
Income,$		
<20 000	68	24.2
20 000–39 900	98	34.9
40 000–60 000	64	22.8
>60 000	46	16.4
Missing	5	1.8
Location of interview		
YMCA	42	14.9
Library	12	4.3
WIC	12	4.3
Kaiser Permanente	161	57.3
Canned food store	44	15.7
Senior center	10	3.6
Ever could not afford food?		
Yes	53	18.9
No	224	79.7
Missing	4	1.4

Note. WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.
[a]Demographic information was missing for 3 persons.

rican American, and one third were other races. Approximately one fourth had incomes of less than $20 000 per year, and almost 60% had incomes below $40 000 per year. Two thirds were female, and almost 20% indicated that sometimes they could not afford enough food or the right kinds of food.

After users completed the program, they were asked to complete a brief questionnaire; 217 did so. Results of their evaluations of the program are shown in Table 2.

Ease of Use and Acceptability

The median length of time spent on the program by all users was 12 minutes. Almost 97% judged the program to be easy to use, 85% approved of the graphics, and 88% thought the program length was just right or that the program should be longer (Table 2). Impressively, more than 88% said that they would recommend this program to others as a tool for learning how to eat healthier, and more than 90% said that they would recommend it to others as a tool for learning about their own eating habits.

Learning

Users were asked the following questions: "Did you learn anything new about nutrition and health?" and "Did you learn anything new about your own eating habits?" If they answered "yes," they were asked to indicate what they had learned. For each of those questions, approximately two thirds of the users indicated that they had learned something new, and more than three fourths of the users answered "yes" to at least 1 of these questions (Table 3).

Among persons who completed the fat module and who stated that they did not already know the recommendation to restrict fat intake to no more than 30% of calories, almost 94% reported that they had learned something new about either nutrition and health or their own eating habits. Among those in precontemplation about eating less fat, more than three fourths reported learning something new. Similar results were seen among those who completed the fruit and vegetable module. About one fourth of the users reported learning factual information such as foods that were major sources of fat and techniques for reducing fat intake. Another one fourth learned specific information such as what constitutes a serving of vegetables or techniques and ideas for making better food choices.

When users were asked what they had learned about their own dietary intakes, many reported learning that they had a high-fat diet and/or a diet poor in fruits and vegetables. Equally useful, about 15% reported learning that they were already doing pretty well in either fat intake or fruit and vegetable intake.

All of the above questions and answers also were examined among those whose incomes were below $40 000 per year. In all cases, the proportions of respondents who found the program easy, would recommend it, learned something, and so forth were virtually identical to those seen in the overall group of respondents.

Goals Attempted and Achieved

Almost 60% of the users stated that they had selected a personal goal to try for 2 weeks (Table 3). Of those, 46% said that they would definitely try to achieve the goal, and another 37% said that they would probably try to achieve it (data not shown).

Ninety-two subjects gave us permission to call them back in 2 to 4 weeks and were subsequently reached. Of these, 50.5% said that they had in fact followed through on their commitment to try a goal, and another 10% said that they had tried to achieve the goal or had had partial success. Many of the persons contacted by telephone expressed satisfaction at the usefulness of the program to their efforts to improve their own dietary habits. More than two thirds of those who had said they would definitely try to achieve their goal had in fact done so.

Discussion

It was not possible in this study to examine the extent of the dietary changes or their long-term maintenance. Certainly, other modalities of intervention and support would probably be needed to maintain long-term behavior change. However, these data do suggest that a low-cost intervention can be a

TABLE 2—User Judgments About the Little-by-Little CD-ROM (N = 217): California, 1997

	n	Proportion of All Participants, %
The program is (easy, difficult) to use		
Easy	210	96.8
Difficult	7	3.2
Graphics (the way the program looks)		
Looks good	207	84.5
Looks okay	25	10.2
Needs improvement	13	5.3
The program (should be longer, shorter; is just the right length)		
Should be longer	34	14.8
Should be shorter	28	12.2
Is just right	168	73.0
I (would, would not) recommend this program to others as a tool for learning how to eat healthier		
Would recommend	198	88.4
Would not recommend	24	10.7
I (would, would not) recommend this program to others as a tool for learning about their own eating habits		
Would recommend	191	90.1
Would not recommend	21	9.9

TABLE 3—Reported Learning as a Result of the Little-by-Little CD-ROM: California, 1997

	n	Proportion of All Participants, %
Answered questions 1[a] and 2[b] (N = 284)		
Yes to either question	222	78.2
Yes to question 1	196	69.0
Yes to question 2	188	66.2
Selected goal (N = 284)		
Yes	166	58.5
No	66	23.2
No response	52	18.4
Put goal into practice (n = 103)		
Yes	52	50.5
Partially	10	9.7
No	41	39.8

[a] *Did you learn anything new about nutrition and health?*
[b] *Did you learn anything new about your own eating habits?*

stimulus or trigger for some users to begin that process.

The importance of nutrition screening and counseling is widely recognized.[15–22] Despite this, relatively few patient contacts actually include dietary screening and counseling,[23] and rarely are such activities performed in a truly preventive mode, *before* signs or symptoms of impending problems. At the clinical level, reasons for this have been examined.[23] "[Many physicians] lack the time and skills to obtain a thorough dietary history, to address potential barriers to changes in eating habits, and to offer specific guidance on food selection."[1(p632)] An additional reason is the lack of monetary support or reimbursement for the use of trained nutrition professionals in primary prevention.

These gaps in clinical preventive services are paralleled in community preventive services. Most community nutrition campaigns focus on education and information, which are desirable and necessary but not sufficient. They serve to raise awareness, perhaps move people into contemplation, but are rarely intensive enough to move the individual to action or to inform him or her of the problem areas in his or her own diet and the methods to remedy them.

The interactive CD-ROM designed by nutrition professionals that is described here appears to be useful in filling these gaps. It was based on established principles of behavior change, and the evaluation suggests that it was quite successful in stimulating respondents to begin actions to improve their diets. The average time spent on the program was brief, with a median time of 12 minutes; 90% learned something new; and more than half of those contacted later had actually put dietary prevention into practice.

We believe that this program can be useful in preventive medical practice and in community locations such as libraries, churches, food stamp offices, WIC and other nutrition support service locations, health fairs, and anywhere community preventive services can be provided. The evaluation of this CD-ROM in the Kaiser Permanente Hospital lobby and Health Education Center illustrates the extent to which managed care and health maintenance organizations can be significant providers of nutrition education and promotion for low-income persons at little additional cost. The successful use of the program in community settings also illustrates the practicality of such low-intensity efforts to reach the general public with screening and counseling that can lead to behavior change. □

Contributors

G. Block planned the study, analyzed the data, and wrote the paper. M. Miller developed the CD-ROM presentation. S. Kayman provided nutrition counseling advice. L. Harnack developed some of the nutrition messages. S. Mandel conducted the evaluation and the statistical analyses. S. Cristofar provided support and advice.

Acknowledgments

The study was supported by the US Department of Agriculture, Food and Nutrition Service.

The authors acknowledge the design and evaluation contribution of Dr Kathryn Kolasa, Dr Doris Disbrow, and Dr Clifford Block and the services provided by Carl Drake and Jennifer Tujague.

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