Patient Choice in Diabetes Education Curriculum

Nutritional versus standard content for type 2 diabetes

POLLY HITCHCOCK NOËL, PHD
ANNE C. LARME, PHD
JULIE MEYER, MSN
GENEVIEVE MARSH, MS
ALICIA CORREA, RN
JACQUELINE A. PUGH, MD

OBJECTIVE — To examine the effects of patient choice between two education curriculums that emphasized either the standard or nutritional management of type 2 diabetes on class attendance and other outcomes among a mostly Hispanic patient population.

RESEARCH DESIGN AND METHODS — A total of 596 patients with type 2 diabetes were randomly assigned to either a choice or no choice condition. Patients in the choice condition were allowed to choose their curriculum, while patients in the no choice condition were randomly assigned to one of the two curriculums. Outcomes were assessed at baseline and at a 6-month follow-up.

RESULTS — When given a choice, patients chose the nutrition curriculum almost four times more frequently than the standard curriculum. Contrary to our hypothesis, however, patients who had a choice did not significantly increase their attendance rates or demonstrate improvements in other diabetes outcomes compared with patients who were randomly assigned to the two curriculums. Patients in the nutrition curriculum had significantly lower serum cholesterol at a 6-month follow-up, whereas patients in the standard curriculum had significant improvements in glycemic control. Of the randomized patients, 30% never attended any classes; the most frequently cited reasons for nonattendance were socioeconomic. Hispanic patients, however, were just as likely as non-Hispanic patients to attend classes and participate at the follow-up. Patients who attended all five classes of either curriculum significantly increased their diabetes knowledge, gained less weight, and reported improved physical functioning compared with patients who did not attend any classes.

CONCLUSIONS — Although providing patients with a choice in curriculums at the introductory level did not improve outcomes, differential improvements were noted between patients who attended curriculums with different content emphasis. We suggest that diabetes education programs should provide the opportunity for long-term, repetitive contacts to expand on the modest gains achieved at the introductory level, as well as provide more options to match individual needs and interests and to address socioeconomic barriers to participation.

The generalizability of diabetes education research is limited by the fact that the majority of programs reported in the literature have focused on middle-class, non-Hispanic whites (1). One study has suggested that diabetes education participation rates are lower for Mexican-Americans than non-Hispanic whites and are significantly lower than that for African-Americans (2). Furthermore, several studies have reported that the attrition rate of African-Americans from diabetes educational programs is higher than those of non-Hispanic whites (3–5), but little is known about the attrition rates of Hispanics. Patient characteristics that have been associated with higher attrition rates include minority status, less education, lower income, poorer health status, and more perceived barriers to self-care (6).

Because of a lack of published data, it is unclear if Hispanics have lacked access to diabetes education or if Hispanics avoid traditional education programs that are perceived to be culturally irrelevant. Clinical observations (7,8) and a few published interventions (1,9) suggest that minority individuals are more responsive to culturally sensitive approaches to diabetes education. Because the majority of patients within our health care system are Hispanic, we have tried to develop a diabetes education program that uses bicultural and bilingual educators, translated materials for patients for whom Spanish is the preferred language, and other culturally relevant teaching aids (e.g., food models of tortillas).

In spite of these efforts, we continued to experience high attrition rates in our education program. Initial no-show rates were as high as 50% (although some of these were rescheduled), while program dropout rates were 45%. Although these rates are similar to those reported in the diabetes education literature (10,11), we were dissatisfied. While much of the attrition may have been due to the economic barriers plaguing our low-income population, informal conversations indicated that our patients also wanted more information regarding food content and preparation. Although many of our patients were aware of the importance of changing their eating habits, they were uncertain how to apply the American Diabetes Association's (ADA) nutritional principles to their traditional foods.

Tailoring educational content to issues perceived by the patient as salient may be one way to improve program completion rates (12). The lack of choice and the one-size-fits-all approach of many diabetes education programs may contribute to the poor attendance rates reported in the literature. Patients who are provided with an educational program that matches their expressed interests may be more likely to

From the University of Texas Health Science Center (P.H.N, A.C.L., J.M., G.M., J.A.P.); the Audie L. Murphy Division of the South Texas Veterans Health Care System (G.M., J.A.P.); the Texas Diabetes Institute/University Health System (A.C.); and the Mexican American Medical Treatment Effectiveness Center (G.M., J.A.P., P.H.N.), San Antonio, Texas.

Address correspondence and reprint requests to Polly Hitchcock Noël, PhD, ALMD-UTHSCSA, Ambulatory Care 11C6, 7400 Merton Minter Blvd., San Antonio, TX 78284.

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Abbreviations: ADA, American Diabetes Association; ANCOVA, analysis of covariance; ANOVA, analysis of variance; MCS, mental component score; PCS, physical component score.

attend and complete classes. If their specific concerns are addressed, patients may be more motivated to adopt self-management practices that correspond to these interests, as well as be more receptive to other aspects of self-care. Offering a choice could therefore help improve overall patient compliance.

The incorporation of patient choice into a randomized design could also address some criticisms of conventional randomized controlled trials (13,14). Patients with a preference for a particular treatment may be less willing to participate in a controlled study if treatment assignment is left to chance (13). Similarly, patients may be more likely to drop out of a controlled trial if they have been assigned to a less-preferred treatment (13). If patients have a chance of a choice, they may be more willing to participate, and the study sample may be more representative of the population. Incorporation of choice into research designs could also provide valuable information on the role that patient motivation may have on dropout rates.

Therefore, we designed a randomized trial examining the effects of patient choice between two curriculums that emphasized either standard or nutritional content for type 2 diabetes. While both curriculums covered topics recommended by the ADA, the enhanced nutritional curriculum was modified so as to spend more class time on topics such as modifying the amount of fat and cholesterol in traditional foods. Although the nutritional curriculum increased the amount of content devoted to dietary issues, it was not as in-depth as some nutritional or weight-loss interventions that have been described in the literature (15). Instead, our intent was to offer patients a choice that was responsive to their interests and informational needs within the confines of an introductory level diabetes education program and to examine the effect on attendance rates and other outcomes. Our hypothesis was that patients who were allowed to choose their curriculum would have higher attendance rates and better improvements in knowledge and other diabetes outcomes than patients who were randomly assigned to curriculums.

RESEARCH DESIGN AND METHODS

Participants

A total of 596 adults with type 2 diabetes participated in the study at an ambulatory care center within a tax-supported county health care system in the Southwest. Patients were either physician- or self-referred for diabetes education. Inclusion criteria were adults 18 years of age or older who had not attended or completed diabetes education classes within the previous 12 months and who received the majority of their health care at the health care system where the study took place.

Measures

Class satisfaction. Patient satisfaction with diabetes education was assessed in two ways. Patients completed a questionnaire that was based on the Diabetes Treatment Satisfaction Questionnaire (DTSQ) (16) but modified to assess satisfaction with education classes (e.g., Would you recommend this class to someone else with your kind of diabetes?). Patients who attended at least one class were also asked to rate the helpfulness of the classes (e.g., 1 = very helpful, 4 = not helpful at all).

Factors affecting class attendance. Patients who did not attend all five classes were also asked an open-ended question at the follow-up to assess life circumstances or attitudes that interfered with attendance.

Diabetes knowledge. We created a modified version of the Michigan Diabetes Knowledge Tests (17) by selecting a pool of 16 items from Michigan's parallel forms A and B that most closely corresponded to the content of the two patient education curriculums. A 17th item for testing general understanding of the use of insulin was added. The wording of some of the items was modified to reflect the vocabulary used with our bilingual/bicultural population. Internal consistency (Modified Kuder Richardson 20 [KR20]) for the test with a subsample of 20 patients was 0.93, indicating good reliability.

Self-care behaviors. Patients were asked to indicate the frequency in which they engaged in several self-care or preventive behaviors (e.g., exercise).

Functional status. The SF-36 (18) was used to assess functional health status. The survey is composed of eight subscales that can be combined to yield a physical component score (PCS) and a mental component score (MCS). The SF-36 is sensitive to clinical characteristics, such as frequency and severity of diabetes complications and demonstrates good internal consistency in patients with type 2 diabetes (19).

Importance of diabetes care. Importance of diabetes care was assessed with a single item. Patients rated the importance of taking care of their diabetes on a 4-point scale (e.g., 1 = one of the most important things in my life, 4 = not important to me at all).

HbA_{1c}. Metabolic control, or the average blood glucose level over the past 8–12 weeks, was assessed by HbA_{1c} assay. HbA_{1c} values were determined with a Bio-Rad DIAMAT Fully Automated Glycosylated Hemoglobin Analyzer System using the principles of ion exchange high-performance liquid chromatography. The 95% CI for this method is 4.3–6.1% (20).

Other physiological measures. Fasting serum cholesterol was also collected and analyzed by the certified hospital laboratory. BMI was calculated from height and weight measurements.

Procedure

Eligible patients were randomly assigned to either a choice or no choice condition using a computer-generated randomization scheme carried out by a secretary who was unaware of baseline patient characteristics. Patients in the choice condition were then provided with written neutral descriptions of the two curriculums and then were assigned to the curriculum of their choice. Patients in the no choice condition were randomly assigned to either curriculum. All patients were allowed to choose either English or Spanish versions of their curriculum. Patients in both conditions attended the 5 weekly 2-h sessions free of charge and received a modest incentive for participating.

At 1–4 weeks before attending classes, patients were assessed with the measures described above. Bilingual data collectors interviewed patients in accordance with their stated language preference, using, as needed, parallel Spanish language versions that had been created using recommended translation procedures (21). Blood samples and the other physiological measurements were also obtained at this time. Immediately following the final session of the 5-week class sequence, patients completed a class satisfaction survey. The patient quantitative survey, HbA_{1c}, and physiological measures were repeated 6 months after patients completed the classes. Strategies to minimize dropouts from follow-up assessments included up to five attempts to contact patients by phone, a letter to those who were unreachable by phone, home visits to individuals who were unable to return to the clinic for assessment, and attempts to reschedule patients who were no-shows for appointments.

Table 1—*Content of standard and nutrition curriculum*

Class	Standard	Nutrition
1	What is diabetes?	What is diabetes?/Meal planning
2	Exercise and diet	Complications/Healthy eating habits
3	Meal planning/New food labels	Foot care/Exercise/Fats and cholesterol
4	Sick day management/Foot and dental care	Dental care/High-fiber foods
5	Complications/Infections	Sick day management/New food labels

Table 2—*Patient baseline characteristics*

n	596
Female	62.8
Hispanic	84.7
Preferring spanish language	25.5
Married	52.2
Taking insulin	32.7
Taking oral medications	59.9
HbA_{1c} (%)	9.0 ± 2.2
Age (years)	50.7 ± 10.9
Education (years)	9.1 ± 4.0
Diabetes duration (years)	6.7 ± 8.1
BMI (kg/m²)	33.3 ± 7.5

Data are % or means ± SD.

Intervention

The two curriculums were taught by two separate groups of diabetes educators. The standard program was our "usual care" diabetes education program based on ADA's recommendations for type 2 diabetes. It devoted ~60% of its content to nonnutritional management practices and ~40% of its content to nutritional management (Table 1). The experimental nutritional program modified the ADA's recommended curriculum to devote ~60% of its content to nutritional management practices and ~40% of its content to nonnutritional management. In addition to varying the amount of time devoted to nutritional issues, there were slight differences in content. In the standard program, patients were given a meal plan and advised to make many dietary changes at once. The nutritional program did not provide a specific meal plan, but instead recommended that patients use the food pyramid as a guideline and promoted gradual, continuous changes in eating habits. In addition, educators assigned to the standard program took measures of blood glucose, blood pressure, and weight when patients arrived for class as a usual care practice. No standardized instruction was provided at this time.

Statistical analysis

The χ^2 and *t* tests were used to assess differences between groups at baseline and between patients who did and did not participate in follow-up assessments. Spearman's rank correlation coefficients were also calculated to measure the association between class attendance and attitudinal variables. The effects of the two factors of interest, choice (no choice versus choice) and curriculum (standard versus nutritional), and their interaction (choice × curriculum) on attendance were assessed using a 2 × 2 analysis of variance (ANOVA). Other outcomes were assessed using 2 × 2 analysis of covariance (ANCOVA). Pretest values were used as covariates to control for baseline differences between groups on the two factors. An intention-to-treat principle was also applied in that baseline values were substituted for any missing follow-up values, so as to include all enrolled patients in the analyses. In addition, repeated measures ANOVA was used to test differences in outcomes over time of patients who attended one or more classes compared with patients who did not attend any classes.

RESULTS

Patient descriptive statistics

Patient baseline characteristics are summarized in Table 2. The majority of patients were Hispanic (n = 505) and female (n = 374). Patients ranged in age from 18 to 91 years. Although the average diabetes duration was 6.72 years, 29.4% had a duration of ≤1 year. Most patients were taking oral agents to control their diabetes (n = 357). The majority of patients (n = 359) were obese with BMI >30 kg/m². Only 203 patients had HbA_{1c} levels of ≤7%.

Choice

Of the 596 patients who were enrolled in the program, 305 were assigned to the choice condition and 291 were assigned to the no choice condition (Fig. 1). Of the 305 patients in the choice condition, significantly more patients chose the nutrition program (78%) than the standard program (22%, Z = 9.91, $P < 0.0001$). There were no significant differences in sex or baseline BMI between patients who chose the nutrition program and those who chose the standard program.

Attendance and follow-up participation

Of the 596 patients who were enrolled and randomized, 177 (29.7%) patients never attended any classes (Table 3). There were no significant differences in ethnic group membership between the patients who did not attend any classes and those who attended one or more classes (χ^2 = 0.24, NS). Although the choice and nutrition groups had higher rates of completing all five classes compared with the no choice and standard groups, an ANOVA did not indicate any statistically significant differ-

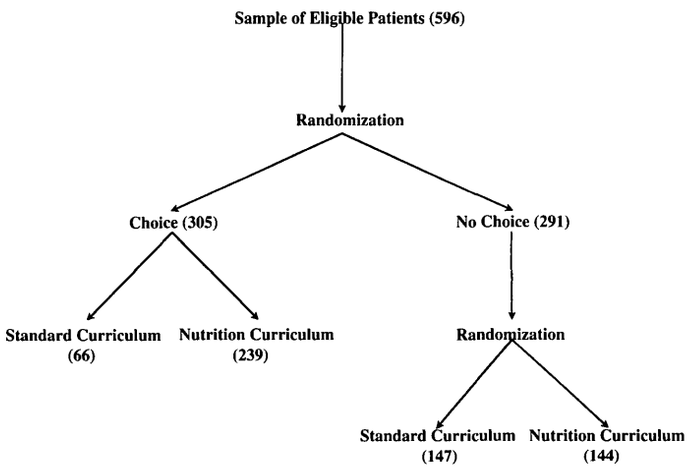

Figure 1—*Study design.*

Table 3—*Class attendance by total enrollees, choice, curriculum type, and follow-up participants*

Classes attended (*n*)	Enrolled patients	Choice	No choice	Nutrition	Standard	Follow-up participation
0	177 (30)	86 (28)	91 (31)	104 (27)	73 (34)	102 (24)
1	43 (7)	20 (7)	23 (8)	27 (7)	16 (8)	26 (6)
2	29 (5)	13 (4)	16 (5)	18 (5)	11 (5)	20 (5)
3	22 (4)	11 (4)	11 (4)	12 (3)	10 (5)	17 (4)
4	43 (7)	17 (6)	26 (9)	32 (8)	11 (5)	32 (7)
5	282 (47)	158 (52)	158 (52)	124 (43)	190 (50)	233 (54)
Total	596	305	291	383	213	430

Data are *n* or *n* (%).

ences in the number of classes attended between groups on the choice factor [choice (2.94 classes) versus no choice (2.79 classes); $F(1,592) = 0.55$, $P = 0.46$] or on the curriculum factor [standard (2.69 classes) versus nutrition (3.04 classes); $F(1,592) = 2.95$, $P = 0.09$]. The interaction term also failed to reached significance. Furthermore, there were no significant differences between participants' ratings of class satisfaction either on the choice factor ($P = 0.25$) or on the curriculum factor ($P = 0.11$).

Of the original 596 patients, 430 (72%) were available for follow-up. Of the patients lost to follow-up, 55 failed to keep scheduled appointments, 15 refused to participate, 5 were known to have moved out of town, 5 died, and 4 were unable to participate because of hospitalization or illness. The remaining 82 patients were unreachable (e.g., either did not respond to contact attempts, their phones were disconnected, or had apparently moved without leaving forwarding addresses). Patients who did not participate in the follow-up were significantly younger ($t = -7.12$, $P < 0.0001$), more likely to be male ($\chi^2 = 5.29$, $P < 0.05$), and to have attended fewer classes ($t = -6.26$, $P < 0.0001$) than patients who did participate in follow-up assessments. There were no significant differences between follow-up and non–follow-up participants on choice condition, ethnicity, diabetes duration, baseline levels of glycemic control, or BMI.

Of the 430 patients on whom we have follow-up data, 233 attended all five classes (54%), 95 attended some classes (22%), and 102 (24%) did not attend any classes. The most frequently reported reasons for nonattendance included illness (20%), inability to leave work (19%), family obligations or emergencies (19%), and transportation problems (16%). A total of 10% reported that their nonattendance was related to a communication or customer-service problem within the hospital system (e.g., doctor told not to attend classes, etc.); 6% reported or suggested motivational problems (e.g., forgot); 5% cited inconvenient class times, and another 5% indicated that the classes were not helpful or did not meet their needs. Class attendance was not correlated with either perceived helpfulness of the classes ($rs = 0.35$; NS), or with perceived importance of diabetes self-care ($rs = 0.06$; NS).

Analysis of other outcomes

An analysis of covariance, controlling for baseline values, yielded no significant differences between groups on any of the dependent variables with respect to the choice factor (Table 4), indicating that patient outcomes were not enhanced by choice of curriculum. There were significant differences between the curriculum groups, however, on two of the outcomes. After controlling for baseline levels of glycemic control, there were significant differences in follow-up HbA_{1c} levels [$F(1,595) = 4.46$, $P < 0.05$], with standard subjects achieving greater improvement in glycemic control than the nutrition subjects. After controlling for baseline levels of cholesterol, there were significant differences in follow-up cholesterol levels, with the nutrition class participants achieving a

Table 4—*Baseline and 6-month means and* P *values of intention-to-treat ANCOVA comparing choice and curriculum type*

Dependent variables	Choice (*n* = 305) Baseline	Choice (*n* = 305) 6 months	No choice (*n* = 291) Baseline	No choice (*n* = 291) 6 months	Choice (*P* value)	Nutrition (*n* = 383) Baseline	Nutrition (*n* = 383) 6 months	Standard (*n* = 213) Baseline	Standard (*n* = 213) 6 months	Curriculum (*P* value)	Interaction (*P* value)
Knowledge	11.9	12.7	11.8	12.4	0.0925	11.7	12.4	12.0	12.7	0.5881	0.6096
Self-care behaviors											
HBG monitoring/day	0.82	0.88	0.75	0.79	0.1213	0.77	0.82	0.80	0.87	0.2961	0.1341
Exercise sessions/week*	1.80	2.71	2.04	2.78	0.2737	1.83	2.64	2.07	2.94	0.2411	0.1102
Home foot checks/day	0.49	0.73	0.53	0.71	0.2268	0.52	0.73	0.49	0.70	0.9621	0.4292
HbA_{1c} (%)	9.0	8.5	9.1	8.4	0.6627	9.0	8.5	9.1	8.2	0.0352	0.7558
Serum cholesterol (mmol/l)	5.05	5.05	5.16	5.15	0.8694	5.11	5.04	5.09	5.22	0.0394	0.3748
BMI (kg/m^2)	33.6	33.7	32.9	33.1	0.9348	33.3	33.5	33.2	33.3	0.6850	0.4093
SF-36 PCS†	39.9	40.2	38.8	40.4	0.2431	39.2	39.9	39.7	40.9	0.7045	0.3627
SF-36 MCS	44.8	46.2	45.7	46.6	0.8514	45.1	46.7	45.6	45.8	0.0938	0.8768

*20 min or more; †higher scores indicate better functioning.

Table 5—*Baseline and follow-up means, and P values for repeated measures ANOVA comparing patients who did not attend any classes and those who attended all five classes of either curriculum*

Dependent variable	Attended 0 classes (n = 102)		Attended 5 classes (n = 233)		F (P value)
	Baseline	6 months	Baseline	6 months	
Knowledge	11.40	11.69	11.94	13.32	0.0001
Self-care behaviors					
Home blood glucose monitoring/day	0.80	0.70	0.84	0.97	0.0733
Exercise sessions/week*	1.86	2.72	1.86	3.20	0.1899
Home foot checks/day	0.37	0.70	0.60	0.91	0.7889
HbA_{1c} (%)	8.85	8.30	9.06	8.15	0.9971
Serum cholesterol (mmol/l)	5.28	5.26	5.04	5.01	0.3844
BMI (kg/m^2)	32.5	33.1	33.8	34.0	0.0472
SF-36 PCS†	39.66	39.01	39.09	41.43	0.0087
SF-36 MCS†	44.08	45.48	47.86	49.35	0.8816

*20 min or more; †higher scores indicate better functioning.

greater average decrease than the standard class participants [$F(1,595) = 4.27$; $P < 0.05$]. None of the interaction terms were significant, indicating that the outcomes of patients in the two curriculums were not differentially affected by the ability (or inability) to choose curriculum type.

Comparison of attenders versus nonattenders

A repeated measures ANOVA was used to assess changes over time from baseline to follow-up for patients who attended all five classes compared with patients who did not attend any classes. The results (Table 5) indicate that patients who completed the five-class sequence had significantly greater improvements from baseline to follow-up compared with those who did not attend any classes on knowledge, BMI (indicating less weight gain), and the physical component scores on the SF-36, but not HbA_{1c}, cholesterol, reported self-care behaviors, or the mental health component scores on the SF-36.

CONCLUSIONS — When given a choice, patients chose the nutrition curriculum almost four times more frequently than the standard curriculum. This was consistent with the interest in nutritional topics expressed by our mostly Mexican-American population in informal surveys. However, there were no apparent significant benefits in outcomes provided by this choice. Contrary to our hypothesis, patients who were allowed to choose their curriculum did not have significantly higher attendance rates or significantly better improvements in diabetes knowledge or other clinical outcomes compared with patients who were randomly assigned to the two different curriculum types. Although patients who had a choice clearly preferred the nutrition curriculum before attending the classes, patients appeared equally satisfied in their ratings of the two different curriculums by the end of the five-class sequences.

Benefits provided by the two different curriculums in terms of patient outcomes were also similar, with two exceptions. Patients who participated in the nutrition curriculum had significantly lower serum cholesterol at the 6-month follow-up than patients who had attended the standard curriculum. This is not surprising given that the modification of fat and cholesterol in traditional Mexican-American foods was a focus of the nutrition curriculum. In contrast, patients participating in the standard classes achieved significantly greater improvements in metabolic control than patients in the nutrition classes. While the reasons for this are not entirely clear, the standard curriculum did spend more instruction time on medication usage and blood glucose monitoring than the nutrition curriculum. It is also possible that the individualized blood glucose monitoring that patients received at the beginning of each standard class may have contributed to this outcome. Although patients did not receive standardized counseling in this regard, they may have received reinforcement for positive changes.

This study also provided detailed information about dropout rates and factors that interfered with class attendance among the mostly Mexican-American sample. In spite of a culturally sensitive approach, ~30% of randomized patients never attended any classes. This, however, was an improvement over our previous education program no-show rates of 50%. Furthermore, we were able to document that Hispanic patients were just as likely to attend classes and participate at follow-up as the non-Hispanic patients. Patients who did not participate in follow-up assessments were more likely to be younger, male, and to have attended fewer classes than follow-up participants, suggesting that more targeted strategies are needed to facilitate their participation in diabetes education research.

Attendance was apparently unrelated to perceived helpfulness of the classes or importance of diabetes self-care. Follow-up patients were most likely to report illness, inability to get off from work, family obligations or emergencies, and transportation problems as the most frequent reasons for not attending classes. The findings suggest that more aggressive strategies (e.g., community outreach programs) are needed to help this population overcome socioeconomic barriers to participation in diabetes education programs and research.

The results also indicate that both curriculums provided a few modest benefits for the patients who attended one or more classes compared with the dropouts who did not attend any classes at all. Patients who attended all five sessions of either curriculum significantly increased their knowledge about diabetes, gained less weight, and improved their self-reported physical functioning compared with patients who did not attend any classes. Although the lack of significantly different

improvements on the other outcomes might at first glance seem discouraging, the results parallel findings from the stage of change and lifestyle intervention literature that it takes time to acquire self-management practices for chronic diseases (22,23).

Our education program is typical in terms of instructional time (600 min). For example, in a 1990 meta-analysis of diabetes educational interventions among the 48 trials for which such information was reported, the average amount of patient contact time was 524 min (24). It is perhaps unrealistic to expect that such short-lived educational programs can produce the motivation, acquisition of knowledge and skills, and actual behavior changes needed for lifelong optimal diabetes self-management. This suggests that diabetes education programs should provide the opportunity for long-term, repetitive, and multilayered contacts. It is our belief that initial modest gains in knowledge and other aspects of self-care can lay the foundation for future learning. In this case, patient choice may not be as important at the introductory level when patients initially benefit more from a general overview of diabetes education. When patients "graduate" from introductory programs, however, curriculums on advanced topics may still be useful in targeting areas of patient deficiency and enhancing self-management. Our long-term goal is to develop a menu of educational choices, such as insulin adjustment and weight management, that can be matched to individual needs and motivation.

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References

1. Brown SA, Hanis CL: A community-based, culturally sensitive education and group-support intervention for Mexican Americans with type 2 diabetes: a pilot study of efficacy. *Diabetes Educ* 21:203–210,1995
2. Coonrod BA, Betschart J, Harris MI: Frequency and determinants of diabetes patient education among adults in the U.S. population. *Diabetes Care* 17:852–858, 1994
3. Bloomgarden ZT, Karmally W, Metzger MJ, Brothers M, Nechemias C, Bookman J, Faierman D, Ginsberg-Fellner F, Rayfield E, Brown WV: Randomized, controlled trial of diabetic patient education: improved knowledge without improved metabolic status. *Diabetes Care* 18:29–33, 1987
4. Brownlee-Duffeck M, Peterson L, Simmons JF, Goldstein D, Kilo C, Hoette S: The role of health beliefs in regimen adherence and metabolic control of adolescents and adults with diabetes mellitus. *J Con Clin Psychol* 55:139–144, 1987
5. Wierenga ME, Wuethrich KL: Diabetes program attrition: differences between two cultural groups. *Health Values* 19:12–21, 1995
6. Irvine AA, Mitchell CM: Impact of community-based diabetes education on program attenders and nonattenders. *Diabetes Educ* 18:29–33, 1992
7. Davidson JA: Diabetes care in minority groups. *Postgrad Med* 90:153–168, 1991
8. Martinez NC: Diabetes and minority populations. *Nurs Clin North Am* 28:87–95, 1993
9. Elshaw EB, Young EA, Saunders MJ, McGurn WC, Lopez LC: Utilizing a 24-hour recall and culturally specific diabetes education in Mexican Americans with diabetes. *Diabetes Educ* 20:228–235, 1994
10. Kaplan RM, Davis WK: Evaluating the costs and benefits of outpatient diabetes education and nutrition counseling. *Diabetes Care* 9:81–86, 1986
11. Glasgow RE, Eakin EG, Toobert DJ: How generalizable are the results of diabetes self-management research? The impact of participation and attrition. *Diabetes Educ* 22:573–585, 1996
12. Goodall TA, Halford WK: Self-management of diabetes mellitus: a critical review. *Health Psychol* 10:1–8, 1991
13. Bradley C: Designing medical and educational intervention studies: a review of some alternatives to conventional randomized controlled trials. *Diabetes Care* 16:509–518, 1993
14. Leventhal H, Nerenz DR, Leventhal EA, Love RR, Bendena LM: The behavioural dynamics of clinical trials. *Prev Med* 20:132–146, 1991
15. Campbell LV, Barth R, Gosper JK, Jupp JJ, Simons LA, Chisholm DJ: Impact of intensive educational approaches to dietary change in type 2 diabetes. *Diabetes Care* 13:841–847, 1990
16. Bradley C: Diabetes Treatment Satisfaction Questionnaire: (DTSQ). In *Handbook of Psychology and Diabetes*. Bradley C, Ed. Chur, Switzerland, Harwood Academic, 1994, p. 111–132
17. Hess GE, Davis WK: The validation of a diabetes patient knowledge test. *Diabetes Care* 6:591–596, 1983
18. Ware JE, Kosinski M, Keller SD: *SF-36 Physical and Mental Health Summary Scales: A User's Manual*. Boston, MA, The Health Institute, 1994
19. Jacobson AM, De Groot M, Samson JA: The evaluation of two measures of quality of life in patients with type I and type II diabetes. *Diabetes Care* 17:267–274, 1994
20. Carter JS, Houston CA, Gilliland SS, Perez GE, Owen CL, Pathak DR, Little RR: Rapid HbA_{1c} testing in a community setting. *Diabetes Care* 19:764–770, 1996
21. Brislin RW, Lonner WJ, Thorndike RM: *Cross-Cultural Research Methods*. New York, Wiley, 1983
22. Prochaska JO, Velicer WF, Rossi JS, Goldstein MG, Marcus BH, Rakowski W, Fiore C, Harlow LL, Redding CA, Rosenbloom D, Rossi SR: Stages of change and decisional balance for 12 problem behaviors. *Health Psychol* 13:39–46, 1994
23. Prochaska JO, DiClemente CC, Norcross JC: In search of how people change: applications to addictive behaviors. *Am Psychol* 47:1102–1114, 1992
24. Brown SA: Studies of educational interventions and outcomes in diabetic adults: a meta-analysis revisited. *Patient Educ Counsel* 16:189–215, 1990