

# Assessment of Group Versus Individual Diabetes Education

## A randomized study

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**OBJECTIVES** — The current study was conducted to compare the effectiveness of delivering diabetes education in either a group or individual setting using a consistent, evidence-based curriculum.

**RESEARCH DESIGN AND METHODS** — A total of 170 subjects with type 2 diabetes were randomly assigned to either group ( $n = 87$ ) or individual ( $n = 83$ ) educational settings. Subjects received education in four sequential sessions delivered at consistent time intervals over a 6-month period. Outcomes included changes in knowledge, self-management behaviors, weight, BMI, HbA<sub>1c</sub>, health-related quality of life, patient attitudes, and medication regimen. Changes were assessed at baseline and after the 2-week, 3-month, and 6-month education sessions.

**RESULTS** — Both educational settings had similar improvements in knowledge, BMI, health-related quality of life, attitudes, and all other measured indicators. HbA<sub>1c</sub> decreased from  $8.5 \pm 1.8\%$  at baseline to  $6.5 \pm 0.8\%$  at 6 months ( $P < 0.01$ ) in the study population as a whole. Subjects assigned to the individual setting had a  $1.7 \pm 1.9\%$  reduction in HbA<sub>1c</sub> ( $P < 0.01$ ), whereas subjects assigned to the group setting had a  $2.5 \pm 1.8\%$  reduction in HbA<sub>1c</sub> ( $P < 0.01$ ). The difference in HbA<sub>1c</sub> improvement was marginally greater in subjects assigned to group education versus individualized education ( $P = 0.05$ ).

**CONCLUSIONS** — This study demonstrates that diabetes education delivered in a group setting, when compared with an individual setting, was equally effective at providing equivalent or slightly greater improvements in glycemic control. Group diabetes education was similarly effective in delivering key educational components and may allow for more efficient and cost-effective methods in the delivery of diabetes education programs.

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The current economic burden of diabetes is staggering, accounting for \$98 billion dollars in direct and indirect health care costs annually (1). Diabetes care currently accounts for ~9% of all expenditures for health care in the U.S. (2). Given the significant financial burden of diabetes, health systems are seeking increasingly effective and efficient means of providing diabetes care.

One critical component of initial dia-

betes care is patient education. The effectiveness of diabetes education on patient outcomes has been summarized and reviewed in detail (3,4). Current evidence suggests that diabetes education has an overall beneficial impact on health and psychosocial outcomes. Specifically, improved patient knowledge and behavior has been shown to improve glycemic control in diverse settings (5–7), although a thorough description of the types of inter-

ventions administered in these studies that led to this success has been lacking (8). Furthermore, many of these studies lack a complement of outcomes measures, and little is known about the relative impact of these interventions on immediate (learning), intermediate (behavior), postintermediate (clinical indicators), and long-term outcomes of quality of life and health status (9,10).

To limit variation in educational interventions and provide a consistent format, the National Standards for Diabetes Self-Management Education Programs (DSMEs) were developed and recently revised (11). These standards state that patients with diabetes require both knowledge and skills to manage their disease, which result in more informed choices and beneficial changes in behavior. Appropriate self-management behavior, in turn, improves clinical indicators and reduces the risk of secondary complications. Based on this evidence-based supposition, the seven outcome areas of diabetes education recently defined by the American Association of Diabetes Educators (AADE) and the 10 content areas identified in the National Standards for DSMEs are stated in behavioral terms—with expectations to guide the educators in their method of delivery of promoting behavior change, rather than the traditional approach of focusing on knowledge (11,12).

One of the most important factors influencing the manner in which diabetes education has been delivered over the past decade is the fiscal constraints imposed on such programs. The movement to group-based education was supported by the Balanced Budget Act of 1997, and it resulted in uniform reimbursement for diabetes education from the Health Care Finance Administration (HCFA). This outcome had the secondary effect of encouraging diabetes education programs to deliver education in a group versus individual setting. The HCFA ruling suggests that group sizes for education

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**Abbreviations:** DSME, Diabetes Self-Management Education Program; HCFA, Health Care Finance Administration; MNT, medical nutrition therapy.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

should ideally consist of 2–20 members, or an average of 10 individuals (13).

To date, there have been no studies performed specifically comparing the effectiveness of diabetes education delivered in a group versus an individual setting. The current study was designed to evaluate the effectiveness of a diabetes education curriculum delivering consistent content areas provided in either a group (consisting of four to eight members) or individual setting. Interventions in both settings emphasized empowering the patient, by increasing knowledge, facilitating self-management behavior change, and modifying perceptions, while achieving clinical success.

## RESEARCH DESIGN AND METHODS

### Study population

Study subjects were recruited continuously over a 2-year period between April 1997 and July 1999. Inclusion criteria included subjects with type 2 diabetes who were referred to our education center by their primary care provider. Subjects were either newly diagnosed with diabetes or previously diagnosed and with no history of prior systematic diabetes education. All patients were treated with medical nutrition therapy (MNT) and/or oral therapy. Patients were aged 30–80 years, had no identifiable language barrier or known mental disability, and were willing to participate in the study. The study protocol was reviewed and approved by the Protocol Review Committee and Institutional Review Board of Park Nicollet Health Services.

### Randomization

Randomization occurred at the time of initial referral for education at our center. When referred, subjects were informed of the study and asked if they were willing to participate in either group or individual education, and if they agreed to participate, informed consent was obtained. Subjects were then randomly assigned to either a group or individual setting in block sizes of six. The first three consecutive subjects were assigned to the group setting, with the next three subjects assigned to the individual setting. After the first year of recruitment, block size was increased to 10 to increase efficiency in scheduling while maintaining random and equal opportunity for allocation. A

total of 170 subjects were randomly assigned to the group setting ( $n = 87$ ) or individual setting ( $n = 83$ ). Once subjects completed their initial visit, follow-up sessions were scheduled as outlined in the education curriculum at intervals of 2 weeks, 3 months, and 6 months in both the group and individual education programs.

### Intervention

The individual and group diabetes education program was composed of four sessions designed to meet the needs of the adult learner and consisted of 5–7 h of education, respectively. The program, which meets the National Standards of DSMEs, is an adult education program designed to provide basic education skills for patients with type 2 diabetes. The program was delivered in a large outpatient diabetes center using a classroom setting for the groups and individual consult rooms for individual sessions. The curriculum includes topics based on “need to know” versus “nice to know” information and is staged to provide specific content at appropriate times. The initial visit was 3 h for group and 2 h for individual education. The 2-week follow-up session was 2 h for group and 1 h for individual education. The 3-month and 6-month follow-up sessions were 1 h for both group and individual instruction. Additional time was scheduled for the group visits at the first two sessions to account for the demands of group dynamics and the group education process. Group size was set at four to eight subjects, a number designed to be manageable without diminishing the opportunity for individualization within each group. All individual sessions were one-on-one. A diabetes nurse specialist (RN) and diabetes nutrition specialist (RD) presented all four sessions in both settings.

The knowledge areas covered included all areas required by the National Standards for DSMEs (11). Skills taught included carbohydrate counting, portion control, meal spacing, and self-monitoring of blood glucose. Education also included information on physical activity, heart-healthy eating, foot care, sick day management, monitoring for diabetes complications, self-management problem solving, and information regarding the progression of type 2 diabetes. Patients were taught to monitor their behavior by keeping food and blood glucose records

and were encouraged to set treatment and behavior goals.

A conceptual framework, which provided the structure of the program, was germane to its development. The framework chosen identified the principles behind the learning objectives, the methodology, and the timing and staging of content (14). The following is a summary of the conceptual models used for the development of this program.

- Adult learning model: supports self-management and control. The learning session is related to personal interactive processes. Incremental, “need to know” information is given in a supportive and social learning environment (14).
- Public health nursing model: focuses on disease prevention and health promotion, with reductions in long-term complications (15).
- Health belief model: addresses the patient’s belief that behavior change can enhance control over their diabetes and facilitates this effort. The support of these behavior changes and attitudes is demonstrated in the methodology and educational materials (16).
- Transtheoretical model: incorporates the stages of change, which moves a patient from precontemplation to action by using cognitive learning concepts. The group support concept serves to enhance the support system, which moves the patient from action to continued compliance (17).

As indicated above, the curriculum content was structured to address knowledge, skills, and attitudes that would encourage, support, and promote self-management skills leading to long-term behavior maintenance. Implementation of this conceptual framework into a practical curriculum that could be delivered over an efficient time period was a significant challenge, but it ultimately focused on knowledge and information, problem-solving, feedback of food and blood glucose records, group dynamics, and goal setting, with an emphasis on collaborative education. Didactic education was limited to the first session, with increased interaction and discussion during subsequent sessions. Interactive instruction primarily included meter training; pattern control; problem solving for high blood glucose, low blood glucose, and sick days; and meal planning. The content

was sequential, successive, and cumulative, with each session building on the foundation of the previous sessions. The emphasis was on support and encouragement, development of achievable goals, and reinforcement of success achieved, with focus on positive and neutral reinforcement. The content of the curriculum was supported by an integrated data collection and evaluation system. A peer-reviewed education and clinical outcomes flow sheet developed over a 2-year period was key to documenting, monitoring, and managing the outcomes of interest. This tool also alerted the educators to overdue processes and measurements outside the normal range, which ultimately aided in prioritizing individualized strategies at each visit. The curriculum and data collection system were developed and subsequently published by the International Diabetes Center (18).

In addition to the curriculum format and educational intervention, the relationship between patient, educator, and provider were instrumental to the success of the curriculum (19). For example, each of the study investigators was trained on the curriculum and group dynamics before enrolling patients into the study. Furthermore, it was essential that the RN and RD education team have a working knowledge of the efficacy and safety of different classes of diabetes medications. As a result, they received training in Staged Diabetes Management, a practice management program developed at the International Diabetes Center. This program identifies recommended standards of treatment and care, sets target goals and testing times, and assists in consistent clinical decision making (20). The intent of this training, however, was not to engage the education team in case management. Each primary care provider was responsible for specific medication changes, while still allowing the education team to make informed decisions in the overall context of diabetes care.

### Measurements

Data were collected at baseline, 2 weeks, 3 months, and 6 months for all patients entering the education program. Variables of interest included learning, behavioral, and clinical measurements as well as medication regimens and survey assessments. The primary learning and behavioral outcomes included knowledge test scores as assessed by a 14-point validated

and reliable knowledge test, self-reported exercise frequency (times/week) and duration (average minutes per activity), and behavioral goal achievement. Specifically, behavioral goals were initiated at the 2-week session and evaluated at both the 3- and 6-month follow-up sessions. Subjects were asked if the goal was met  $\geq 80$ , 50–80, or  $< 50\%$  of the time. Clinical outcomes of interest included glycemic control as measured by changes in HbA<sub>1c</sub> (measured by standard laboratory methods, normal range 4.2–6.0%); weight; and BMI (in kg/m<sup>2</sup>).

Survey assessments included an adjustment-to-diabetes instrument (ATT19), the Medical Outcomes Study short form (SF-36), and a general satisfaction survey. The ATT19 is an abridged version of the ATT39, measuring psychosocial adjustment and attitudes toward diabetes using a 19-item self-reported questionnaire with a corresponding five-point Likert scale. The SF-36 is a global health-related quality of life instrument measuring quality of life in both physical and mental health component scores. In addition, eight scale scores can be generated in the following domains: general health, physical functioning, role-physical, role-emotional, vitality, social functioning, mental health, and pain. The satisfaction scale is a four-point Likert scale measuring the degree to which the patient feels they can control their diabetes as a result of the education program. The validity and reliability of both of the ATT19 and SF-36 instruments have been well documented and tested in a variety of populations (21,22). All of the aforementioned assessments were measured immediately before the education intervention.

### Data analysis

Descriptive characteristics of the study patients in each treatment arm were calculated as means  $\pm$  SD for continuous variables and as percentages for categorical variables. For the majority of study variables, changes within each educational setting were calculated by determining differences between baseline and 6-month measurements and testing these mean differences using paired Student's *t* tests. Comparisons between treatment arms at 6 months were conducted using  $\chi^2$  tests for categorical variables and two-sample *t* tests for continuous variables. *F* tests to assess the equality of the two variances being tested were also employed to

determine whether a Student's *t* test with equal or unequal variance was more appropriate. In addition, ANOVA was used to determine which variables significantly predicted HbA<sub>1c</sub> improvement within and between educational settings. All analyses were performed using SAS, version 8.0 (Cary, NC).

Both the ATT19 and the SF-36 were scored based on information or scoring algorithms either provided in the literature or purchased by the investigators. The mean scores for the ATT19 were calculated by summing the five-point Likert scales assigned to each question. For consistency, questions 11, 15, and 18 were reverse-scored. Thus, the ATT19 has a range of scores from 19 to 95, with higher scores representing less adjustment to, or poorer attitudes with, living with diabetes (21). To score the SF-36, a customized SAS program code was purchased. The two component scores of physical and mental health have a population average of roughly  $50 \pm 10$  points, and higher scores indicate a higher perceived quality of life in these domains (22).

**RESULTS** — Descriptive characteristics of the study population, including age, sex, ethnicity, education level, duration of diabetes, height, weight, BMI, and HbA<sub>1c</sub> are summarized in Table 1. With the exception of weight and HbA<sub>1c</sub>, baseline data on these subjects did not differ significantly by educational setting. Of the 170 study subjects, 154 (91%) completed the 2-week session, 122 (72%) completed the 3-month session, and 92 (54%) completed the entire 6-month program. Altogether,  $\sim 50\%$  (43 of 87) of the participants in the group setting and 59% (49 of 83) of the participants assigned to the individual setting completed the program. Descriptive characteristics of subjects completing all four sessions of the program were similar to subjects not completing the entire program (data not shown).

For subjects completing the program in both educational settings, outcomes of knowledge, weight, BMI, attitude, and mental health-related quality of life significantly improved over the study period within each group (Table 2). As Table 2 also indicates, the improvements demonstrated in program completers at 6 months were not significantly different between the group and individual setting. In the entire study cohort, HbA<sub>1c</sub> de-

Table 1—Mean descriptive characteristics of 170 individuals entering a comprehensive diabetes education program by educational setting

Characteristic	Overall	Group (n = 87)	Individual (n = 83)	P
Age (years)	52.5 ± 11.1	51.6 ± 9.2	52.9 ± 12.8	0.68
Sex (% female)	65.9	64.4	67.5	0.67
Race (% Caucasian)	92.9	89.5	96.4	0.13
Education (% high school/or lower)	24.7	25.3	24.1	0.86
Duration of diabetes (years)	0.9 ± 3.1	1.1 ± 4.0	0.6 ± 1.7	0.30
Weight (lbs)	230.9 ± 46.1	222.4 ± 39.4	239.5 ± 50.9	0.02
Height (inches)	68.8 ± 4.5	68.2 ± 4.1	69.4 ± 4.8	0.09
BMI (kg/m <sup>2</sup> )	34.4 ± 6.3	33.8 ± 6.1	34.9 ± 6.5	0.24
HbA <sub>1c</sub> (%)	8.5 ± 1.8	8.9 ± 1.9	8.0 ± 1.7	<0.01

Data are means ± SD or %.

creased from 8.5 ± 1.8% at baseline to 6.5 ± 0.8% at 6 months ( $P < 0.01$ ). Subjects completing the program assigned to the individual setting had a 1.7 ± 1.9% reduction in HbA<sub>1c</sub> ( $P < 0.01$ ), whereas subjects assigned to the group setting had a 2.5 ± 1.8% reduction in HbA<sub>1c</sub> ( $P < 0.01$ ). The difference in HbA<sub>1c</sub> improvement was marginally greater in subjects assigned to group versus individual education setting ( $P = 0.05$ ). The majority of the improvement in HbA<sub>1c</sub> was achieved by 3 months in each educational setting, and these improvements were maintained at 6 months in subjects completing the program. By the end of the study period, the proportion of well-controlled subjects (HbA<sub>1c</sub> <7.0) in each educational setting exceeded 80%. Furthermore, although a difference in program effectiveness between educational settings was the primary hypothesis of interest, as measured

in program completers, we also evaluated the data using an intent-to-treat analysis with all available data. After controlling for baseline HbA<sub>1c</sub>, we also noted no significant difference in HbA<sub>1c</sub> improvement by educational setting in the population overall, regardless of program completion.

Changes in treatment were assessed in both the overall study cohort and in each educational setting. At baseline, 50% of patients in the group setting were treated with pharmacological therapies, whereas only 24% of those in the individual setting were receiving medication in addition to MNT. This relative difference was sustained throughout the study (with 61 and 49% maintained on pharmacological therapy at 3 and 6 months, respectively, in the group setting compared with 33 and 31% of subjects in the individual setting). In general, medication classes (MNT only versus MNT and oral agents)

were not significantly altered after the 2-week session. Although there was a significant decrease ( $P < 0.01$ ) in HbA<sub>1c</sub> for each medication class, those subjects who received oral agent therapy at 2 weeks and 6 months had a 3% mean reduction in HbA<sub>1c</sub>, whereas those on MNT achieved a 1% mean reduction in HbA<sub>1c</sub>.

Thus, the presence of oral agent therapy was a significant predictor of HbA<sub>1c</sub> improvement in the overall population ( $P < 0.01$ ), independent of study completion, and within each education setting ( $P < 0.01$ , group;  $P < 0.01$ , individual). However, more importantly, each treatment regimen achieved a comparable mean level of metabolic control (HbA<sub>1c</sub> <7%) by the completion of the program.

**CONCLUSIONS**— This study uniquely demonstrates that group and individual diabetes education are equally effective

Table 2—Learning, behavioral, and clinical outcomes in 92 individuals completing a comprehensive diabetes education program by intervention format

Measurement	Intervention format						Mean differences* (P)
	Group (n = 43)			Individual (n = 49)			
	Baseline	6 Months	P	Baseline	6 Months	P	
Knowledge test (14 points)	8.4 ± 2.7	12.6 ± 1.6	<0.01	7.6 ± 2.8	12.5 ± 1.5	<0.01	0.15
Exercise frequency (times/week)	2.1 ± 1.7	2.4 ± 2.0	0.37	2.1 ± 1.7	2.3 ± 1.9	0.37	0.97
Exercise duration (min/activity)	20.2 ± 18.0	23.8 ± 20.1	0.38	19.1 ± 17.5	21.6 ± 18.7	0.39	0.83
Goal achieved (%)	—	76.3†	—	—	82.9†	—	0.49
Weight (lbs)	224.3 ± 32.9	218.5 ± 33.2	<0.01	227.8 ± 51.4	217.4 ± 49.1	<0.01	0.16
BMI (kg/m <sup>2</sup> )	34.1 ± 5.9	33.3 ± 6.1	0.11	33.6 ± 7.1	32.1 ± 7.0	<0.01	0.13
HbA <sub>1c</sub> (%)	9.0 ± 1.6	6.5 ± 0.7	<0.01	8.2 ± 1.7	6.5 ± 0.9	<0.01	0.05
ATT-19 survey	47.0 ± 9.0	41.3 ± 9.0	<0.01	44.1 ± 9.6	39.3 ± 10.3	<0.01	0.64
SF-36 mental scale	51.1 ± 8.8	54.3 ± 8.3	<0.01	50.3 ± 10.1	53.2 ± 10.1	0.04	0.82
SF-36 physical scale	49.4 ± 8.4	50.1 ± 7.3	0.63	48.5 ± 8.3	50.0 ± 7.5	0.93	0.69

Data are means ± SD. \*Comparison of change over time between education setting (hypothesis: mean change in group setting = mean change in individual setting).

†Percentage of participants indicating achieving behavioral goal 50–80 or >80% of the time during the study period.

when using a consistent curriculum systematically delivered over a defined time frame. The unique findings of this study include the observation that education in either setting resulted in similar improvements in learning, behavioral, and clinical outcomes. Improvement in glucose control was comparable in the two study populations, with slightly greater reduction in HbA<sub>1c</sub> values reported in the group when compared with the individual setting. However, despite this small difference, mean HbA<sub>1c</sub> levels for both settings were similar at the 6-month follow-up (<7.0%). Whether this small difference in HbA<sub>1c</sub> level between groups indicates a significant advantage of the group education process versus individualized education cannot be determined from a small randomized trial. It does, however, suggest that group education does not offer any significant disadvantage when compared with individualized education programs. Moreover, the higher rate of use of glucose-lowering medications in the group education subjects cannot be excluded as a potential contributor to this relatively small difference.

Patient well-being, as assessed by a satisfaction survey administered at the end of the 2-week, 3-month, and 6-month follow-up sessions, noted positive responses in both settings. Due to the anonymity of these surveys, satisfaction was not tied to the outcomes described above and, as such, is not reported. The aggregate findings, however, reinforce that education, whether delivered in a group or individual setting, can fulfill a patient's perceived needs. Subjects expressed satisfaction with the program, citing repetition and review of content as both practical and valuable. Importantly, comments from a satisfaction survey may assist educators in evaluating the ongoing effectiveness of their teaching and can assist educators in curriculum design and modification of teaching methods. In the future, systematic collection of such qualitative feedback will be critical because it may be a key component if the success of this program is to be replicated in other educational settings.

In view of the recent HCFA regulations, careful assessment of the effectiveness of group education is essential. Our finding of similar effectiveness of group education provides strong incentive for all diabetes education programs to con-

sider the regular use of group education programs—both to serve the ever-expanding population with diabetes and to maximize the cost-efficiency of such programs. Before initiating the current study, we found that educating more than eight individuals in a group did not allow for appropriate individualization when needed, such as in reviewing food and blood glucose records and obtaining weight and blood pressure. Larger group sizes may limit the opportunity for individual interaction and require a greater amount of didactic teaching, thereby reducing the effectiveness of the intervention. Determining optimal group size for any diabetes education program will require further study and will also be constrained by both space limitations and staff availability.

Although the current program did not involve case management, the results are consistent with a recent publication by Aubert et al. (23) demonstrating that nurse case management could improve glycemic control in subjects with diabetes treated in a managed care setting. This report demonstrated a 1.7% reduction in HbA<sub>1c</sub> in the nurse case management group, who received close monitoring and follow-up, versus a 0.6% reduction in HbA<sub>1c</sub> in the usual care group, who were followed by primary care physicians. In our unpublished audit of those individuals with diabetes who were referred to the diabetes education center but who did not attend an initial session during the study period (i.e., "usual care"), we also noted no significant improvement in glucose control. Unlike the nurse case management findings, however, we were able to demonstrate improved learning, behavioral, and clinical outcomes in an education model, independent of the educational setting. Our model limited follow-up care outside the scheduled sessions, such as telephone calls, individual counseling, or additional medical management for diabetes. These findings were achieved with 5–7 h of education versus the 12-h tailored education program used in the nurse case management study (23). Exact comparisons, however, are limited by the fact that our study population was newly diagnosed with type 2 diabetes, whereas the nurse case management population had a median diagnosis of 6 years, and large differences existed in the standardized delivery of evidence-based dia-

betes education between these two studies.

Despite the unique findings reported in our trial, there are several limitations to the current study that must be reviewed. First, the relative homogeneity of the populations studied limits the potential application of these results to other clinical settings. Whether the conceptual framework of our program can be used in other settings or used with a more diverse patient population remains to be determined. Regardless, most education programs will benefit from the use of a consistent curriculum and specific educational materials tailored to the specific needs and barriers in a population. Second, the retention rate for our study subjects was 54% at the 6-month follow-up visit, suggesting a need to better assess reasons for drop out from the education program. Although a 54% return rate is consistent with the diabetes outcomes studies reported in the recent summary by Norris et al. (4), educators must systematically document reasons for discontinuation from such programs in order to maximize efficiency and retention. The retention rate in our study was likely impacted by a variety of factors, including a change in health care coverage or referring provider, psychosocial issues, or a lack of interest or perceived significance with the program. For example, subjects may not feel the need to return if they have the information at hand to review at a later time. To quantify these issues, we queried a subset of subjects that did not return for the 6-month follow-up visit. These subjects indicated a number of consistent reasons for withdrawal from the education program, such as relocation, a schedule that would not permit them to leave work, other family commitments, or the perception that they were doing well and did not see the value in returning. Third, our study provided follow-up care of only 6 months duration. This follow-up interval was due to the established duration of the education program and, as such, the investigators were unable to measure maintenance of long-term outcomes in the study population. Ideally, continued outcome evaluation at 6- or 12-month intervals would be highly informative to more fully evaluate the long-term effects of the educational intervention. Finally, although the investigators measured a variety of outcomes, we did not assess the impact of education on

other significant risk factors or comorbid conditions, such as smoking cessation, dyslipidemia, or hypertension. Although smoking and other comorbidities were briefly addressed with all subjects, along with recommendations for continued and ongoing education, the impact of specific intervention on risk factors other than glucose will require further evaluation.

Thus, further research will be required to determine whether group education can achieve results comparable with individual education when used in other settings. Determination of optimal group size, in regard to both the effectiveness of the intervention and the efficient use of staff and resources, also remains to be determined. Although small-group education is likely to be a more cost-efficient means of providing diabetes education, there remains a significant gap in our understanding of the factors involved in evaluating the cost-effectiveness of delivering education in a group versus an individual setting. Specific evaluation of the health economic impact of such delivery will serve to clarify the role of group and individual education in successful diabetes management programs.

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