ORIGINAL RESEARCH

The Efficacy of Diabetes Patient Education and Self-Management Education in Type 2 Diabetes

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ABSTRACT

OBJECTIVE: The goal of this randomized, controlled trial was to compare the 6-month efficacy of didactic diabetes patient education to a model that augmented this education with a self-management program.

METHODS: Adults with type 2 diabetes were randomly assigned to a group that received diabetes patient education or to a group that received this education augmented by a community self-management program. Outcome measures were taken at baseline and 6 months. Analysis included pre- and 6-month-post–program paired comparison for each group; a comparison of change between groups; and an intent-to-treat comparison of change between groups.

RESULTS: At baseline, there were no between-condition differences with respect to behavioural or biological outcomes or healthcare utilization. The pre- and 6-month-post–program comparison found statistically significant improvements in both groups in terms of glycated hemoglobin (A1C) and weight, and the experimental group had statistically significant improvements in 4 additional outcomes. A 12-month analysis found that baseline scores were statistically lower for both A1C and weight in the experimental group and statistically higher than baseline A1C in the control group.

CONCLUSION: Augmenting diabetes patient education with a low-cost community self-management education program brought about additional improvements. Study limitations included self-selection of participants, short-term study duration and lack of comparison studies.

KEYWORDS: diabetes patient education, randomized controlled trial, self-management education

RÉSUMÉ

OBJECTIF : Cet essai contrôlé avec répartition aléatoire avait pour objet de comparer l'efficacité, après six mois, d'un programme d'éducation sur le diabète à un modèle associant ce programme à un programme d'autogestion.

MÉTHODES : Des adultes atteints de diabète de type 2 ont été répartis au hasard pour participer au programme d'éducation sur le diabète seulement ou à ce programme et à un programme communautaire d'autogestion. Des mesures ont été effectuées au départ et six mois plus tard. Trois analyses ont été effectuées : une comparaison par paires des valeurs obtenues avant le programme et après six mois dans chaque groupe, une comparaison du changement entre les groupes et une comparaison en intention de traiter du changement entre les groupes.

RÉSULTATS : Au départ, il n'y avait pas de différences entre les groupes pour ce qui est des comportements, des valeurs biologiques ou de l'utilisation des services de santé. La comparaison entre les mesures effectuées avant le programme et six mois plus tard a montré qu'il y avait eu des améliorations statistiquement significatives dans les deux groupes de l'hémoglobine glycosylée (HbA_{1c}) et du poids. Dans le groupe expérimental, il y a eu des améliorations statistiquement significatives de quatre autres mesures. Une analyse effectuée douze mois plus tard a montré que les scores de base étaient statistiquement plus bas tant pour le taux d'HbA_{1c} que pour le poids dans le groupe expérimental et statistiquement plus hauts pour le taux d'HbA_{1c} dans le groupe témoin.

CONCLUSION : L'association d'un programme communautaire d'autogestion peu coûteux à un programme d'éducation sur le diabète a produit d'autres améliorations. Les limites de l'étude étaient l'auto-sélection des participants, la courte durée de l'étude et le manque d'études de comparaison.

MOTS CLÉS : éducation des patients diabétiques, essai contrôlé avec répartition aléatoire, éducation sur l'autogestion

INTRODUCTION

The United States (US) national standards for diabetes self-management education (1) and the Canadian Diabetes Association 2008 clinical practice guidelines (2) provide a comprehensive description of the evidence-based education that is effective for improving clinical outcomes and quality

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of life for people with diabetes. Education that couples diabetes disease management with behavioural strategies—namely the use of action plans and problem solving—has been shown to bring about improved outcomes (3). Therefore, the standards and guidelines strongly specify that education should be interactive and presented in behavioural terms to exemplify the importance of action-oriented behavioural goals and objectives, and that goal setting, action planning/follow-up and problem-solving skills are effective strategies. The International Diabetes Federation has formulated a strong position statement on diabetes self-management, advocating that people with diabetes need to understand the nature of their illness; identify emerging health problems at early, reversible stages; adhere to self-care practices; and make needed changes to their health habits (4).

The standards and guidelines are consistent with the literature advocating the involvement of registered nurses, dietitians and pharmacists as key primary educators, but they also cite literature supporting the involvement of lay health and community workers and peers in providing information and behavioural support (5). The goal of this randomized, controlled trial was to compare the 6-month efficacy of didactic diabetes patient education that focused on disease management to the same program augmented by participation in a community peer-led self-management program that taught and reinforced the use of action planning, follow-up and problem solving.

METHODS

The standard protocol for diabetes care in British Columbia, Canada, is that adults diagnosed with type 2 diabetes are referred to a diabetes education centre. Between April 2004 and December 2006, all persons referred to the diabetes education centre at Richmond Hospital, Richmond, British Columbia (approximately 1400 in total) were informed about this study. Diabetes education centre staff explained the purpose and process of the study, and inquired about patients' interest in participating. The majority of adults (n=1079) indicated they were too busy to participate in a study that involved additional diabetes education. Those who were interested (n=321) were given a copy of the study consent form, which they reviewed with a staff member, and provided their signature. Ethical approval for this project was obtained from the University of Victoria Human Research Ethics Committee and Richmond Health Services Delivery Area Research Advisory Committee.

Diabetes education staff made arrangements with the laboratory to obtain metabolic data (glycated hemoglobin [A1C], high-density lipoprotein cholesterol [HDL-C] and low-density lipoprotein cholesterol [LDL-C]) and recorded patients' self-reported weights. Patients then completed 2 self-administered questionnaires. The first questionnaire inquired about the following:

a) Self-management behaviours (i.e. communication with physician, amount of time doing aerobic exercise, amount of time doing stretching/strengthening exercise and number of times in the last week a relaxation technique was practiced) (6).
b) Self-efficacy to manage symptoms and emotional distress (6).
c) Health status (i.e. self-rated health) (7), social/role activities limitations (6), health distress (7), fatigue, shortness of breath and pain severity (6).
d) Medical care utilization in the last 6 months (number of doctor appointments, visits to hospital emergency room, times hospitalized and nights in hospital).

The second questionnaire was the Diabetes Empowerment Scale (8). This scale contains 28 questions comprising 3 subscales: managing the psychosocial aspects of diabetes (9 items); assessing dissatisfaction and readiness to change (9 items); and setting and achieving diabetes goals (10 items). This scale is a valid and reliable measure of diabetes-related psychosocial self-efficacy.

Completed questionnaires were sent to the project coordinator at the University of Victoria, who randomly assigned each subject to a group that would receive regular diabetes patient education (control group) or a group that would receive the same education and also participate in a local Stanford Chronic Disease Self-Management Program (CDSMP) (experimental group). Randomization involved summing the last 3 numbers of patients' provincial health number and assigning those with even numbers to one group and odd numbers to the other. Subjects in both groups received diabetes patient education delivered in group format by a certified diabetes educator nurse and dietitian over a 2-day period. The education delivered at the centre was consistent with the 2003 Canadian Diabetes Association *Standards for Diabetes Education in Canada* (9).

After attending diabetes patient education, subjects in the experimental group were mailed a schedule of self-management programs taking place in their community to select the program they wished to attend. The coordinator contacted subjects who had not responded within 2 weeks to assist them with their selection. A maximum of 2 contacts were initiated, the first being the mailed course schedule, and the second the telephone call to subjects who had not responded. The Stanford CDSMP (10) involves participants with a variety of chronic health conditions. Each CDSMP is delivered by 2 program leaders, who successfully complete a 4-day training workshop and demonstrate they can deliver the program following a scripted leader manual (11). Leaders are trained by pairs of master trainers who have completed an additional 4½-day training workshop, during which they learn to use a master trainer manual to train new program leaders. Pairs of trained leaders deliver

the CDSMP to groups of 10 to 12 people for 2½ hours once per week for 6 consecutive weeks. Participants are considered to have completed the CDSMP if they attend at least 4 of the 6 sessions. A review of CDSMP attendance records of an earlier sample of 4000 participants in British Columbia showed mean attendance was 4.3 sessions (unpublished data). In this study, all 82 participants attended at least 4 of the 6 sessions.

The program teaches general skills for living with and managing chronic health condition(s), including the following: a) problem-solving skills, which involve problem definition, generation of possible solutions, solution implementation and evaluation of results; b) decision-making (making day-to-day decisions in response to their disease conditions); c) seeking out and using resources; d) building a partnership with healthcare providers by reporting the trends and tempo of their disease, making informed decisions about treatment and discussing these with their healthcare provider; and e) taking action by making short-term action plans and carrying them out.

In the CDSMP, participants obtain new information, learn new skills and abilities, and develop higher levels of self-confidence to manage and cope with chronic health conditions. The sessions are highly interactive, with emphasis on strategies to help individuals manage more effectively. It includes skills mastery (accomplished through weekly contracting to do specific behaviours and through feedback) and modelling (accomplished by leaders with chronic conditions). As well, there are frequent group problem-solving sessions. The 82 experimental group subjects participated in 1 of 15 CDSMPs being offered in their local area during the study period, led by 15 different pairs of program leaders.

In total, 321 people registered in the study; 169 were randomly assigned to the experimental group, and 152 to the control group. These target sample sizes were determined by referring to multiple sources for previous results. This author's pilot study [12] showed a standard deviation of 0.008 in pre- to six-month post program A1C scores. A review of the literature determined that a clinically relevant mean pre- to post-program change in A1C was 0.005. Allowing for a small placebo effect of 0.001 in the control group, and to achieve 80% power and a 5% 2-tailed significance level, a sample size of 64 per group was required. The sample sizes were increased to approximately 165 per group to allow for detection of smaller changes in A1C (0.0035 to 0.001). The final sample size (82 subjects in the experimental group and 152 in the control group) was therefore considered adequate for this study.

Six months after attending the diabetes education program, subjects were contacted by diabetes education centre staff to obtain A1C, HDL-C and LDL-C lab results. The project coordinator also mailed questionnaires to subjects.

The study was designed as an efficacy study; that is, the main research question was whether outcomes of subjects who attended the community CDSMP were different from outcomes of subjects in the control group. For an efficacy study, the question is whether the intervention can work if subjects do indeed receive the intervention. Hence, the analysis plan involved comparisons of the control group with that subset of the experimental group who took the CDSMP (i.e. a protocol-compliant experimental group). For completeness, a secondary, intent-to-treat analysis compared the control group to the full experimental group (i.e. those who took the CDSMP and those who did not).

Five sets of analysis were undertaken. To begin, baseline outcome measures within the assigned experimental group were done to compare the 82 subjects who attended the CDSMP with the 87 subjects who did not attend. As well, baseline comparisons were made between the experimental group subjects and control group subjects. Two-sample t-tests were used for quantitative variables and chi-square tests of independence for categorical variables.

Next, matched comparisons of pre- and 6-month-post–program findings were done with paired t-tests and Wilcoxon rank tests for quantitative outcomes. A comparison of change (calculated by subtracting Time 2 minus Time 1 between the experimental and control groups) was carried out using 2-sample t-tests and Mann-Whitney rank tests, and analysis of covariance (ANCOVA) to adjust for baseline differences.

An intent-to-treat analysis of change scores between groups was carried out using all subjects originally assigned to the experimental group—not just those who attended the CDSMP. Finally, an exploratory comparison of groups with respect to 12-month changes was carried out on a subset of cases for whom 12-month data were available, using the same tests as were used for the 6-month comparisons.

Mann-Whitney tests were used to compare group changes for the number of visits to the doctor, visits to a hospital emergency room, times hospitalized for 1 night or longer and total number of nights spent in hospital in the last 6 months.

RESULTS

In total, 321 people registered in the study; 169 were randomly assigned to the experimental group, and 152 to the control group. Of the 169 subjects randomly assigned to the experimental group, only 82 (49%) agreed to take the community CDSMP after receiving diabetes patient education, even though they had all agreed to so when they registered in the study. The main reasons provided for not wanting to take the community CDSMP were as follows: not able to take time off work (n=19), not having transportation to travel to the program location (n=6), not feeling comfortable with the English language (n=12) and not being

interested in taking more patient education (n=50). Five subjects in the experimental group and 15 subjects in the control group did not complete the 6-month-post–program questionnaire. The reasons for not completing the 6-month follow-up for subjects in the experimental group were as follows: moved and could not be located (n=3) and illness (n=2). Reasons for the control group were as follows: moved and could not be located (n=1), illness (n=1), out of the country (n=1) and refused to complete the questionnaire (n=12). Therefore, the analysis was based on 77 subjects in the experimental group and 137 in the control group.

Baseline comparisons

Table 1 shows demographics and key baseline measures for subjects in the control group and 2 subgroups of the assigned experimental group (attendees and non-attendees). Subjects in the control and experimental groups (attendees) were similar with respect to age, sex, education, ethnic origin, marital status, time since diagnosis, height, lipid profile and presence of other health conditions. Subjects in the control group were heavier (83 vs. 80 kg) and had higher A1C levels (7.1 vs. 6.8%) than those in the experimental group (attendees).

Pre- to 6-month-post–program and comparison of groups

Paired t-tests and Wilcoxon rank tests showed statistically significant ($p<0.0125$ using the Bonferroni method for multiple testing) reductions in weight and A1C in both groups at 6 months post-program of ~3% weight loss and ~6%, respectively. The experimental group also had statistically significant improvements in self-rated health; health distress; communication with doctors; number of times a relaxation technique was practiced in the previous week; and in the 3 subscales of the Diabetes Empowerment Scale (setting and achieving goals, managing psychosocial aspects and assessing readiness to change). The experimental group had statistically significantly greater changes than the control group in self-rated health, communication with doctor and 2 subscales of the Diabetes Empowerment Scale. An analysis of covariance using baseline weight and A1C levels did not find a significant effect of the covariates on the level of change in the 2 groups. Table 2 shows the pre- and 6-month-post–program means and significance, as well as 6-month change means and significance for outcome measures.

Table 3 shows that while there was no change in the mean number of times subjects were hospitalized for 1 night

Table 1. Baseline characteristics of subjects in the experimental, control and no course groups

	Experimental group (n=82)	*Control group (n=152)*	*No-course group (assigned to experimental group) (n=87)*
Age, y	55 (12)	59 (12)	55 (11)
Sex, %			
Female	54	55	40
Male	46	45	60
Education, y	14 (4)	14 (3)	14 (3)
Ethnic origin, %			
English	51	54	36
Chinese	15	9	12
Filipino	7	9	12
Married/partner, %	71	72	77
Time since diagnosis, y	2.8 (4.6)	2.8 (5.2)	3.4 (4.9)
Height, cm	168 (10)	170 (20)	170 (13)
Weight, kg	80 (15)	83 (19)	85 (22)
A1C, %	6.8 (1.2)	7.1 (1.5)	7.5 (1.5)
HDL-C, mmol/L	1.19 (0.74)	1.15 (0.35)	1.01 (0.34)
LDL-C, mmol/L	2.81 (1.11)	2.79 (0.81)	2.79 (0.79)
Other conditions, %			
Heart	9	11	9
Hypertension	55	49	40
Lung	5	5	3

A1C = glycated hemoglobin
HDL-C = high-density lipoprotein cholesterol
LDL-C = low-density lipoprotein cholesterol

Data are mean (SD) unless otherwise indicated

Table 2. Pre- and 6-month-post–program means and significance, and 6-month change means and significance

*Outcome measure**	*Experimental (n=82)*			*Control (n=152)*			*Experimental*	*Control*	
	Pre-program, mean (SD)	Post-program, mean (SD)	p value†	Pre-program, mean (SD)	Post-program, mean (SD)	p value†	6-month change, mean (SD)	6-month change, mean (SD)	p value‡
Health status									
Self-rated health (1–5) ↓	2.82 (0.81)	2.50 (0.89)	<0.01§	2.85 (0.92)	3.01 (0.89)	0.07	–0.32 (0.82)	0.17 (0.85)	<0.01§
Health distress (0–5) ↓	1.69 (1.29)	1.35 (1.0)	<0.01§	1.51 (1.24)	1.46 (1.23)	0.66	–0.34 (0.99)	–0.05 (0.99)	0.05
Social/role activity limitations (0–4) ↓	0.70 (1.03)	0.62 (0.86)	0.44	0.68 (0.97)	0.80 (1.05)	0.17	–0.08 (0.95)	0.13 (0.88)	0.13
Fatigue (0–10) ↓	4.09 (2.79)	3.50 (2.50)	0.02	4.15 (2.45)	4.16 (2.50)	0.97	–0.59 (0.23)	0.01 (2.3)	0.09
Shortness of breath (0–10) ↓	1.57 (2.19)	1.17 (1.81)	0.04	2.11 (2.57)	2.06 (2.37)	0.86	–0.40 (1.68)	–0.04 (2.37)	0.26
Pain (0–10) ↓	2.82 (2.94)	2.58 (2.46)	0.39	3.17 (2.92)	3.38 (2.83)	0.43	–0.23 (2.37)	0.21 (2.58)	0.24
Self-management behaviours									
Communication with doctor (0–5) ↑	2.62 (1.12)	2.96 (1.07)	<0.01§	2.40 (1.02)	2.26 (1.12)	0.27	0.34 (1.05)	–0.14 (1.16)	0.01§
Time doing stretching/strengthening exercise (0–4) ↑	0.99 (1.20)	1.12 (1.04)	0.35	0.96 (1.17)	1.04 (1.18)	0.61	0.14 (1.25)	0.07 (1.27)	0.75
Time doing physical exercise (0–4) ↑	0.50 (1.18)	0.72 (0.41)	0.14	0.75 (0.61)	0.74 (0.58)	0.91	0.22 (0.58)	–0.01 (0.66)	0.91
Times practiced relaxation in last week ↑	0.40 (1.23)	1.08 (2.32)	0.01§	0.98 (2.40)	0.94 (2.18)	0.91	0.68 (2.35)	–0.03 (2.68)	0.07
Self-efficacy									
Self-efficacy to manage symptoms (1–10) ↑	7.12 (2.51)	7.66 (2.39)	0.03	6.95 (2.86)	7.04 (2.73)	0.78	0.54 (2.12)	0.09 (3.00)	0.03
Self-efficacy to manage disease in general (1–10) ↑	7.11 (2.87)	7.54 (2.79)	0.11	7.03 (2.79)	7.21 (2.78)	0.55	0.43 (2.33)	0.18 (2.89)	0.54
Laboratory tests									
A1C, % ↓	6.8 (1.2)	6.4 (0.6)	<0.01§	7.1 (1.5)	6.7 (1.0)	0.01§	–0.50 (0.80)	–0.40 (1.30)	0.93
HDL-C, mmol/L ↑	1.24 (0.83)	1.20 (0.35)	0.70	1.15 (0.35)	1.18 (0.37)	0.21	–0.04 (0.81)	0.03 (0.19)	0.48
LDL-C, mmol/L ↓	2.66 (0.99)	2.74 (0.88)	0.38	2.76 (0.71)	2.58 (0.81)	0.62	0.08 (0.64)	–0.18 (0.79)	0.35
Weight, kg ↓	80.5 (15.3)	78.1 (15.1)	<0.01§	83.0 (18.0)	80.0 (17.4)	<0.01§	–2.40 (5.13)	–3.00 (4.8)	0.50
Diabetes empowerment									
Setting and achieving goals (1–5) ↑	3.94 (0.55)	4.14 (0.47)	<0.01§	3.96 (0.56)	3.88 (0.68)	0.24	0.20 (0.49)	–0.08 (0.64)	<0.01§
Managing psychosocial aspects (1–5) ↑	3.78 (0.67)	4.02 (0.57)	<0.01§	3.85 (0.61)	3.82 (0.69)	0.73	0.24 (0.61)	–0.03 (0.73)	0.02
Assessing readiness to change (1–5) ↑	3.77 (0.46)	4.05 (0.49)	<0.01§	3.81 (0.53)	3.76 (0.53)	0.48	0.30 (0.53)	–0.05 (0.61)	<0.01§

A1C = glycated hemoglobin
HDL-C = high-density lipoprotein cholesterol
LDL-C = low-density lipoprotein cholesterol

*Numbers in parentheses give range of the scales. Arrows (↓↑) indicate direction of improvement
†Paired t-tests were used to compare pre-program vs. post-program in each group
‡2-sample t-tests were used to compare the 2 groups with respect to 6-month change
§Statistical significance <0.0125 level (adjusted for multiple testing)

Table 3. Pre- and 6-month-post–program means and significance, and 6-month change means and significance for healthcare utilization

Healthcare utilization in last 6 months	*Experimental (n=75)*			*Control (n=90)*			*Experimental*	*Control*		
	Pre-program, mean (SD)	Post-program, mean (SD)	p value*	Pre-program, mean (SD)	Post-program, mean (SD)	p value*	6-month change, mean (SD)	6-month change, mean (SD)	p value†	p value‡
Number of doctor visits	3.20 (2.09)	2.35 (2.30)	0.002	3.34 (2.37)	2.62 (2.31)	0.007	0.85 (2.25)	0.72 (2.52)	0.74	0.63
Number of visits to emergency room	0.15 (0.49)	0.07 (0.38)	0.28	0.17 (0.48)	0.18 (0.61)	0.88	0.08 (0.63)	–0.01 (0.70)	0.38	0.48
Number of times hospitalized for 1 night or longer	0.05 (0.28)	0.01 (0.12)	0.26	0.04 (0.21)	0.10 (0.34)	0.13	0.04 (0.31)	–0.06 (0.35)	0.065	0.09
Total number of nights spent in hospital	0.40 (1.99)	0.17 (1.39)	0.32	0.10 (0.50)	0.48 (2.17)	0.08	0.23 (1.94)	–0.38 (2.03)	0.054	0.083

*Based on paired t-tests of dependent means

†Based on 2-sample t-tests of independent means

‡Based on Mann-Whitney rank test of 2 distributions

or longer in either group, there was a trend that subjects in the experimental group spent fewer nights in hospital (0.40 to 0.17), while subjects in the control group spent more nights in hospital (0.10 to 0.48). Nights patients spend in hospital is a significant healthcare expenditure, and certainly any intervention that suggests effectiveness in reducing hospital nights needs to be further investigated.

Intent-to-treat analysis

A similar set of analyses (2-sample t-tests, Mann-Whitney, ANCOVA) was carried out to compare the intent-to-treat experimental and control groups. There was a statistically significant change (p=0.008) with respect to assessing readiness to change subscale of the Diabetes Empowerment Scale; mean change in the experimental group was 0.183 (SD 0.61) and in the control group was –0.045 (SD 0.61).

Comparison of 12-month changes

An attempt was made to follow subjects beyond the 6-month-post–program period, but diabetes education centre staff were able to convince only a subset of subjects in both groups to return for repeated tests. In total, 12-month post-program A1C measures and weights were obtained for 40 and 51 subjects of the experimental group (attendees), and 55 and 88 subjects of the control group, respectively. At 12 months, experimental group subjects' scores were statistically lower than at baseline for both A1C (6.4 vs. 6.8%) and weight (79.2 vs. 80.0 kg), respectively. Mean weight in the control group was still lower than at baseline (78.5 vs. 83.0 kg), while mean A1C had risen from 7.1% at baseline to 10.6% at 12 months. However, because the samples were not random and sizes were small, one cannot draw inferences. A longer-term (i.e. 12 to 36 month) randomized, controlled trial would provide stronger evidence regarding the sustainability of changes.

DISCUSSION

This study compared the efficacy of a didactic model of diabetes patient education provided at a diabetes education centre in British Columbia, Canada, to that of a model that combined diabetes patient education with a community self-management program. Results showed that at 6 months post-program, subjects in both the experimental and control groups had made improvements in key diabetes measures, namely A1C level and weight. Adjustment for baseline A1C levels and weight did not account for the differences between experimental and control groups. The analysis found that for 4 outcome measures, the experimental group had statistically greater pre/post changes at 6 months than the control group. The intent-to-treat analysis found 1 statistically significant change between the groups. This was to be expected, since only about half of the experimental group subjects actually received the intervention; including these subjects in the analysis resulted in a diluting of the effect of the "add on" CDSMP.

The major significance of this study is that a non–disease-specific self-management intervention that taught subjects to use action plans and the problem-solving process was effective in bringing about improvements in a few outcome measures, over and above the effectiveness of didactic diabetes education that focused on disease management. While new Canadian, US and international guidelines encourage diabetes educators to incorporate self-management support strategies into patient education

(1,2,4), referring patients to community self-management programs is a cost-effective option.

The study also found that the group that participated in the self-management program showed improvements in 4 additional areas, in contrast to subjects in the control group, who had statistically worse scores in 2 areas. The study demonstrated that additional positive changes could be brought about by attending an "add-on" community self-management program. In recent years, self-management skills have been integrated into best practice diabetes education by the Canadian Diabetes Association (2) and the US national standards for diabetes self-management education (1) and are used by diabetes educators. Self-management programs have become widely available in most communities and are usually available at either no cost or a minimal fee. Two principles of effective patient education are to have programs and services available where they can be easily accessed and taken when people are ready and motivated. As A1C levels generally start increasing after 6 months following diabetes patient education, participation in a self-management program following diabetes patient education can provide a maintenance function, especially as the self-management programs focus on strategies that address lifestyles factors such as exercise and eating habits. Future studies need to investigate the optimal timing and "dose" of self-management programs following patient education. In addition, diabetes educators should encourage patients to take a community self-management program, as research has demonstrated that if people are encouraged to take the program by a health professional, they are 18 times more likely to do so (13). Community self-management programs should therefore be considered an extension and reinforcement to the diabetes patient education provided at diabetes education centres.

The study uses self-report data on weight and healthcare utilization. While self-report data is frequently used because of its accessibility and cost-effectiveness, there are problems with social desirability and recall bias (14). However, studies have indicated that self-reported and actual weights reached are reported with acceptable accuracy (15). A number of studies have reported fairly high concordance between self-reports and medical records of hospital care among the general population (16-19).

There were several limitations to this research. The first is that the results cannot be extrapolated to the larger population of adults with type 2 diabetes referred to a diabetes education centre, because only a portion of this population agreed to participate in the study. A second limitation is that longer-term follow-up could not be accomplished, as subjects were reluctant to return to the diabetes education centre for retesting, and only a small number of subjects were retested at 12 months. A third limitation is that it was not possible to compare the results of this study to similar studies, because the study team could not find published studies examining the efficacy of an intervention comprised of didactic diabetes patient education augmented by completion of the CDSMP, and could not find publications that examined the efficacy of diabetes patient education in British Columbia, Canada. This lack of efficacy evaluations was highlighted in the British Columbia Auditor General Report (20), which noted that diabetes education centres in British Columbia collected little performance information, and the norm was to focus on input measures of services provided (visits, attendance in a class, hours of class time) rather than on more patient-specific outcome information. While this type of information is necessary for ongoing budgeting and planning, major centres should be encouraged and supported to participate in efficacy studies by both provincial and federal funding as well as professional and legislative bodies.

CONCLUSION

A subset of patients receiving diabetes patient education agreed to also participate in a 6-week community self-management program. By examining pre- and post-program changes in self-report and biometric disease measures the findings suggest incorporating a low-cost community self-management program into routine diabetes care can bring about additional patient improvements. The community lay-led self-management program provided support for the clinical services delivered by diabetes health professionals and should be considered an adjunct to usual care.

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AUTHOR DISCLOSURES

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