Pharmacist-Led Shared Medical Appointments for Multiple Cardiovascular Risk Reduction in Patients With Type 2 Diabetes

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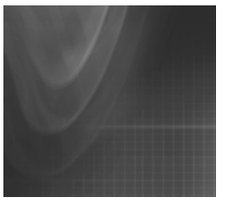

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Purpose

To assess whether VA MEDIC-E (Veterans Affairs Multidisciplinary Education and Diabetes Intervention for Cardiac risk reduction[EM DASH] Extended for 6 months), a pharmacist-led shared medical appointments program, could improve attainment of target goals for hypertension, hyperglycemia, hyperlipidemia, and tobacco use in patients with type 2 diabetes compared to standard primary care after 6 months of intervention.

Methods

A randomized, controlled trial of VA MEDIC-E (n = 50) versus standard primary care (n = 49) in veterans with type 2 diabetes, hemoglobin A1c (A1C) > 7%, blood pressure (BP) > 130/80 mmHg, and low density lipoprotein cholesterol (LDL-C) > 100mg/dl (2.59 mmol/l) in the previous 6 months was conducted. The VA MEDIC-E intervention consisted of 4 weekly group sessions followed by 5 monthly booster group sessions. Each 2-hour session included 1 hour of multidisciplinary diabetes specific healthy lifestyle education and 1 hour of pharmacotherapeutic interventions performed by a clinical pharmacist. Evaluation measures included lab values of A1C, LDL cholesterol, BP, and goal attainment of these values, and diabetes self-care behavior questionnaires at 6 months.

Results

The randomization groups were similar at baseline in all cardiovascular risk factors except for LDL, which was significantly lower in the MEDIC-E arm. At 6 months, significant improvements from baseline were found in the intervention arm for exercise, foot care, and goal attainment of A1C, LDL-C, and BP but not in the control arm.

Conclusions

The results of this study demonstrate that the pharmacist-led group intervention program for 6 months was an efficacious and sustainable collaborative care approach to managing diabetes and reducing associated cardiovascular risk.

Cardiovascular disease is the leading cause of death in patients with diabetes mellitus and is largely preventable by simultaneous control of cardiovascular risk factors.[1-5] Current guidelines for comprehensive diabetes management include intensive pharmacologic and behavioral interventions for the treatment of hypertension, hyperlipidemia, hyperglycemia, and tobacco cessation,[6] yet national rates for simultaneous cardiovascular risk factor control remain poor.[7] Shared medical appointments (SMAs) are defined as visits in which several patients meet with the same provider at the same time[8]; these appointments share similarities with traditional diabetes self-management education (DSME)[9] programs in the educational component. SMAs have been shown to be an efficient method of achieving cardiovascular risk reduction and guideline implementation in diabetes mellitus through efficient resource use, improvement of access to care, and promotion of behavioral change through group support.[8-11]

The main differences of SMA compared to traditional diabetes self-management education programs are the direct behavioral activation and pharmacotherapy components, which are usually absent in the latter. While diabetes self-management education programs have shown to have variable short-term efficacy in improving glycemic control after 4 weekly sessions,[11] this control may regress over time without added pharmacotherapy or direct behavioral intervention since long-term adherence to purely educational intervention programs is known to be difficult.[11-14] Moreover, patients with diabetes often have multiple other cardiovascular risk factors that require multitarget treatment of cardiovascular risk factors in addition to glycemic control. Previous studies have shown SMAs to have short-term efficacy in achieving A1C < 7%, reducing A1C, facilitating systolic blood pressure (SBP) < 130 mm Hg, and improving diabetes self-efficacy scores.[9,11] Therefore, the question remains on the efficacy of a pharmacist-led SMA program in diabetes to treat individuals with multiple uncontrolled cardiovascular risk factors and whether the program is still be efficacious for control of these risk factors after a longer period, beyond 4 weekly sessions. In addition, it is important to determine the potential impact on health-related quality of life of a comprehensive program that combines behavioral changes and pharmacotherapy, an area that has been lacking in previous literature.[15]

We hypothesized that, compared to standard primary care alone, a long-term (6 months) pharmacist-led SMA program added to standard primary care will be more efficacious in achieving target goals for hyperglycemia and multiple other cardiovascular risk factors as recommended by the American Diabetes Association (ADA) and without deleterious effects in the health-related quality of life in this difficult-to-treat population.

Methods

Research Design

This study was a randomized controlled trial (clinicaltrials.gov identifier NCT00409240) to assess the efficacy of adding a pharmacist-led intensive behavioral and pharmacologic SMA intervention—namely, the Veterans Affairs (VA) Multidisciplinary Education and Diabetes Intervention for Cardiac Risk Reduction–Extended (MEDIC-E)—to standard primary care, as compared to standard primary care alone for the treatment of patients with type 2 diabetes and associated cardiovascular risk factors over a 6-month period. Participants were assigned to the VA MEDIC-E arm or the standard primary care arm in a 1:1 ratio. The Institutional Review Board at the Providence VA Medical Center approved the protocol, and all study procedures were conducted in accordance with the ethical standards of the Helsinki Declaration of 1975. Enrollment for this study began October 2007 and ended October 2008.

Table 1

Veterans Affairs Multidisciplinary Education and Diabetes Intervention for Cardiac Risk Reduction–Extended

Part 1				Part 2
Session	**Taught By**	**Topics**	**Method of Education Delivery**	**Behavioral and Pharmacotherapeutic Session**
Once-weekly sessions[a]				
Week 1	Pharmacist	Program overview Diabetes basics Social support Blood glucose levels A1C Hypoglycemia Stress Medications and insulin	Demonstration PowerPoint slides Discussion	Report card review Individual goal setting Pedometer instruction Blood pressure cuff instruction Pharmacologic and behavioral assessments and interventions Homework assigned
Week 2	Dietitian	Medical nutrition therapy Challenges in meal planning Carbohydrate counting Nutrition labels Food pyramid Serving sizes Food journals Alcohol Eating out Veterans Affairs nutrition services	Food models Food labels Demonstration PowerPoint slides Discussion	Reassessment of individual goals Review food, blood pressure, and blood sugar logs Pharmacological and behavioral assessments and interventions Homework assigned
Week 3	Pharmacist / physical therapist	Blood glucose monitoring Goal blood glucose Pattern management Exercise Barriers to exercise Exercise and blood sugars Hypoglycemia Types of exercise/activity Sick day management	Demonstration PowerPoint slides Discussion	Reassessment of individual goals Review food, blood pressure, and blood sugar logs Pharmacologic and behavioral assessments and interventions Homework assigned
Week 4	Nurse	Chronic complications Foot care Necessary appointments (ie, dilated eye exam) Changing behaviors Readiness to change Goal setting	Power Point slides Discussion	Reassessment of individual goals Review food, blood pressure, and blood sugar logs Pharmacologic and behavioral assessments and interventions Homework assigned

(continued)

Table 1

(Continued)

Session	Taught By	Topics	Method of Education Delivery	Part 2: Behavioral and Pharmacotherapeutic Session
		Part 1		
Boosters[b]				
Monthly	Pharmacist	Less structured, more discussion Holiday eating Exercise ideas for inclement weather Reviews of previous topics Role-playing (eg, menus from restaurants, social event eating, alcohol)	PowerPoint slides Discussions Role-playing Videos Internet	Reassessment of individual goals Review food, blood pressure, and blood sugar logs Pharmacologic and behavioral assessments and interventions Homework assigned

[a]Time, 60 minutes.
[b]Time, 45-60 minutes.

Population

Eligible patients were identified by a review of the VA Medical Center's electronic medical record system. Veterans were eligible for the study on the basis of the following criteria: diagnosis of type 2 diabetes; A1C > 7.0%, LDL > 100 mg/dL (2.59 mmol/L) or LDL > 70 mg/dL (1.81 mmol/L) for those with coronary artery disease, and blood pressure > 130/80 mm Hg, each documented at least once in the medical records in the 6 months before enrollment; and willingness to participate and discuss diabetes and cardiac risk factors in a group setting and provide written informed consent. Patients with gestational diabetes mellitus were excluded, as were patients who were unable to attend the group sessions for reasons such as lack of transportation, psychiatric instability (actively suicidal, psychotic), or organic brain injury that precluded them from diabetes self-care.

Phase 1: VA MEDIC-E Intervention

In addition to attending regular visits with a primary care provider, participants in the VA MEDIC-E intervention arm attended 4 once-weekly 2-hour sessions, followed by 5 monthly booster sessions held in a classroom with approximately 4 to 6 participants in each session. Family members, friends, and other sources of social support were encouraged to participate in the sessions with the participants. Each session consisted of 2 parts: education in the first half and behavioral and pharmacologic interventions for hypertension, hyperlipidemia, and hyperglycemia and tobacco use in the second (Table 1).

The educational component (first hour) provided by the pharmacist, dietitian, nurse, and physical therapist followed the curriculum of the ADA and consisted of interactive lectures that reviewed diabetes basics, symptomatology, hypertension, dyslipidemia, tobacco use, and the target goals for each condition.[6,16] Chronic complication discussions followed recent recommendations for topics such as blood pressure, foot care, sick days, and immunizations.[6,10,17-21]

The intervention component for the second hour was provided by a clinical pharmacist who was either a nationally certified diabetes educator or a Rhode Island certified diabetes outpatient educator,[22] to achieve behavioral change through enhancement of self-efficacy, peer support through the group, and monitoring and reinforcement to target each participant's individual risk factor control.[6,18] This part of the weekly sessions was more informal and allowed for open discussions about each individual's risk factor control, obstacles, and solutions.

Obstacles to self-care behaviors were discussed as a group, and solutions were developed to evaluate, induce, and maintain therapeutic lifestyle changes.[18] Before starting the group sessions, participants were given a cardiovascular report card, which contained their medication list, vitals, and laboratory data. Participants set dietary goals, kept a food log, and set goals to increase daily exercise with the use of a pedometer and the step function. Exercise prescriptions were given to each patient, following the recommendations of the American Heart Association.[19,20] Medication regimens were discussed and evaluated, and dose up-titrations were made per preestablished protocols. Credentialed pharmacists at the VA have prescribing privileges and can modify pharmacotherapeutic regimens. Participants that wanted individual assistance with exercise or dietary guidance were given referrals to the health care provider after the 4 weekly sessions.

Phase 2: Monthly Booster Intervention

The booster SMA sessions occurred monthly for 5 months and lasted 90 minutes. The structure of the monthly booster was similar to the weekly group SMA session except that the educational component was less structured and focused on group needs, such as discussing alternative modes of exercise in inclement weather and preparing for holiday eating. Treatment plans for diet, exercise, monitoring, or other self-care behaviors were followed and adjusted. To increase the generalizability of study findings, 3 clinical pharmacists led distinct groups of participants through all the study sessions until completion.

Standard Primary Care

The standard of care for patients with type 2 diabetes in the Providence VA Medical Center is provided through individual clinic visits with primary care providers. The frequency of these visits for patients with diabetes averages once every 4 months. The primary care providers have access to the same electronic medical record, which contains clinical reminders, computer-based references, drug formulary information, and referral services to diabetes self-management education, nutrition, physical therapy, and the VA's weight loss program MOVE![23] Per national average, patient visits with their primary care providers varied from 20- to 60-minute appointments at the discretion of the health care provider.[3]

Outcomes

The primary outcomes were the change in proportion of participants achieving target glycemic and cardiac risk factor goals as recommended by the ADA: SBP < 130 mm Hg, LDL < 100 mg/dL (2.59 mmol/L), and A1C < 7%. Secondary outcomes were absolute change from baseline for health-related quality of life as assessed by the SF-36 for Veterans (VR-36) questionnaire, absolute change in the values of SBP, A1C, total cholesterol, HDL, triglycerides, and LDL. Intermediate outcomes were also examined, such as changes from baseline of the 4-question Assessment of Perceived Competence and the Summary of Diabetes Self-Care Activities questionnaire.[24]

Data Collection

Demographic variables (age, sex) and comorbid health conditions (chronic obstructive lung disease, heart failure, stroke, coronary artery bypass graft surgery, and mood disorder) were obtained from the medical record at baseline and confirmed by interview. Laboratory values of blood pressure and weight were obtained at baseline and at 6-month follow-up visits for all study participants. Quality-of-life questionnaire (VR-36), Perceived Competence, and adherence to Summary of Diabetes Self-Care Activities were assessed at baseline and at 6-month follow-up for all study participants. Medication adherence was measured with medication possession ratios, as calculated with the following formula: total days' supply of medication received divided by total number of expected medication intake days.[25]

Statistical Analysis

Baseline characteristics were compared between the treatment and control arms for risk factors, utilizing *t* tests for continuous variables or likelihood ratio χ^2 tests for discrete variables. We utilized χ^2 tests to compare the change in the percentage of participants who attained ADA target goals of A1C, SBP, and LDL between study arms. To compare the change from baseline in absolute values of cardiovascular risk factors, VR-36, Perceived Competence, and Summary of Diabetes Self-Care Activities questionnaires within and between the 2 study arms, we used a *t* test. To compare the change in the percentage of medication use from baseline to 6 months within the same study arm, we used McNemar difference in proportions. Logistic regression modeling was used to adjust for imbalance in the baseline values in the primary

Table 2

Baseline Characteristics[a]

Characteristic	Case (n = 50)	Controls (n = 49)	*P*
Age	69.8 ± 10.7	67.2 ± 9.4	.214
Men	100	96	.242
Weight, kg	96.1 ± 16.4	97.9 ± 18.4	.625
Blood pressure, mm Hg			
Systolic	136.1 ± 16.8	136.1 ± 16.5	.992
Diastolic	73.3 ± 10.1	75.2 ± 9.9	.335
A1C	7.8 ± 1.0	8.1 ± 1.4	.272
Cholesterol, mg/dL (mmol/L)			
Total	165.1 ± 34.0 (4.3 ± 0.9)	180.7 ± 43.4 (4.7 ± 1.1)	.049*
HDL	38.0 ± 10.7 (1.0 ± 0.3)	37.9 ± 11.1 (1.0 ± 0.3)	.955
Triglycerides	164.6 ± 94.2 (1.9 ± 1.1)	164.9 ± 92.4 (1.9 ± 1.0)	.987
LDL	96.1 ± 25.4 (2.5 ± 0.7)	110.7 ± 37.2 (2.9 ± 1.0)	.024*
High-sensitivity C reactive protein, mg/dL	4.0 ± 3.4	4.7 ± 3.7	.366
Heart failure	16.0	10.2	.554
Smoker	14.0	8.2	.525
Stroke	4.0	4.1	.984
Coronary heart disease	48.0	46.9	.916
Chronic obstructive pulmonary disorder	14.0	20.4	.398
Mood disorder	14.0	14.3	.967
At goal			
A1C	16.0	12.2	.592
Blood pressure, < 130/80 mm Hg	24.0	32.7	.339
LDL, < 100 mg/dL	68.0	46.9	.034*
Blood pressure, A1C, and LDL	8.0	4.1	.414

[a]Mean ± SD or %.
*$P < .05$.

outcome of change in goal attainment in the 3 treated cardiovascular risk factors (A1C, LDL, SBP). All statistical analyses were conducted using SPSS 19. Statistical significance was defined as $P < .05$. Data are presented as mean ± standard deviation and 95% confidence intervals (CIs).

Results

Approximately 1 in 5 eligible patients who were approached agreed to participate. Of the 103 participants randomized, 1 participant from the standard primary care group and 3 participants in the VA MEDIC-E group revoked their consent. A total of 99 patients were included in the final analysis, of which 3 died during the study period (2 in the VA MEDIC-E group and 1 in the standard primary care group). Fifty participants were in the study group and 49 in the control group.

Compared to the control arm, VA MEDIC-E participants had lower baseline levels of LDL cholesterol, 96.1 ± 25.4 mg/dL (2.5 ± 0.7 mmol/L) vs 110.7 ± 37.2 mg/dL (2.9 ± 1.0 mmol/L), $P = .024$, and total cholesterol, 165.1 ± 34.0 mg/dL (4.3 ± 0.9 mmol/L) vs 180.7 ± 43.4 mg/dL (4.7 ± 1.1 mmol/L), but were similar in other characteristics (Table 2). There were no significant differences in any of the baseline questionnaire values (VR-36, Perceived Competence, and Summary of Diabetes Self-Care Activities).

After 6 months, the MEDIC-E arm achieved target goals in A1C values (40.8% in cases vs 20.4% in usual

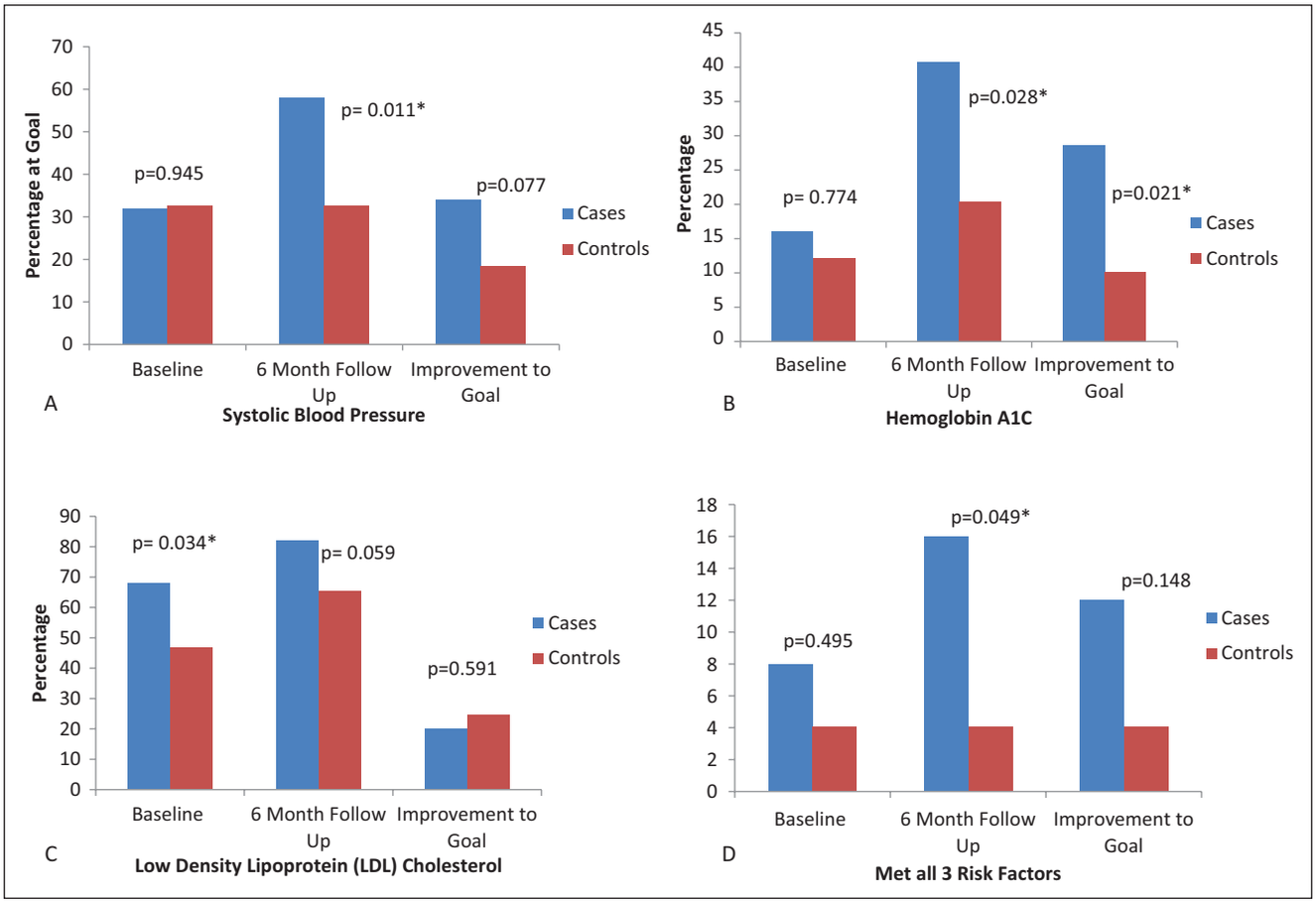

Figure 1. Patients at target clinical goals at baseline, 6-month follow-up, and improvement to goal at 6 months: A, systolic blood pressure < 130 mm Hg; B, A1C < 7%; C, LDL < 100 mg/dL; D, all 3 risk factors.
*$P < .05$ (between intervention and control arm).

Table 3

Change in Risk Factor Control[a]

Parameter	Cases (n = 50)	Controls (n = 49)
A1C, %	−0.41 (−0.74, −0.07)[b]	−0.20 (−0.61, 0.21)
LDL, mg/dL	−9.40 (−16.14, −2.65)[b]	−11.53 (−21.07, −1.99)[b]
Systolic blood pressure, mm Hg	−9.19 (−14.95, −3.43)[b,c]	−0.80 (−5.61, 4.02)
Weight, kg	−0.45 (−1.70, 0.78)	−0.60 (−2.33, 1.13)

[a]Mean change from baseline (95% confidence interval).
[b]Significant change from baseline.
[c]Significant difference between the study arms.

care arm, $P = .028$) and SBP < 130 mm Hg (58% cases vs 32.7% in usual care, $P = .015$) at rates significantly greater than the usual care arm, while nonsignificant differences were found for LDL (82.0% vs 65.3%, $P = .059$) (Figure 1). The significant change in A1C and SBP goals persisted despite adjusting for baseline values.

Table 4

Days per Week of Patient Adherence to Diabetes Self-care Activities[a]

	Cases			Controls		
Self-Care Activities	**No.**	**Baseline**	**Mean Change at Follow-up (95% CI)**	**No.**	**Baseline**	**Mean Change at Follow-up (95% CI)**
General diet	40	4.49 ± 1.93	1.03 (0.43, 1.63)*	44	3.93 ± 1.79	0.69 (0.11, 1.28)*
Specific diet	40	3.98 ± 1.50	0.61 (0.16, 1.07)*	45	3.41 ± 1.69	0.82 (0.40, 1.24)*
Exercise	40	2.98 ± 2.01	0.83 (0.21, 1.44)*	45	2.34 ± 2.30	0.44 (–0.32, 1.21)
Blood sugar testing	40	3.81 ± 2.78	2.30 (1.25, 3.35)*	46	4.08 ± 2.86	0.67 (0.02, 1.32)*
Foot care	40	4.04 ± 2.37	1.46 (0.75, 2.18)*	44	3.84 ± 2.47	0.47 (–0.16, 1.09)
No. of cigarettes smoked per day	4	31.25 ± 20.16	–8.75 (–25.15, 7.65)	3	15.00 ± 5.00	–2.33 (–12.37, 7.71)

[a]Adapted from Toobert et al.[24] CI, confidence interval.
*$P < .05$ (change from baseline).

When compared to usual care, cases had significantly higher odds of attainment of A1C goals (adjusted odds ratio, 2.73; 95% CI, 1.03 to 7.26) and SBP goals (adjusted odds ratio, 3.06; 95% CI, 1.31 to 7.16). The MEDIC-E arm also had higher attainment of combined goals of BP, LDL, and A1C (16.0% vs 4.1%, $P = .049$) when compared to usual care. In addition, the MEDIC-E arm had significant reductions for SBP (–9.19; 95% CI, –14.95 to –3.43 mm Hg), A1C (–0.41; 95% CI, –0.74 to –0.07%), and LDL (–9.40; 95% CI, –16.14 to –2.65 mg/dL) from baseline to 6-month follow-up, whereas only the LDL cholesterol levels were significantly reduced from baseline in the usual care arm (–11.53; 95% CI, –21.07 to –1.99) (Table 3). At the 6-month follow-up, there were no significant differences from baseline to follow-up in the quality-of-life scale (VR-36) in either the physical score (mean change, 1.65; 95% CI, –3.06 to 6.36, in cases vs –1.95; 95% CI, –5.21 to 1.31, in usual care) or mental score (mean change, 0.48; 95% CI, –3.37 to 4.32, in cases, vs 0.78; 95% CI, –2.67 to 4.23, in usual care). In addition, there were no significant differences in the change from baseline of perceived competence scores (mean change –0.21; 95% CI, –0.96 to 0.56, in cases vs 0.37; 95% CI, –0.14 to 0.77, in usual care). There were 13 VA MEDIC-E participants and 6 standard primary care participants missing baseline and follow-up values for the Summary of Diabetes Self-Care Activities. For those participants who answered the questionnaires at both baseline and 6 months, the Summary of Diabetes Self-Care Activities (Table 4) had a significant increase in the number of days per week for following directions for testing blood glucose for both cases (2.30 days per week; 95% CI, 1.25 to 3.35) and usual care (0.67 days; 95% CI, 0.02 to 1.32). The number of days of the week that patients followed foot care recommendations was significantly higher for cases, 1.46 days (95% CI, 0.75 to 2.18), but not for usual care, 0.47 days (95% CI, –0.16 to 1.09) (Table 4). The frequency of active smoking was not significantly changed between the study arms: –8.75 cigarettes per day for cases (95% CI, –25.15 to 7.65) vs –2.33 cigarettes for usual care (95% CI, –12.37 to 7.71). Additionally, MEDIC-E and usual care had similar improvements in compliance with diet and exercise.

No significant differences were noted in prescribing cardiovascular and diabetes medications at baseline between the 2 study arms. At 6-month follow-up, more patients in the MEDIC-E arm were prescribed diuretics (62.79% for cases vs 37.21% for usual care, $P = .032$) and sulfonylureas (60.38% for cases vs 39.62% for usual care, $P = .035$). Overall, there was a significant increase in the number of prescribed medications in MEDIC-E patients for hypertension, diabetes, and cholesterol from baseline to 6-month follow-up, while no significant change was found in the usual care arm (Table 5). Antihypertensive, cholesterol, diabetes, and total medication possession ratios were not significantly different

Table 5

Medications Prescribed[a]

Medication	Baseline			End		
	Cases (n = 50)	Controls (n = 49)	*P*	Cases (n = 50)	Controls (n = 49)	*P*
β-blocker	44.0	42.9	1.000	50.0	46.9	.841
ACE inhibitor or ARB	80.0	77.6	.810	90.0	75.5	.066
Diuretic	48.0	28.6	.063	54.0	32.7	.043*
Calcium channel blocker	24.0	24.5	1.000	34.0	24.5	.378
β-blocker	44.0	42.9	1.000	50.0	46.9	.841
Metformin	46.0	46.9	1.000	44.0	46.9	.841
Thiazolidinedione	14.0	16.3	.786	6.0	12.2	.318
Sulfonylurea	40.0	46.9	.546	60.0	42.9	.045*
Insulin	38.0	36.7	1.000	50.0	38.8	.314
Statin	74.0	73.5	1.000	86.0	81.6	.595
Niacin or fibrates	6.0	8.2	.715	14.0	4.1	.160
Any cholesterol medication	76.0	75.5	1.000	88.0	83.7	.577
Total antihypertensive medications	2.02 ± 1.09	1.86 ± 1.12	.322	2.34 ± 1.22	1.94 ± 1.18	< .001
Total diabetes medications	1.38 ± 0.81	1.47 ± 0.82	.518	1.64 ± 0.78	1.41 ± 0.73	.026
Total cholesterol medications	0.80 ± 0.49	0.82 ± 0.53	.533	1.00 ± 0.49	0.86 ± 0.41	.006

[a]Mean ± SD or %. ACE, angiotensin converting enzyme; ARB, angiotensin receptor blocker; CCB calcium channel blocker.
*$P < .05$.

between cases and usual care, 0.87 (95% CI, 0.84 to 0.90) vs 0.83 (95% CI, 0.77 to 0.88), respectively ($P = .193$).

Throughout the 6-month follow-up, patients in the MEDIC-E arm had 78 primary care provider visits, an average of 1.56. The usual care arm had 81 primary care provider visits, an average of 1.65 visits per 6 months, slightly higher than the MEDIC-E group.

Discussion

Compared to standard care, VA MEDIC-E participants achieved significantly greater attainment of SBP and glycemic goals after 6 months. In achieving the goals, VA MEDIC-E participants also had significant improvement from baseline in blood glucose monitoring and foot care behaviors. Achieving targets of glycemic and cardiovascular goals may have been due to the combined effect of group education, peer support, enhanced self-care behaviors, and number of prescribed medications.

Although medication possession ratios were not significantly different between MEDIC-E patients and the control arm, the number of prescribed medications targeting diabetes and cardiovascular risk factors was greater in MEDIC-E patients at the end of the study. This result is similar to that of the Asheville Project since medication costs increased despite a decrease in A1C, blood pressure, and lipid levels.[26] The medication possession ratios did not differ among the groups because the MEDIC-E and control arm patients had medication possession ratios above 80%, indicating a high medication adherence rate in both groups. The VA Medical Center prescription system has a mail order component, and patients may receive refills for chronic condition medications a few weeks before they are scheduled to run out. Even with the increased number of prescribed medications, the medication possession ratios remained above 80%.

Previous studies had shown potential mechanisms of efficacy in SMAs that include improved patient and provider satisfaction, increased patient compliance, and reduced repetition of information from provider to patients.[11,27-29] Wagner et al used a model of quarterly physician-led chronic care clinics over a 2-year period without medication changes during the group clinics and showed improved patient process measures, such as a

microalbumin test and a foot examination, but they were unable to show benefit on clinical measures, such as A1C and total cholesterol.[16] The VA MEDIC-E trial showed that pharmacist-led SMAs for 6 months had a significant impact on improvement of glycemic and cardiovascular risk factors goals. Possible reasons for this impact are the front-loaded schedule of the program, the use of dedicated diabetes providers to act as specialists for diabetes care and effect medication changes, and the inclusion of patients such as veterans, who may be used to being part of a group (ie, the military) and so may have a strengthened desire to achieve outcomes together, in a group setting.[9,18,29-36]

One study found that multidisciplinary group medical visits improved SBP but not A1C in patients that were followed up for 1 year.[37] We used similar multidisciplinary providers to deliver education and medication management; however, the intensity of our group visits may be different. Specifically, we started with a front-loaded schedule of weekly visits for 4 weeks before the monthly booster sessions, as opposed to the group visits program used by the previously published study, which had 7 visits from beginning until the end, over a period of 1 year. Previously Taveira et al found that pharmacist-led SMAs achieved favorable outcomes for A1C, LDL, and SBP during 4 weekly sessions.[11] MEDIC-E extended the Taveira et al study by showing that concomitant treatment of several interrelated targets of A1C, SBP, and LDL is possible and that the effects of the treatment are durable up to 6 months; however, this was achieved by instituting additional monthly booster sessions.[11]

Since this was a feasibility study, a complete economic analysis was not performed. However, based on the difference in the higher number of primary care physician visits per year in the usual care arm, it may offset the MEDIC-E visits in terms of the cost and at the same time have a higher quality of care. The MEDIC-E group may help to enhance the increasing demand for clinical pharmacists and other allied health professionals to operate as physician extenders and comanage chronic conditions. In addition, the standard model of diabetes care may not be viable in the future with the continued increase in diabetes diagnoses, decrease primary care physicians, and decreasing funds for medical treatment.

Studies have shown that those patients who are on insulin may have a lower quality-of-life score despite the improvements of glycemic control and reduction in hyperglycemic symptoms.[30] However, our patients sustained no significant change in their quality-of-life scores despite being aggressively managed with several interventions and self-care modifications. These interventions include things such as medication up-titrations, including insulin, increase daily exercise, blood glucose monitoring, and performing other self-care behaviors.

This study was performed in a managed-care health system of the Veterans Health Administration. Within this structure, pharmacists and other health professionals may obtain prescribing privileges and follow disease state protocols for medication administration. More states are recognizing and changing regulations to allow collaborative practice agreements among physicians, nurses, pharmacists, and other allied health professionals with pharmacotherapeutic comanagement. These collaborative agreements would allow more streamlined delivery of health care delivery from nonphysician health professionals (eg, clinical pharmacists) to participants with common health conditions, such as diabetes and cardiovascular risks. Since the estimate of diabetes prevalence is projected to increase exponentially, extended group medical visits is an excellent venue to manage such a complex condition.

Our study does have some limitations. One was that only 1 in 5 participants responded to the invitation of the study and was willing to participate in group medical visits. Perhaps responders are more highly motivated and more likely to join group visits than the nonresponders. However, our results demonstrate that those who are willing to enroll can achieve significant improvements in cardiovascular disease risk factors for at least 6 months. Another limitation of our study is that the participants were mostly male veterans. The effect of the group may not be able to be extrapolated to other groups without previous military experience. Studies have shown that men may not have as much improvement in self-care behavior as women due to differences in the social cognitive determinants between sexes.[38] Our study showed, however, that self-care behavior improvement is possible in male veterans through group guidance, counseling, and peer support. Another limitation of the study is its relative short duration to observe change in quality-of-life scores. Most studies evaluated variations in quality-of-life scores after a year of interventions.[30-35] Generalizability may also be limited in our study since clinical pharmacists at the VA who were involved in the MEDIC-E groups had prescribing privileges, which is not applicable in all medical settings. However, in more than 50% of states, pharmacists have collaborative practice

agreements in which they can prescribe and/or monitor drug therapy.

In conclusion, the VA MEDIC-E was efficacious in addressing multiple cardiovascular risk factors in one program and maintaining control of these factors over 6 months. This study demonstrates that the pharmacist-led group intervention program was an efficacious and sustainable collaborative care approach to manage diabetes, educate patients to improve self-care behaviors, and reduce associated cardiovascular risk.

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