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Journal

The Science of Diabetes Self-Management and Care, 29(3)

ISSN

2635-0106

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Publication Date

2003-05-01

DOI

10.1177/014572170302900311

Peer reviewed

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Volume 29, Number 3 • May/June 2003

A Systematic Review of Diabetes Self-Care Interventions for Older, African American, or Latino Adults

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PURPOSE

This study systematically identified and examined published self-care interventions designed to improve glycemic control or quality of life (QoL) among older, African American, or Latino adults.

METHODS

Six electronic databases were searched. Eligible publications were those that described an intervention to change knowledge, beliefs, or behavior among adults with diabetes who were either older than 55 years, African American, or Latino, and that measured the outcomes of glycemic control or QoL.

RESULTS

Twelve studies met the inclusion criteria, of which 8 were randomized controlled trials (RCTs). Of the 8 RCTs, improved glycemic control was reported in the intervention arm of 5 RCTs compared with the control arm. Of the 4 RCTs that examined QoL, improved QoL was reported in the intervention arm of 1 study. Characteristics of successful interventions included poor glycemic control at baseline (A1C>11%), cultural or age-tailoring the intervention, use of group counseling or support, and involvement of spouses and adult children.

CONCLUSIONS

Large-scale clinical trials designed according to cultural and age criteria specific for older Latinos and African Americans with diabetes are needed to determine how best to address this growing public health problem.

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By the year 2030, the number of Americans age 65 years and older will nearly double from the current estimate of 34 million to close to 70 million.[1] At the same time, the ethnic profile of the older American population will change dramatically. Currently, 84% of adults age 65 years and older are non-Hispanic white. By 2050, however, the percentage of older adults who are African American is projected to increase from 8% to 12%, and the percentage of older adults who are Latino will nearly triple from 6% to 16%.[2] Unfortunately, most of the medical knowledge to date has been based upon studies of non-elderly, non-Hispanic whites. Given the rapidly growing numbers of African American and Latino older adults, developing and testing interventions to improve the health of this rapidly growing segment of the population is an urgent public health priority.

Diabetes mellitus and its complications are becoming an increasing problem among older adults and particularly among African American and Latino seniors. Among adults age 75 years and older, 13% report having diabetes and another 6% have the disease but remain undiagnosed.[3] Diabetes disproportionately affects African Americans and Latinos; among those age 75 years and older, 22% of non-Hispanic blacks and 30% of Latinos have diabetes. Furthermore, having diabetes places individuals at increased risk of cardiovascular disease, nephropathy, blindness, and mortality.[4] Among older adults in particular, diabetes is a leading cause of disability.[5]

Unlike some medical illnesses in which little can be done to change the outcomes, this is fortunately not the case for diabetes. Carefully conducted trials have demonstrated that medical interventions to reduce hyperglycemia, control blood pressure, and lower lipids can decrease rates of both microvascular and macrovascular disease progression.[6-8] In addition, lifestyle changes such as exercise and diet can substantially alter the course of diabetes.[9] Accordingly, the American Diabetes Association treatment guidelines for patients with diabetes recommend that self-management training, in which patients learn how to control and monitor their diabetes, be an integral part of the care plan.[10] Several excellent reviews of diabetes self-management education programs have been conducted in the past 10 years.[11-14] From these we have learned that (1) self-management education programs are associated with improved knowledge and, to a variable degree, improved biophysical markers of health (eg, weight and glycemic control) and psychosocial markers of health (eg, self-reported quality of life); and (2) the most successful interventions are ones that aimed to change actual behavior rather than merely increase knowledge. The extent to which interventions have been effective (or ineffective) among specific ethnic or age groups was not explored in previous reviews.

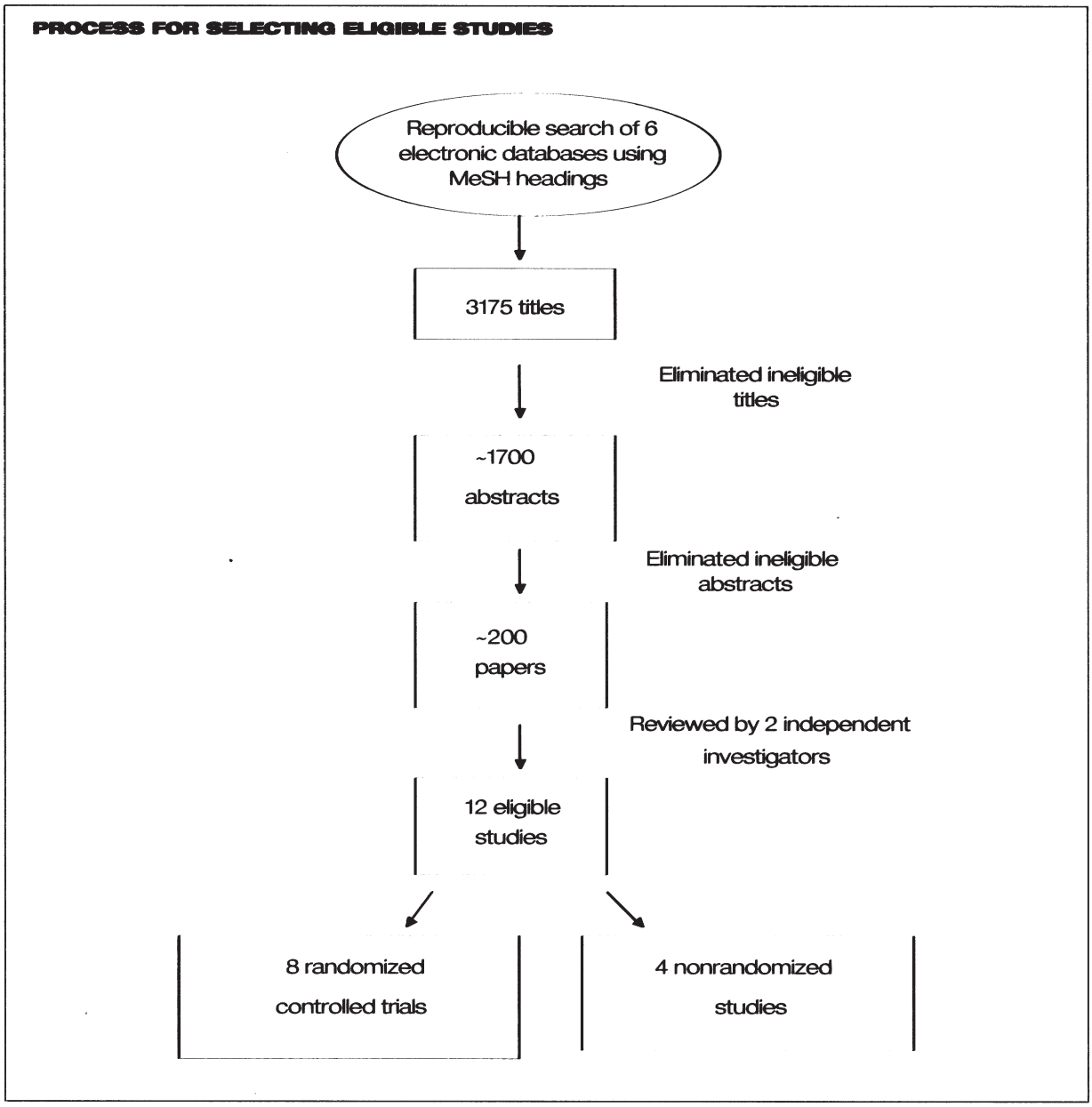
As part of an effort to develop a patient-centered self-care intervention for older Latinos and African Americans with diabetes, the existing literature was reviewed. Beliefs about aging and the cultural context in which older adults experience their diabetes have the potential to profoundly influence their self-management of the illness.[15,16] Therefore, of particular interest to this study was the extent to which self-care interventions succeed among this rapidly growing high-risk sociodemographic group. Specifically, the goal of this study was to systemically identify and examine the results from published self-care interventions that sought to improve glycemic control or health-related quality of life among older, African American, or Latino adults with diabetes.

METHODS

From January 1985 through December 2000, 6 databases (Medline, HealthSTAR, EMBASE, PsycINFO, Ageline, and Sociological Abstracts) were searched for potentially eligible studies using a reproducible strategy. To minimize the chance that the search would miss a relevant article, 3 separate searches were conducted. The first search began with the general search terms *diabetes* and *self-care*. The second began with the search terms *diabetes* and *ethnic groups*. The third began with the search terms *diabetes* and *patient centered*. All searches were limited to English language publications. These 3 separate searches produced 3257 citations.

The following inclusion criteria were established for the publications: (1) must describe an intervention; (2) the intervention must be aimed at changing knowledge, beliefs, or behavior among adults with diabetes; (3) the intervention must target 1 or more of the following 3 groups: older persons (>55 years), African American adults, or Latino adults; and (4) the intervention must measure 1 or more of the following outcomes: glycemic control, diabetes-related symptoms, or

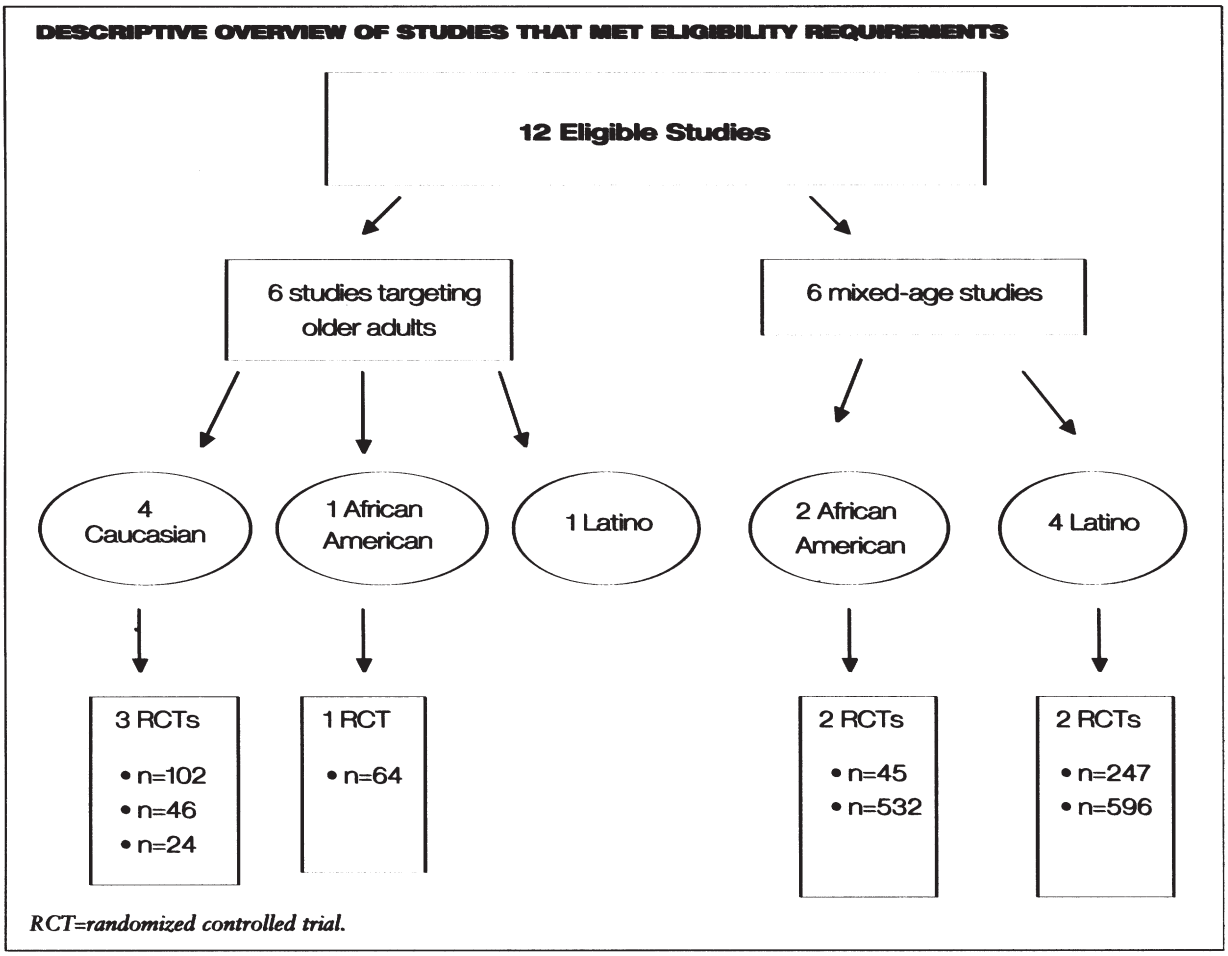
Figure 1.



quality of life (QoL). The specific outcome of glycemic control was focused on because this biophysical marker of successful self-management is associated with lower rates of microvascular disease progression.[6] The specific outcomes of diabetes-related symptoms and self-rated quality of life were also selected because of their strong face validity as measuring constructs that are personally meaningful in the lives of older adults. How best to measure quality of life is an area of active debate.[17] For the purposes of this systemic review, a study was classified as measuring self-reported quality of life if the participants were asked in some way to subjectively rate their health or well-being.

The process used to determine whether a publication met inclusion criteria is illustrated in Figure 1. Titles that were obviously ineligible were eliminated, including those describing childhood, adolescent, or gestational diabetes, and review articles. The abstracts of the other potentially eligible citations (n=800) were reviewed and eliminated when ineligible, leaving 68 remaining abstracts. The full articles of these remaining abstracts were read and reviewed by 2 investigators (CS, RW) using a standardized abstraction tool. In the case of disagreement regarding whether an article should be included in the review (1 of 68), a third investigator (CM) was asked to make the final decision.

Figure 2.



RCT=randomized controlled trial.

The quality of the investigations was assessed based on the criteria used by the US Preventive Health Task Force. The highest ratings were given to well-designed randomized clinical trials, followed by well-designed controlled trials without randomization, and then noncontrolled trials.

RESULTS

Selection of Eligible Articles

Of the 68 articles reviewed, 12 met the predetermined inclusion criteria.[19-29] Of these, 8 were randomized controlled trials,[18-25] 3 were uncontrolled trials using a preintervention/postintervention design,[26-28] and 1 study was a randomized trial, but results were presented using a preintervention/postintervention analysis of participants from both arms who completed the trial.[29] Because the number of randomized clinical trials was too small to perform a meta-analysis, all articles are described in a detailed systematic fashion.

Figure 2 provides an overview of the 12 selected studies; details and findings are presented in Table 1. Six of the studies described interventions targeting older adults.[18,20-22,27,28] Three of these 6 studies were randomized trials with a Caucasian population,[20-22] 1 study was a randomized trial with an African American population,[18] 1 was an uncontrolled intervention with Caucasian participants,[28] and 1 was an uncontrolled intervention with a Latino population.[27] No randomized clinical trials were found that targeted older Latinos. Six articles that met the inclusion criteria described studies that involved participants of mixed ages.[19,23-26,29] Two of these 6 articles described fully randomized clinical trials with African American populations[23,24] and 2 described fully randomized clinical trials with Latino populations.[19,25] All 12 studies examined glycemic control as an outcome, 5 studies examined quality of life,[20,22,23,25,28] and none examined diabetes-related symptoms.

Table 1.

Summary of Studies That Met Inclusion Criteria

Characteristics	Studies		
Study author, year, study design	Agurs-Collins et al,[18] 1997, RCT	Brown et al,[19] 1999, RCT	Gilden et al,[20] 1992, RCT
Duration of intervention	12 wk	1 y	6 wk
Number of participants (no. completed)	64 (55)	247 (NR)	24 (24)
Mean age of participants, y	61.7	54	68
Race/ethnicity	African American	Mexican American	NR
Setting	Urban hospital, Washington, DC	Rural Texas	Veterans Affairs (urban), Chicago, IL
Mean baseline A1C, %	Intervention: 11 Control: 10	12.4	NR
Intervention description	12 weekly educational group sessions followed by exercise class (30 min); 6 biweekly support groups; 1 individual diet counseling session w/nutritionist	12 weekly educational group meetings; 11 biweekly support groups followed by 3 monthly meetings	6 weekly educational sessions + monthly support group meetings for 18 mo
Theoretical basis	Social Action Theory	NR	NR
Control	1 didactic class; 2 nutrition mailings w/copies of lab values	Wait listed; usual care	6 weekly educational sessions; no support groups
Outcomes of interest*			
Intervention			
Mean change in A1C, % (remaining subjects)	3 mo: – 1.5 (31) 6 mo: – 1.1 (30)	1 y: – 1.7 (NR)	Mean A1C at 2-y follow-up: 6.6 (11)
Mean quality-of-life score (remaining subjects)			2-y follow-up: 78 (11) (unpublished items)
Control			
Mean change in A1C, % (remaining subjects)	3 mo: 0.06 (27) 6 mo: 1.3 (25)	1 y: 0.3 (NR)	Mean A1C at 2-y follow-up: 6.5 (13)
Mean quality-of-life score (remaining subjects)			2-y follow-up: 71 (13) (unpublished items)
Mean observational difference, statistical significance†	3 mo: – 1.6 (CI – 2.4, – 0.7) 6 mo: – 2.4 (CI – 4.2, – 0.6)	NR	NS for A1C, $P<.05$ for quality-of-life scores
Comments	Intervention group had statistically significant reduction in A1C compared w/control group; sustained at 6 mo	50% attrition reported (exact numbers NR); no test of significance	2-y follow-up: no difference in A1C between intervention/control; scores for quality-of-life tool significantly higher for intervention group (baseline values NR)

RCT=randomized controlled trial, NR=not reported in publication, A1C=hemoglobin A1C, DQOL=Diabetes Quality of Life Scale, CI=confidence interval, 95%.

**Because most studies were not conducted using intention-to-treat analysis, the number of participants included in the outcome analysis is reported.*

†*P-values based on 2-tailed tests unless otherwise specified; NS=P>.05.*

Table 1.

Summary of Studies That Met Inclusion Criteria (continued)

Characteristics	Studies		
Study author, year, study design	Falkenberg et al,[21] 1986, RCT	Glasgow et al,[22] 1992, RCT (3 mo) followed by quasi-experimental replication study (6 mo)	Jaber et al,[23] 1996, RCT
Duration of intervention	3 mo	3 mo (follow-up at 6 mo)	4 mo
Number of participants (no. completed)	46 (33)	102 (101)	45 (39)
Mean age of participants, y	NR (range=55-73 y)	67	Intervention: 59 Control: 65
Race/ethnicity	NR	NR	African American
Setting	Sweden	Eugene, OR	Detroit, MI
Mean baseline A1C, %	8.3	Intervention: 6.8 Control: 7.4	Intervention: 11.5 Control: 12.2
Intervention description	8 group sessions (2-h each) led by physician, nurse, or dietitian	10 group meetings (8 weekly + 2 at 2-wk intervals); 16 biweekly exercise sessions	Weekly appt. w/pharmacist until glycemic control reached, then every 2 wk
Theoretical basis	Problem-oriented participatory education	Problem-solving-based learning	Disease-specific model of pharmaceutical care[‡]
Control	1-day conventional group teaching w/dietitian-led trip to grocery store	Usual care	Standard medical care
Outcomes of interest*			
Intervention			
Mean change in A1C, % (remaining subjects)	3 mo: – 1.1 (22) 6 mo: – 0.1 (22)	3 mo: – 0.5 (52) 6 mo: – 0.1 (48)	4 mo: – 2.2 (17)
Mean quality-of-life score (remaining subjects)		DQOL Scale[§] 3 mo: 0.3 (52) 6 mo: 0.2 (48)	NR
Control			
Mean change in A1C, % (remaining subjects)	3 mo: – 0.1 (11) 6 mo: – 0.1 (11)	3 mo: – 0.4 (49) 6 mo: no control	4 mo: +0.1 (22)
Mean quality-of-life score (remaining subjects)		DQOL Scale 3 mo: – 0.5 (49) 6 mo: no control	NR
Mean observational difference, statistical significance[†]	3 mo: $P<.05$ (A1C) 6 mo: NS (A1C)	3 mo: NS (A1C/DQOL scores) 6 mo: NS (pre/post intervention)	4 mo: – 2.3 (A1C), $P=.02$ between groups NS for quality-of-life scores[¶]
Comments	3 mo: statistically significant decrease in A1C in intervention group; not sustained at 6 mo	3 mo: no significant difference in A1C and DQOL scores between intervention/control 6 mo: no significant reduction in A1C or change in DQOL scores 6 mo postintervention	4 mo: statistically significant decrease in A1C in intervention group; NS change in quality-of-life scores

RCT=randomized controlled trial, NR=not reported in publication, A1C=hemoglobin A1C, DQOL=Diabetes Quality of Life Scale, CI=confidence interval, 95%.

**Because most studies were not conducted using intention-to-treat analysis, the number of participants included in the outcome analysis is reported.*

[†]P-values based on 2-tailed tests unless otherwise specified; NS=P>.05.

[‡]Helper CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. Am J Hosp Pharm. 1990;47:533-543.

[§]Diabetes Control and Complications Trial Research Group. Reliability and validity of a diabetes quality-of-life measure for the Diabetes Control and Complications Trial (DCCT). Diabetes Care. 1988;11:725-732.

Table 1.

Summary of Studies That Met Inclusion Criteria (continued)

Characteristics	Studies		
Study author, year, study design	Mazzuca et al,[24] 1986, randomized block design (randomized for clinical team, n=27)	Noel et al,[25] 1988, RCT	Brown et al,[26] 1995, pre/post design
Duration of intervention	NR	5 wk	2 mo
Number of participants (no. completed)	532 (275)	596 (596)	5 (5)
Mean age of participants, y	58.1 (median)	50.7	60.8
Race/ethnicity	African American	Latino (85%)	Latino (Mexican American)
Setting	Indiana (urban)	San Antonio, TX	Starr County, TX (rural)
Mean baseline A1C, %	10.7	9.0	11.7
Intervention description	Systematic program in diabetes education (didactic sessions, goal setting, exercise) w/follow-up phone call; approx. half of physicians also received education	Weekly 2-h classes; choice of standard or nutritional management curriculum	8 weekly 2-h education sessions; one 2-h support group session
Theoretical basis	NR	NR	Cultural competency
Control	Usual care or usual care + physician education	No choice; random assignment to standard or nutritional management curriculum	Not applicable
Outcomes of interest*			
Intervention			
Mean change in A1C, % (remaining subjects)	Postintervention (median 14.3 mo from start of intervention): – 0.43 (135)	6 mo after completion of classes: – 0.5 (305)	3 mo: – 2.4 (5)
Mean quality-of-life score (remaining subjects)		Change in SF-36 PCS‖: +0.3 Change in SF-36 MCS‖: +1.4	
Control			
Mean change in A1C, % (remaining subjects)	Postintervention (median 14.3 mo from start of intervention): +0.35 (140)	6 mo after completion of classes: – 0.7 (291)	Not applicable
Mean quality-of-life score (remaining subjects)		Change in SF-36 PCS‖: +1.6 Change in SF-36 MCS‖: +0.9	
Mean observational difference, statistical significance†	$P<.05$ for difference between groups for A1C using 1-tailed *t*-test	A1C: NS, $P=.66$ SF-36 PCS: NS, $P=.24$ SF-36 MCS: NS, $P=.85$	A1C (preintervention/postintervention): $P=.04$
Comments	Postintervention (median 14.3 mo from start of intervention): statistically significant decrease in A1C in intervention group using 1-tailed *t*-test	Randomization to choice of curriculum did not influence A1C or quality of life	Statistically significant decrease in A1C postintervention

‖*Ware JE, Kosinski M, Keller SD. Short-Form 36 Physical and Mental Health Summary Scales: A User's Manual. Boston, Mass: The Health Institute; 1994.*

¶*Health Status Questionnaire, Version 2.0, User Guide. Bloomington, Minn: Health Outcomes Institute, 1993.*

Table 1.

Summary of Studies That Met Inclusion Criteria (continued)

Characteristics	Studies		
Study author, year, study design	Garcia et al,[27] 1996, pre/post design	Gilden et al,[28] 1989, pre/post design	Corkery et al,[29] 1997, RCT, pre/post analysis of those from both arms was completed program
Duration of intervention	5 y	6 wk	1-5.4 mo (mean=3.4)
Number of participants (no. completed)	186 (148)	45 (45)	64 (40)
Mean age of participants, y	NR (range=60-81 y)	70	52.8
Race/ethnicity	Latino (Cuban)	NR	Latino (Puerto Rican)
Setting	Havana, Cuba	Veterans Affairs (urban), Chicago, IL	New York City (urban)
Mean baseline A1C, %	12.4	7.0	NR (entire sample); 11.7 for 40 who completed the program
Intervention description	60 monthly interactive meetings (group discussion)	6 weekly group educational sessions	1-to-1 diabetes education program + bicultural community health worker acting as liaison between patients, families, healthcare workers
Theoretical basis	NR	NR	NR
Control	Not applicable	Not applicable	1-to-1 diabetes education program of variable duration
Outcomes of interest*			
Intervention			
Mean change in A1C, % (remaining subjects)	5 y follow-up: – 4.5 (148)	6 wk: +0.2 (45) 6 mo follow-up: +0.1 (45)	End of intervention: – 1.8 (40, pooled from both arms); later follow-up (mean=7.7 mo, range=6-16.2): – 2.2 (40)
Mean quality-of-life score (remaining subjects)		6 wk: +3.3 (45) 6 mo follow-up: +7.1 (45) (unpublished items)	Not applicable
Control			
Mean change in A1C, % (remaining subjects)	Not applicable	Not applicable	Not applicable
Mean quality-of-life score (remaining subjects)		Not applicable	Not applicable
Mean observational difference, statistical significance†	Preintervention/postintervention A1C: $P<.02$	A1C: NS Quality of life: $P<.01$ (at both measurements)	End of intervention A1C: $P=.004$; later follow-up $P<.001$
Comments	Statistically significant decrease in A1C postintervention	A1C not changed by intervention; scores for quality-of-life tool increased significantly at 6 wk and 6 mo follow-up	Results not presented separately for intervention/control groups; statistically significant decrease in A1C at end of intervention and follow-up in patients from both groups who completed 1-to-1 education program

RCT=randomized controlled trial, NR=not reported in publication, A1C=hemoglobin A1C.
**Because most studies were not conducted using intention-to-treat analysis, the number of participants included in the outcome analysis is reported.*
†P-values based on 2-tailed tests unless otherwise specified; NS=P>.05.

Sample sizes in the selected studies ranged from 7[26] to 596,[25] mean baseline hemoglobin A1C (A1C) ranged from 7.0%[28] to 12.4%,[19,27] and attrition rates also varied widely, reaching 50% in the study by Brown and Hanis[19] (Table 1). Patient-level randomization was used in each trial, with the single exception of the *Diabetes Education Study* (DIABEDS) by Mazzuca and colleagues,[24] in which randomization was conducted at the level of the clinical team of providers. Only the *Sixty-Something Study* by Glasgow and colleagues[22] presented the data using intention-to-treat analysis, in which subjects randomized to the intervention who did not actually receive the intervention were kept in the intervention arm. Most participants were recruited from urban settings, with the exception being the rural Texas population of the 2 studies by Brown and Hanis.[19,26]

Efficacy of the Interventions

Of the 8 randomized controlled trials, 5 reported improved glycemic control in the intervention arm compared with the control arm at the completion of the intervention.[18,19,21,23,24] However, 1 of these[19] had 50% attrition and did not report any test of statistical significance, and another used a 1-tailed test of statistical significance. Three of the randomized controlled trials examined whether the effect on glycemic control was sustainable beyond the duration of the intervention.[18,21,22] Of these, 2 had negative findings[21,22] and 1 reported partially sustained improved glycemic control.[18]

Four of the 8 randomized controlled trials examined the effect of the intervention on quality of life[20,22,23,25]; 3 of these reported no difference in mean quality of life scores between the intervention and control groups at the end of the intervention.[22,23,25] In the 1992 trial of an 18-month support group by Gilden and colleagues,[20] the authors reported a statistically significant difference in scores on a 20-item quality-of-life test between the 11 participants in the intervention arm who completed the trial and the 13 participants in the control arm who completed the trial (78 points versus 71 points, respectively; $P<.05$). Although baseline scores were not provided or adjusted for in this analysis, the authors reported no significant difference between the scores of the 2 groups at baseline.

Of the 4 studies without control groups, statistically significant improvement in glycemic control was reported in 2 studies immediately following the intervention,[27,29] significant improvement in glycemic control was reported in another study 1 month following a 2-month intervention,[26] and no change in mean A1C was reported in another study at the end of the intervention. However, this study did report improved mean scores on a quality-of-life instrument,[28] and these changes in QoL remained present at a 6-month follow-up.

Characteristics of the 10 successful interventions are shown in Table 2. Baseline glycemic control was very poor (A1C>11%) in most of these studies. All of the interventions set out to change the behavior of patients as opposed to emphasizing traditional didactic educational formats. Four of the studies were designed according to cultural criteria specific to the targeted group.[18,19,26,29] Techniques used to accomplish the cultural tailoring included conducting focus groups prior to designing the intervention to elicit input from the prospective participants[19,26] and using specific recipes appropriate for the ethnic group being studied.[18,19,26] In addition, the trial by Agurs-Collins and colleagues[18] also included a curriculum that had been modified to be more appropriate for older people, such as using large print in handouts. With the exception of the pharmacist-led intervention,[23] all of the successful interventions used some form of group counseling; many also supplemented the group sessions with one-on-one sessions with nutritionists or diabetes educators. Physicians were never directly involved in the intervention; rather, nutritionists and nurse educators almost always worked with the patients. In 2 of the 5 successful randomized controlled trials and 4 of the 5 successful noncontrolled interventions, spouses and adult children were encouraged to become involved in the intervention by attending group sessions with their family member who had diabetes.

DISCUSSION

Using a reproducible search strategy of electronic databases, over 3000 potential studies were reviewed, from which 12 interventions met the inclusion criteria of improving self-care for older (>55 years), Latino, or African American adults with diabetes and measuring A1C or quality-of-life outcomes. Eight of the 12 interventions were randomized controlled clinical trials.

Table 2.

Characteristics of Interventions That Improved Glycemic Control or Quality of Life

Study Author	Theoretical Basis	Behavior Oriented	Culturally Tailored	Age Tailored	Nurse Educators	Nutritionist Educator	One-to-One Counseling	Group Counseling	Physician Involvement	Supervised Exercise	Family Involvement
Agurs-Collins et al[18*†]	Social Action Theory[‡]	X	X	X		X		X		X	X
Falkenberg et al[21*]	Problem-oriented participator education	X			X	X		X	X (training)		
Jaber et al[23*]	Disease-specific model of pharmaceutical care[§]	X					X				
Brown (99) et al[19*]	Cultural competency	X	X		X	X		X			X
Mazzuca et al[24*]	None specified	X			X	X		X			
Gilden (92) et al[20*]	None specified	X			X	X		X			X
Garcia et al[27*]	None specified	X			X	X	X	X	X		
Corkery et al[29]	None specified	X	X		X		X				X
Brown (95) et al[26]	Cultural competency	X	X		X	X		X			X
Gilden (89) et al[28]	None specified	X			X	X		X			X

**Randomized controlled trial.*
†Demonstrated sustained improvement in glycemic control.
‡Kumanyika SK, Ewart CK. Theoretical and baseline considerations for diet and weight control of diabetes among blacks. Diabetes Care. 1990;13:1154-1162.
§Helper CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. Am J Hosp Pharm. 1990;47:533-543.

Although these studies provide helpful information for current patients, caregivers, and researchers interested in improving the QoL of older adults with diabetes, the paucity of relevant articles in the published medical literature should serve as a call that more work needs to be done in this important area. Interdisciplinary teams should implement and test pilot studies of interventions based on existing data that will lead to federally-funded, large-scale multicenter interventions to improve the health of older, African American, and Latino adults with diabetes.

An encouraging finding was that all of the described interventions were aimed at changing behavior rather than simply educating patients. This finding is consistent with a recent and more general review by Norris and colleagues[14] and reflects the increasing recognition over the past 2 decades that affecting meaningful change requires going beyond traditional didactic teaching models.[30] For example, Lorig and colleagues[31] developed a chronic disease self-management program with a group session format that aims to increase participant self-efficacy; this intervention also appears to be successful at improving QoL and reducing healthcare utilization. Anderson and colleagues[32] developed a similar innovative intervention consisting of facilitated group sessions in which participants become empowered to change their health behaviors. Among nonelderly persons with diabetes, this empowerment intervention has been shown to improve glycemic control. Leveille and colleagues[33] found that facilitated goal setting in a group format was successful in slowing the rate of functional decline among older adults recruited at senior centers. Interventions in which the participants (patients) are given the tools to solve their own problems represent an exciting, fundamental shift in the way healthcare providers care for persons with chronic illnesses such as diabetes.[34]

Many of the studies included in this review had several methodological weaknesses that limit the strength of the conclusions. Specifically, the findings in the 4 studies using a preintervention/postintervention design have the disadvantage of potentially being influenced by time-dependent confounding variables and secular trends, as well as the phenomenon of regression

to the mean.[35] Among the randomized trials, attrition was a problem in most of the studies and was as high as 50%.[19] Although it may be logistically impossible to measure the A1C of subjects who have dropped out of a study, presenting results only on those individuals who completed the study[18,19,21,23,24] likely biased the findings away from the null hypothesis (eg, subjects who dropped out probably did not improve their glycemic control as much as those who stayed in the study). In addition, it is not clear whether the *P* value reported as <.05 by Mazzuca[24] would have been significant had the investigators used a 2-sided *t*-test.

There was marked variation in baseline glycemic control, which may reflect marked variations in compliance and/or disease severity across the study populations reviewed. Likewise, the trials with near-normal baseline A1C values probably did not have the statistical power to demonstrate a statistically significant effect of the self-care intervention. Improved glycemic control was demonstrated in the self-care interventions that reported markedly poor baseline glycemic control (A1C>10%), supporting the efficacy of self-care interventions in otherwise difficult-to-treat patients.

Despite the methodological limitations, these studies provide important information to guide future and ongoing interventions. While the heterogeneity of the studies makes it impossible to compare results across interventions, interventions that were designed according to specific cultural criteria appeared to be successful among African Americans and Latinos. Future interventions targeting these populations should incorporate the appropriate cultural values and attitudes into the intervention content. This finding is consistent with a growing body of research supporting the importance of cultural competency in patient-centered research as a means of decreasing health disparities.[36]

Only 1 of the 6 studies specifically targeting older adults[18] demonstrated sustained improvement in glycemic control beyond the duration of the intervention. As such, it may be possible to increase the effectiveness of future interventions among older adults by adopting age-tailoring techniques such as those described by the aforementioned authors.

There are a number of limitations to this systemic review. First, the investigation was limited to English-speaking studies published by December 2000. Second, this systematic review was limited to those studies focusing on glycemic control, which is a risk factor for microvascular disease progression. Because of the extremely limited number of publications that have assessed the impact of self-care interventions on intermediate outcomes such as blood pressure control or treatment of dyslipidemias, this review did not include studies that assessed these critical macrovascular risk factors. Future studies should examine the impact of self-care interventions on these other important intermediate outcomes. In addition, because studies with positive findings are more likely to be published than those with negative findings,[37] the studies that were identified and included in this review likely reflect this publication bias away from the null hypothesis. Because so few eligible studies were identified, it was not possible to do a true metanalysis to compare findings across studies. Likewise, the heterogeneity of the quality-of-life instruments used makes it impossible to summarize the effect of self-care interventions on quality of life. Conclusions derived from this systematic review are qualitative and meant to guide future research rather than to serve as final answers to how care should be designed for older adults with diabetes.

In conclusion, after an extensive reproducible search of the published medical literature, only 12 interventions were identified that aimed at improving self-care for older (>55 years), Latino, or African American adults with diabetes and that measured A1C or quality-of-life outcomes. Clinical trials of interventions designed according to specific age and cultural criteria for older Latinos and African Americans with diabetes are needed to determine how best to address the growing public health problem of diabetes among older adults.

The authors thank Roberta Shanman, RAND librarian, for her careful assistance with the literature search. We also appreciate Dr. Emmett Keeler for his assistance with the study design and for providing resources through the UCLA Claude D. Pepper Older Americans Independence Center Social Sciences Core.

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Dr Sarkisian received support from the National Institute on Aging (NIA), Grant No. AG01004, and the Brookdale National Fellowship Program. Dr Mangione received support from the National Institute of Diabetes and Digestive and Kidney Diseases, RO1 DK59527-01; the NIA-funded UCLA Older Americans Independence Center, Grant No. P60-AG10415-11; the UCLA Center for Health Improvement in Minority Elders/Resource Centers for Minority Aging Research, National Institutes of Health; and the National Institute of Aging, Grant No. AG-02-004. Dr Norris received support from the Research Centers in Minority Institutions Award, Grant No. G12RR-03026, from the National Center for Research Resources, National Institutes of Health. Dr Brown received support from the Minority Faculty Development Program, Grant No. 037214, and the National Institute of Diabetes and Digestive and Kidney Diseases, Grant No. RO1 DK59527-01.

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