Published in final edited form as:

Ann Intern Med. 2010 October 19; 153(8): 507–515. doi:10.7326/0003-4819-153-8-201010190-00007.

Diabetes control with reciprocal peer support versus nurse care management: A randomized trial

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Abstract

Background—Many health care systems face barriers to implementing resource-intensive care management programs for patients with poorly controlled diabetes. Mobilizing patients to provide reciprocal peer support may enhance care management and improve clinical outcomes.

Objective—To compare the effectiveness of a reciprocal diabetes peer support program (RPS) with nurse care management (NCM) in improving glycemic control in real-world clinical settings.

Design—Six-month parallel randomized controlled effectiveness study from 2007–2010 (Trial Registration NCT00320112)

Setting—Two U.S. Veterans' Affairs (VA) health care facilities

Participants—244 male diabetes patients with a hemoglobin A1c (HbA1c) in the prior 6 months of 7.5% or more.

Primary Funding Source—VA Health Services Research and Development (HSR&D)

Measurements—The primary outcome was change in HbA1c between baseline and six months. Secondary outcomes were new insulin starts and intensification, blood pressure, diabetes-specific social support, emotional distress, and medication adherence.

Intervention—Participants in both arms attended an initial session led by a nurse care manager to review and discuss their point-of-service HbA1c and blood pressure values, and most recent medical record cholesterol values. RPS patients then participated in a group session to set

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diabetes-related behavioral goals, receive brief training in peer communication skills, and be paired with another age-matched participant. Paired peer partners were encouraged to talk weekly using a telephone platform that recorded call frequency and duration and provided automated reminders promoting peer contact. Intervention participants were also offered three optional 1.5 hour patient-driven group sessions at months 1, 3, and 6 to share concerns, questions, strategies, and progress on goals. Patients in the NCM arm attended a 1.5 hour session to receive education on care manager services and diabetes educational materials and be assigned to a nurse care manager with whom they were encouraged to follow up regularly.

Results—Of the 244 patients enrolled, at six months 216 (89%) completed the HbA1c and 231 (95%) the survey assessments. RPS participants had a mean HbA1c of 8.02% at baseline, which improved to 7.73% at six months (−0.29%) compared with an average increase in HbA1c among NCM participants (7.93 to 8.22 [SD 0.29]). The difference between groups was 0.58% ($p=0.004$). Among patients with a baseline HbA1c >8.0%, RPS participants had a mean decrease of 0.88% compared with a 0.07% decrease among NCM participants ($p<0.001$). Eight RPS patients started insulin compared to one NCM patient ($p=0.02$), and RPS participants reported greater increases in diabetes social support than NCM participants (+11.4 vs. +4.5, $p=0.01$). There were no differences between groups at follow-up in blood pressure, self-reported medication adherence, or diabetes-specific distress.

Limitations—The study was limited to male veterans. It will be important to replicate this study in gender-mixed samples of patients who share the same chronic condition and other shared characteristics (e.g., religion, ethnicity, culture) in different settings.

Conclusions—Participants in the reciprocal peer support intervention had improved HbA1c levels, insulin starts, and diabetes-specific support after six months compared to usual nurse care management. Peer-based models are effective in bridging service gaps while increasing the quality and quantity of self-care support.

Keywords

diabetes; peer support; randomized controlled trial; glycemic control; self-management; nurse case management

Introduction

Many patients with diabetes would benefit from self-management assistance between clinic visits. In efficacy trials, nurse-led care management programs improve diabetes self-care and risk factor control (1–3). Real-life practices, however, especially in low-resource settings, face multiple barriers to delivering these services (4).

As recognized in initiatives such as the United Kingdom's Expert Patient Program (5), peer support among patients with the same chronic health problem is a promising approach to increasing the quality and quantity of support (6). Peer support could allow patients to share experiences and receive reinforcement unavailable from time-pressed clinicians and may be especially beneficial when patients are tackling challenging medical tasks, such as insulin management. Many patients with poor glycemic control require either insulin initiation or

intensification yet resist these due to concerns about the additional self-management burdens (7, 8), resulting in neuropathic and microvascular complications (9).

While few peer support models have been evaluated in randomized controlled trials (RCTs), effective tested models combine peer support with a more structured program of education and assistance (10, 11). Face-to-face peer- and clinician-led group visits (12–14) and training sessions (15–17) improve some outcomes. Yet, many participants assigned to face-to-face peer support or group sessions do not attend sessions (14, 15). It is thus important to identify novel delivery mechanisms to extend the reach (18) of evidence-based peer support models.

To build on the potential benefits of face-to-face peer support while circumventing access barriers, we designed and piloted a novel intervention supplementing optional periodic nurse-led group sessions with telephone-based peer support between paired diabetes patients (19). The model was intended to be egalitarian, i.e., encouraging both peers to receive and provide support, with no designation of a ‘helper’ or ‘helpee’. Although one mechanism by which peer support may work is to “activate” patients by having them help others (20), such reciprocal models had not been examined in chronic disease management. In the current study, we compared this reciprocal peer support (RPS) program with nurse care management (NCM) in an RCT in a real-life clinical setting. We hypothesized that helping and receiving help from other diabetes patients in group sessions and in one-on-one telephone conversations would bolster patients’ autonomous motivation (21) and self-efficacy (22) to execute diabetes self-care tasks to improve glycemic control.

Methods

Setting and Identification of Patients

From April 2007–April 2009, we identified veterans with diabetes and poor glycemic control receiving care at two Midwestern Veterans’ Affairs (VA) facilities from electronic medical records with a validated algorithm (23). Patients had to have a most recent recorded HbA1c of at least 7.5% within the prior 6 months. Exclusion criteria were an International Classification of Diseases (ICD)-9 diagnosis of post-traumatic stress disorder, bipolar disorder, dementia, schizophrenia, or personality disorder.

Telephone Screening

The protocol was approved by the VA Ann Arbor Healthcare System institutional review board. Lists of patients were generated every four to six weeks. All providers except one (N=49) allowed their patients to participate, were sent lists of potentially eligible patients prior to contact by research staff, and signed the initial information letter sent to the patients. A research associate then telephoned patients, described the study as a comparison of two diabetes self-management support models (to avoid possible expectation bias), and administered a screening questionnaire. We excluded those reporting active substance abuse, severe depression, hearing loss, terminal illnesses, and participation in other diabetes studies. Eligible and interested patients were scheduled for a face-to-face initial session in groups of 4 to 18. We alternated recruitment between cohorts aged 45–66 with cohorts aged

65 or older to facilitate group cohesion in the group sessions and help pair participants with an age-matched peer partner.

Recruitment and Randomization

At the initial group session, participants completed written informed consent, a self-administered survey, blood pressure, and HbA1c tests with a Bayer DCA2000+ Analyzer (Bayer AG, Keverkusen, Germany) (24), and were randomized to RPS or NCM arms. Participants were provided \$20 for the baseline and six-month assessments.

Random sequence generation and treatment group assignment were determined centrally just prior to the initial session. Sequence was concealed until interventions were assigned. Patients, research staff, and care managers were blinded to randomization results until completion of baseline surveys and physiologic measures. Data assessors remained blinded to group assignment throughout the study. Because an even number of participants in the RPS group was required to pair participants, randomization algorithms ensured allocation of an even number to that group. After randomization, based on evidence that peers closer in age increase the likelihood of effective peer support (6), participants in the RPS group were paired based on age with a peer partner attending the same initial session.

Description of the Intervention

Initial Case Manager Training

As this was an effectiveness study, all care managers (9 at one site, 6 at the other) facilitated intervention group sessions as part of their assigned VA work duties with no additional salary support. The study was explained to care managers and other providers as comparing two different diabetes self-management support models, with no mention of specific hypotheses. Care managers completed a 4-hour training in Motivational Interviewing (MI) (25) and Empowerment-based approaches (26) to facilitate group discussion and encourage patients to identify diabetes-related behavioral goals consistent with their goals and values and to develop a short-term 'action plan' of specific steps to meet these goals (27). Care managers also attended two one-hour booster sessions. Because VA clinical leaders wanted all care managers to participate in both programs, we actively encouraged the care managers to use these same behavioral approaches in their interactions with patients in both arms to be able to assess the additional value of peer support interactions in the RPS group. Participants in both arms were given the same instructions about algorithms for self-adjusting insulin as per usual care and were not instructed to self-adjust oral anti-hyperglycemic medications.

Nurse Care Management (NCM)

All study participants received point-of-service HbA1c and blood pressure results and most recent medical record cholesterol values at baseline and six-month follow-up. NCM participants then attended a 1.5 hour session led by a care manager to review their lab and blood pressure results, ask questions, and receive information on VA care management services. They were provided contact information of their assigned care manager and encouraged to schedule follow-up (telephone calls and/or face-to-face visits) with that care manager. Each participant was also provided with diabetes self-management educational

materials. NCM patients thus received enhanced usual care, because although they all would be eligible for nurse case manager support at the study sites, in practice unless their physician refers them to nurse case management, many patients are not aware and do not avail themselves of this service.

Reciprocal Peer Support (RPS) Group

After the baseline assessment, RPS participants attended a 3-hour group session facilitated by a care manager and research associate. In the first half, participants' lab and blood pressure results were reviewed and action planning was introduced. In the second half, participants received brief training in basic peer communication skills and were paired with another age-matched intervention participant in their cohort. Peer partners were encouraged to call each other at least once a week using an interactive voice response-facilitated telephone platform that recorded call initiation, frequency, and duration; enabled partners to telephone without exchanging telephone numbers and to set time periods in which calls could be blocked; and generated automated reminders every 7 days if no peer calls were attempted. During a reminder call, participants could be transferred automatically to their peer-partner's number. The system also had functions enabling participants to leave voice messages for research staff or care managers. At the end of the initial session, intervention participants were given a DVD demonstrating peer communication skills and a diabetes self-management workbook that they could use to help guide their peer telephone calls.

Intervention participants were also offered three optional 1.5 hour group sessions at months 1, 3, and 6. These were completely patient-driven sessions in which participants were encouraged to share concerns, questions, strategies, and progress on their action plans. Sessions were facilitated by a care manager and a research associate. Research associates were present to help maintain intervention fidelity by encouraging non-directive facilitation of group discussions and to complete a check list of key areas covered and communication skills used in each session.

Outcomes and Measurements

The primary outcome was change between baseline and six-month HbA1c, measured with a Bayer DCA 2000+ point-of-care analyzer (24). The assay has a test coefficient of variation <5% as required by the National Diabetes Data Group (24). A subsample of HbA1c results was compared with those from the VA's laboratory services with no significant discrepancies. Blood pressure was recorded according to American Heart Association guidelines (28) with an Omron Intellisense Blood Pressure Monitoring System (Omron Corporation, Kyoto, Japan). We had intended to include change in point-of-service cholesterol levels, but after trial commencement determined the quality of measurement was poor (in comparisons of a subsample of assays with VA laboratories), so dropped this measure. Secondary self-report outcomes measured via survey at baseline and 6 months included validated measures of medication adherence (29), diabetes-related emotional distress (30), and diabetes-specific social support (31). Finally, we reviewed medical records to determine all primary care and diabetes-related subspecialty clinic visits, care manager contacts (phone or face-to-face), and anti-hyperglycemic and blood pressure medication increases.

Statistical Analysis

We estimated the sample size to provide 80% power with a two-sided alpha of 0.05 to detect an HbA1c difference of 0.5% between groups. The unit of analysis was the individual, but we allowed for a possible correlation of outcomes between members of the same pair (intraclass correlation [ICC], or ρ) of 0.05 in the intervention group, using the methods of Cohen (32, 33). We estimated a standard deviation of HbA1c of 1.2 based on our prior RCTs (34).

Analyses—As per international guidelines for analysis and reporting of clinical trials (35), we visually examined baseline data for clinically important differences between groups for study endpoints and other potential prognostic indicators. To assess the primary endpoint of change in mean HbA1c we used STATA 11's *xtmixed* command, which fits multi-level mixed-effects linear regression models, with clustering by assigned pairs (33, 36). All models evaluating changes between baseline and six-month values included as independent variables participants' baseline value and intervention arm. Although there were no differences between arms in baseline characteristics at <0.1 level, further analyses adjusted for variables that hypothetically could influence the outcome (e.g., insulin use, age, comorbidities). As there were no differences in results, unadjusted analyses are reported.

The intra-pair ICC for changes in HbA1c in our sample was .092, and there were no differences in our results in analyses accounting for clustering (*xtmixed*) and using simple linear multiple regression (*regress*). To maintain the integrity of our *a priori* study design in which pairing of peer partners was a key element, we conducted all analyses clustering by assigned pairs in the RPS arm and by sham pairs created by matching age-matched participants in the NCM arm (37). If RPS patients requested reassignment to another peer (2 cases), they were analyzed according to their initial pairing. All analyses were intention-to-treat. We also conducted alternative analyses adjusting for potential clustering by cohort and by site with no differences in our results.

Treatment of Missing Data—Six-month HbA1c data were missing for 28 randomized participants (11%). We therefore conducted a second analysis that imputed missing data (38, 39). In a third sensitivity analysis we examined the worst-case scenario that baseline HbA1c values of participants lacking 6-month HbA1cs remained unchanged at 6 months. Our results in both of these were unchanged. The funding sources had no role in study design, conduct, analysis or decision to submit findings for publication.

Results

Participant flow, baseline data, level of engagement and other outpatient health care utilization

The CONSORT diagram in Figure 1 shows participant flow. Of the 1171 patients who were contacted, 244 (21%) were enrolled: 126 were randomized to RPS, and 119 to NCM. One RPS participant incorrectly completed written informed consent and then refused to correct it so did not receive the intervention. Participants' baseline characteristics and assessment

results are reported in Table 1. There were no statistically significant differences between groups in any measure.

Figure 2 shows average duration and number of recorded calls in each month among the 90% of peer pairs who had at least one conversation. 20 pairs reported talking without using the system. 61% of RPS participants attended the month 1 group session, 59% the month 3 session, and 63% the six-month session. 40% attended all three optional sessions, 26% attended two, and 12% attended one. During the intervention period, there were no significant differences between groups in additional case manager contacts (mean RPS 1.24 [SD 1.58] vs. mean NCM 1.48 [SD 1.50] or physician visits (mean RPS 1.70 [SD 1.23] vs. mean NCM 1.57 [SD 0.99]). The range of case manager encounters was 0–7 in RPS and 0–8 in NCM. There were no adverse events including severe hypoglycemia reported in either group.

Six-month outcomes

Table 2 reports changes in study measures from baseline to six-month follow-up. RPS participants had a mean baseline HbA1c of 8.02%, which improved to 7.73% at six months (−0.29%). NCM participants had on average an increase in HbA1c (7.93 to 8.22 [+0.29]). The difference in the change in HbA1c between the two groups was −0.58% ($p=0.004$). In stratified analyses, among patients with baseline HbA1c >8.0%, RPS participants had a mean decrease of 0.88% at six months compared with 0.07% among NCM participants ($p<0.001$) (analyses not shown). Mean blood pressures at baseline in both groups were relatively good (mean systolic blood pressure 138.4, SD 17.9) (42) and decreased slightly, with no significant differences between groups (see Table 2).

As Table 2 shows, there were more insulin starts among RPS than NCM participants (8 vs. 1, $p=0.02$), and on average among patients on oral anti-hyperglycemic medications more intensification events (1.41 vs. 1.00, $p=0.01$). RPS participants reported greater increases in diabetes-specific social support at six-months (+11.4 vs. +4.5, $p=0.01$). Besides insulin starts, there were no differences between groups at follow-up in number of other medication intensification events, self-reported medication adherence, or diabetes-specific quality of life (Table 2).

COMMENT

Participants randomized to reciprocal peer support achieved HbA1cs on average 0.58% lower than those randomized to nurse care management. RPS patients with baseline HbA1cs >8.0% achieved a mean decrease of 0.88% compared with a 0.07% decrease among NCM participants. These are both statistically and clinically significant differences. The UK Prospective Diabetes Study found that a 0.5% mean difference in HbA1c translates into a 2.8% absolute risk reduction in diabetes events over a 10 year period, or a number needed to treat of 36 (43). There were more insulin starts among RPS participants and higher reported diabetes-specific social support at six months, but no differences in blood pressure, self-reported medication adherence or diabetes distress.

By mobilizing patients to help each other, peer support interventions are less resource-intensive than many diabetes management programs. When six-month outcomes were assessed, besides for the peer telephone calls, the 46% of RPS participants who attended the initial, 1-month and 3-month group sessions had 4.5 hours in face-to-face meetings over the six-month period more than what all NCM participants received. This is far less time-intensive than other diabetes self-management programs that achieved similar or smaller improvements in glycemic control (1, 44, 45). Moreover, introduction of most oral medications as monotherapy leads to HbA1c decreases of 0.5 to 1.0%, similar to the reductions achieved in this intervention (41).

These findings reinforce evidence from observational and non-randomized studies suggesting health benefits from both receiving and giving social support (20, 40, 46, 47) and address the call by two recent Cochrane Reviews for high-quality research on the clinical effectiveness of peer support in chronic disease management (10, 11). This RCT is the first to demonstrate benefits from a reciprocal model of peer support. In addition, because we conducted our trial as an effectiveness trial with nurse case managers providing care as part of their normal duties, the results are more likely to be replicated in other real-life clinical settings.

Further work is necessary to disentangle the relative contributions of the different intervention components, i.e., the group sessions versus the one-on-one peer telephone calls, to the intervention's success. Future research also will need to examine correlates of successful peer partner pairings as well as assess mediators and moderators of intervention effects in both quantitative and qualitative assessments. The success of peer support is hypothesized to be due in part to the nonhierarchical, reciprocal relationship created through sharing similar life experiences (6). Many sources of patient resistance to initiating and intensifying insulin therapy lend themselves to peer support (8, 48–50). Our findings of higher rates of insulin starts in RPS compared to NCM suggests that patients' experiential concerns about insulin may indeed be best addressed with another person also coping with insulin management. We did not gather data on changes in diet, exercise, or weight that may have also contributed to the HbA1c improvements.

Our study had a number of limitations. First, it only included male patients. While peer support interventions have been found to be more acceptable to women than men (6, 51), research also suggests that more similar peers are more likely to have mutually supportive peer relationships (6, 51). Peer support initiatives may thus be especially effective among participants with common identity bonds, such as shared experiences, cultural and ethnic backgrounds, or religious faith. We targeted veterans in the same age cohort, who often have a common sense of 'veteran identity' due to shared military experience within a specific socio-historical context (52). It will thus be important to replicate this study in other gender-mixed samples of patients. It will also be important to examine the effectiveness of different peer support models among patients facing a range of self-management challenges. The success of this intervention can help guide other efforts to combine periodic group sessions, care management support and peer communication to initiate and support other behavior changes in diabetes and other conditions requiring high levels of self-management (e.g., obesity, heart failure, chronic pain, physical inactivity).

Second, this intervention only lasted six months. It will be important to test peer support interventions such as the one we tested over longer periods of time. One advantage of peer support interventions is their potential to provide flexible, longer-term self-management support (53). Third, while nurse care managers and all other providers were blinded to the study's hypotheses, the nature of the intervention prevented blinding to treatment group. Moreover, because the same care managers provided care to patients in both arms, treatment bias cannot be excluded. However, the nurse care managers might be expected to be invested in showing that their current provision of care was superior to between-patient support, so the most likely effect of any treatment bias would be toward the null. It is also important to note that this intervention focused exclusively on activating patients to improve their self-management. A more powerful intervention would also target provider behaviors (e.g., encourage provider medication initiation and intensification). A final limitation is the relatively low rate of uptake of the intervention. Peer-based programs such as this would need to be part of a menu of options available to patients. It is also possible that with greater acceptance of novel programs such as this, uptake rates would increase.

In conclusion, periodic nurse-facilitated, patient-driven group sessions supplemented with one-on-one peer-support telephone calls between age-matched partners improved glycemic control and other key outcomes more than provision of nurse care management services alone among male diabetes patients. Because many chronically-ill patients need more support for self-care than most healthcare systems can provide, models such as this that increase the quality and intensity of assistance through peer support deserve further exploration. Reciprocal peer models can be an effective and efficient approach for helping patients help each other and themselves.

Acknowledgments

The Principal Investigators Michele Heisler and John Piette had full access to all of the data in the study and take responsibility for the integrity of the data and accuracy of the data analysis. We thank the very dedicated VA nurse care managers who participated in this intervention as part of their VA work assignments: Debra Beaulieu, Amanda Benadum, Christine Bulifant, Marion Cooper, Joanne Donovan, Janette Elwing, Kelly Johnston, Jacqueline Hurd, Wendy Morrish, Alex Paul, Joe Pawelezyke, Carol Peterson, Maria Reno, Ken Sizemore, and Diane Sobecki-Ryniak. We also thank VA clinical leaders Denise Ramsey, Jennifer Walch, Adam Tremblay, Thomas Gross, and Susan Meade. Many thanks also to Barbara Stanislawski and Jennifer Burgess who successfully conducted all participant recruitment, helped with facilitation and successful execution of the group sessions, and with data collection. Martha Funnell and Mary Lou Gillard provided initial training to the VA nurse care managers in group facilitation, assisted in the creation of the peer partner workbooks, and documented intervention fidelity through periodic observation of group sessions. Many thanks to Mary Rogers, PhD for technical assistance with study design and analysis.

Role of Funding Sources

This research was supported by the VA HSR&D Grant No. IIR 04-239, the Michigan Diabetes Research and Training Center (NIH Grant 5P60-DK20572), the Robert Wood Johnson Foundation Clinical Scholars Program, and the Michigan Institute for Clinical and Health Research (NIH #UL1RR024986). John Piette is a VA Research Career Scientist. The authors have no conflict of interest or financial disclosures. The funding sources had no role in the study design; data collection; administration of the interventions; analysis, interpretation, or reporting of data; or decision to submit the findings for publication.

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Figure 1.
CONSORT 2010 Flow Diagram

Figure 2.
Distribution of Interactive Voice Response (IVR) Telephone Calls Data

Table 1

Participant Baseline Characteristics (n=244)*

Characteristic	Reciprocal Peer Support n = 125 n(%) or mean(SD)	Nurse Case Management n = 119 n(%) or mean(SD)	Between-Group Difference P-value	Total n = 244 n(%) or mean(SD)
Age in years	61.8(6.1)	62.3(6.6)	0.26	62.0(6.3)
Male	125(100%)	119(100%)	–	244(100%)
Race or Ethnicity			0.54	
White, non-Hispanic	99(80%)	98(84%)		197(82%)
Hispanic	5(4%)	2(2%)		7(3%)
Black	11(9%)	11(9%)		22(9%)
Other	9(7%)	5(4%)		14(6%)
Education			0.67	
Some High School, High School Graduate, or General Educational Development (GED)	34(27%)	35(30%)		69(28%)
Some college, technical, or vocational	91(73%)	83(70%)		174(72%)
Annual Income, \$			0.94	
30,000	78(63%)	71(63%)		149(63%)
31,000	46(37%)	41(37%)		87(37%)
Social Support				
Lives with a spouse	82(66%)	84(71%)	0.40	166(68%)
Lives alone	29(23%)	22(18%)	0.37	51(21%)
Travels an hour or more to appointments	33(26%)	37(31%)	0.42	70(29%)
Diabetes Social Support [†]	55.1(24.5)	53.3(25.4)	0.72	54.2(24.9)
Diabetes Distress[†]	26.5(16.4)	26.4(19.8)	0.52	26.4(18.1)
Anti-hyperglycemic Medications			0.93	
Only oral diabetes medication	55(44%)	53(45%)		108(44%)
Insulin, +/- oral medication	70(56%)	66(55%)		136(56%)
Medication Adherence				
Misses 1 insulin dose per week	52(74%)	48(73%)	0.84	100(74%)
Misses 1 oral med dose per week	71(72%)	66(66%)	0.38	137(69%)
Self-Rated General Health Status				
Fair or Poor health	59(47%)	56(47%)	0.98	115(47%)
Physiological Tests				
HbA1c	8.02(1.32)	7.93(1.40)	0.70	7.98(1.40)
Systolic Blood Pressure	140.3(18.6)	136.4(16.9)	0.96	138.4(17.9)
Diastolic Blood Pressure	77.1(11.5)	75.8(10.7)	0.81	76.5(11.1)

* Baseline characteristics are the results from surveys and blood draws taken during the first group session.

[†]“Diabetes Support” was assessed using 6 questions from the Diabetes Support Scale (40). Each question had 6 answer choices, ranging from “Strongly Disagree” to “Strongly Agree” The answers were scored from 0 to 5 points, with higher scores indicating higher levels of diabetes social support, and the total score was calculated as a percentage of possible points.

[‡]“Diabetes Distress” was assessed using 14 questions from the Diabetes Distress Scale (41). Each question had 5 answer choices, ranging from “Not a problem” to “Serious problem.” The answers were scored from 0 to 4 points, with higher scores indicating higher levels of distress, and the total score was calculated as a percentage of possible points. *T*-test used for continuous measures of age, physiological tests, Diabetes Distress and Diabetes Social Support.

χ^2 Used for all other categorical variables.

Table 2

Changes in Outcome Measures from Baseline to 6months

	Reciprocal Peer Support (RPS) [*]		Nurse Care Management (NCM) [†]		Between-group differences (p-value)		
	Baseline	6 month	Change	Baseline		6 month	Change
A. Physiological Measures							
Hemoglobin HbA1c (mean[SD])	8.02(1.32)	7.73(1.32)	-0.29	7.93(1.40)	8.22(1.74)	0.29	.004
Systolic Blood Pressure (mean[SD])	140.3(18.6)	136.9(16.8)	-3.4 [‡]	136.4(16.9)	135.0(17.7)	-1.4	.91
Diastolic Blood Pressure (mean[SD])	77.1(11.5)	76.8(11.9)	-0.3	75.8(10.7)	76.1(10.6)	0.3	.10
B. Medication Change Measures (from Medical Chart Review)							
Insulin Starts (n)//	-	-	+8	-	-	+1	.02
% participants with insulin dose increase			38.5			43.3	.56
% participants with increase in oral anti-hyperglycemic medications (dose or number)			16.5			17.2	.90
% participants with increase in blood pressure medications (dose or number)			24.0			24.4	.95
Mean # of insulin dose increases (SD)			1.50(.78)			1.31(.54)	.28
Mean # of oral anti-hyperglycemic increases (SD)			1.41(.62)			1.00(.00)	.01
Mean # blood pressure medication increases (SD)			1.40(.86)			1.41(.78)	.95
C. Self-Reported Measures (from Surveys)							
Diabetes Social Support [‡] (mean[SD])	55.1(24.5)	66.5(19.5)	11.4 [‡]	53.3(25.4)	57.8(25.8)	4.5	.01
Diabetes Distress ^{**} (mean [SD])	26.5(16.4)	22.8(17.2)	-4.0 [‡]	26.4(19.8)	20.8(18.8)	-5.6 [§]	.24
Medication Adherence							
Misses 1 insulin dose per week	52(74%)	49(69%)	-3(-5%)	48(73%)	38(63%)	-10(-10%)	.67
Misses 1 oral medication dose per week	71(72%)	65(70%)	-6(-2%)	66(66%)	59(63%)	-7(-3%)	.54

^{*} For RPS participants, baseline values for all measures reflect the total number of 125 participants. For measures related to six month follow-up, 117 RPS participants completed a six month follow-up patient survey and 113 provided six month follow-up physiologic measures.

[†] For NCM participants, baseline values for all measures reflect the total number of 119 participants. For measures related to six month follow-up, 114 NCM participants completed a six month follow-up patient survey and 103 provided six month follow-up physiologic measures.

[‡] Statistically significant difference at p<.05 within the RPS group.

[§] Statistically significant difference at p<.05 within the NCM group.

// Data from both medical chart review and patient survey report

¶ “Diabetes Social Support” was assessed using 6 questions from the Diabetes Support Scale (40). Each question had 6 answer choices, ranging from “Strongly Disagree” to “Strongly Agree”. The answers were scored from 0 to 5 points, with higher numbers signifying higher social support, and the total score was calculated as a percentage of possible points.

** “Diabetes Distress” was assessed using 14 questions from the Diabetes Distress Scale (41). Each question had 5 answer choices, ranging from “Not a problem” to “Serious problem.” The answers were scored from 0 to 4 points, with higher scores signifying more distress, and the total score was calculated as a percentage of possible points.