Multifocal Interventions Enhance Outcomes and Reduce Disparities among Diverse Patient Populations

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Abstract

The Alliance to Reduce Disparities in Diabetes, sponsored by The Merck Company Foundation, is a consortium of five grantees, a National Program Office, and an external evaluator. The Alliance integrates innovative professional and patient education and quality of care improvements aimed at vulnerable patients, and focuses on reducing disparities in diabetes care and enhancing outcomes through clinical and community interventions. Five project sites involving key community stakeholders in reducing disparities are based in Chicago, IL, Camden, NJ, Wind River Indian Reservation, WY, Dallas, TX, and Memphis, TN. The sites enrolled a multiracial patient group and implemented multilevel and multicomponent interventions to enhance patient skills, clinician cultural competencies, and health care systems changes to address disparities and enhance care. Each grantee provided clinical (hemoglobin A1c [HbA1c], blood pressure [BP]) and patient-reported outcomes (diabetes competence, quality of life, resources and supports for self-management, and diabetes self-care behaviors) for program participants to the Alliance's external evaluator. Baseline and follow-up clinical data are reported for more than 1000 patients, with a decrease of mean HbA1c values from 8.5% to 7.9% and a decrease in BP from 132/80 to 129/78, both significant at the $p < .001$ level. Analyses of the patient-reported survey measures also showed significant improvements in perceived diabetes competence, resources and supports for self-management, and self-care behaviors. Multivariable regression analysis showed that patients who participated in more than half of the program offering across sites had greater changes in both HbA1c and BP over time, controlling for age and gender. We conclude that multicomponent programs can reduce disparities and improve outcomes for people with diabetes, and describe next steps.

1. Background

Through grants to five organizations, The Merck Company Foundation supports comprehensive, multifaceted, community-based programs that address key factors to improve health outcomes for people living with diabetes.

The five programs and grantees are:

- Improving Diabetes Care and Outcomes on the South Side of Chicago, University of Chicago, Illinois
- Camden Citywide Diabetes Collaborative, Camden, New Jersey
- Diabetes for Life Program, Memphis, Tennessee
- Reducing Diabetes Disparities in American Indian Communities, Wind River Indian Reservation, Wyoming
- The Diabetes Equity Project, Dallas, Texas

Interventions

Although the interventions vary across the programs, the focus is on three core components:

- **Patient Component:** Patient education included community, small group, and individual materials, classes, and discussions.
- **Clinician Component:** Provider education included training in cultural competency, communication, and how to facilitate behavior change.
- **System Change Component:** Diabetes management via systems changes included care coordination, use of diabetes registries, nurse or community health worker participation in care management, enhanced community partnerships, and policy changes.

As of October 2012, 5,617 encounters took place across the sites with 1,143 patients, in which they discussed over 23,000 self-management topics (Table 1).

Table 1. Number of Times Diabetes Self-Management Topics Addressed

A1c, BP, and cholesterol education	99
Complications	859
Coping	1,696
Decision making/Goal setting	61
Diabetes basics	1,017
Doctor's visits and self exams	70
Glucose monitoring/Glucose targets	5,915
Healthy eating/food planning	5,310
Medication	5,055
Physical activity	2,009
Smoking and alcohol	1,336
Total	**23,427**

2. Cross-Site Evaluation

Methods

We collected clinical and patient-reported data from the five grantees four times over the past 3 years and conducted two site visits (one virtual) to document the interventions undertaken. All data reported are aggregated across grantees to understand the net effect of the Alliance programs on diabetes and health outcomes.

Measures

Clinical data collected across all grantees included BP calculated as mean arterial pressure, blood HbA1c levels, and LDL cholesterol.

Patient-reported measures common across at least 2 grantees included:

- **Perceived diabetes competence[1]:** Average of 4 items where higher scores indicate greater confidence in managing diabetes
- **Resources and supports for self-management[2]:** Average of 6 items where higher scores indicate more support from one's health care team in learning how to manage diabetes
- **Quality of life (Veterans RAND 12 Item Health Survey [VR-12])[3]:** 12 items split into 2 subscales indicating mental and physical functioning (scored via algorithm) where higher scores indicate better functioning
- **Diabetes self-care behaviors[4]:** Average of 2 items for each of 5 behaviors where higher scores indicate more frequent self-care behaviors

Program Participants

Table 2 presents the demographic characteristics for program participants who currently have baseline and follow-up measures, and are included in the cohort analysis. The average time between baseline and follow-up measures is 1 year.

Table 2. Demographic Characteristics of Program Participants in the Cohort

Characteristic		N	Unweighted Percent
Cohort		1,143	100.0
Gender	Male	417	37.0
	Female	710	63.0
Race/Ethnicity	White	91	8.0
	African American	300	26.3
	Native American	34	3.0
	Hispanic	627	54.9
	Asian/Pacific	16	1.4
	Other	16	1.4
	Unknown	59	5.2
Age	18–44	345	30.5
	45–54	398	35.2
	55 or older	388	34.3

3. Preliminary Results

Results for Clinical and Patient-Reported Outcomes

For the participant cohort, we used t-tests and multivariable regression analyses to understand how health and diabetes outcomes changed over time because of program participation. Table 3 presents the descriptive statistics for the baseline and follow-up clinical measures, and indicates significant differences. Both HbA1c and BP improved from baseline to follow-up. Table 4 presents the same information for patient-reported outcomes. All measures show improvement from baseline to follow-up ($p < .05$), except for quality of life measured by mental functioning, although there was a trend toward significance for this measure ($p < .10$).

3. Preliminary Results *(continued)*

Table 3. Clinical Measures Aggregated Across All Grantees

Outcome	Time	Mean	N	Min	Max	Median	t-test (*p*-value)
HbA1c	Baseline	8.5	1,143	4.5	15.1	8.0	
	Follow-up	7.9	1,143	5.0	18.5	7.4	0.000
BP	Baseline	132/80	1,067	84/36	220/170	128/80	
	Follow-up	129/78	1,067	80/41	230/130	123/78	0.000
LDL	Baseline	104	294	32	233	98	
	Follow-up	103	294	39	240	97	0.437

Note: HbA1c = hemoglobin A1c; BP = blood pressure; LDL = Low-density lipoprotein cholesterol

Table 4. Patient-Reported Measures Aggregated Across All Grantees

Outcome	Number of Sites	Time	Mean	N	Min	Max	t-test (*p*-value)
Diabetes Competence	3	Baseline	5.2	126	1.0	7.0	
	3	Follow-up	5.9	126	1.4	7.0	0.000
Resources and Support for Self-management	2	Baseline	2.6	38	1.0	4.0	
	2	Follow-up	2.9	38	1.0	4.0	0.004
Quality of Life (VR-12)							
Physical	4	Baseline	40.1	167	18.8	59.9	
	4	Follow-up	41.2	167	18.1	64.4	0.019
Mental	4	Baseline	44.6	167	11.5	69.5	
	4	Follow-up	45.6	167	20.4	69.6	0.090
Diabetes Self-care							
General diet	4	Baseline	3.6	162	0.0	7.0	
	4	Follow-up	4.5	162	0.0	7.0	0.000
Specific diet	4	Baseline	4.0	165	0.0	7.0	
	4	Follow-up	4.4	165	0.5	7.0	0.000
Exercise	4	Baseline	2.8	166	0.0	7.0	
	4	Follow-up	3.3	166	0.0	7.0	0.000
Blood-glucose testing	4	Baseline	4.2	168	0.0	7.0	
	4	Follow-up	5.0	168	0.0	7.0	0.000
Foot care	4	Baseline	4.0	167	0.0	7.0	
	4	Follow-up	5.0	167	0.0	7.0	0.000

Note: VR-12 = Veterans RAND 12 Item Health Survey

To further understand the potential impact of the grantee programs on changes over time, we regressed each of the changes in clinical measures on selected characteristics, including age (under 55 years vs. 55 or older), gender (male vs. female), and race (any underrepresented race vs. White), and program participation status (high intensity vs. low intensity). High-intensity program participants were those who attended over half of the program sessions that composed the Alliance programs; low-intensity program participants were those who attended less than half of the sessions. The results appear in Table 5.

Table 5. Results of Clinical Measures Regressed on Patient Characteristics and Program Participation Status

	Regression Coefficients		
Predictor Variable	HbA1c (n=1,121)	BP (n=1,057)	LDL (n=285)
Constant (intercept)[1]	−0.28*	6.2*	−7.1
Age 55 or older	0.34*	−0.3	−6.3
Male	−0.31*	0.4	−2.7
African American	0.00	−1.9	8.3
Native American	0.03	−2.4	15.5
Asian	−0.33	−1.8	4.3
Hispanic/Latino	−0.05	−0.7	8.5
Other race/ethnicities	−0.75	0.1	−11.3
Unknown race/ethnicity	0.19	4.5	9.0
High-intensity program participation	−0.63*	−9.8*	−0.3

[1] Represents mean changes for White females under age 55 who were low-intensity participants.

* $p < .05$ level

4. Discussion

Although these five programs are not randomized controlled trials, early comparisons of clinical and patient-reported measures from baseline to follow-up show improvements across almost all measures, including both clinical and behavioral outcomes. This preliminary evaluation suggests that the Alliance is demonstrating that diabetes outcomes can be improved and disparities potentially decreased in groups most burdened by diabetes management by using multilevel, multifocal interventions that include patient, provider, and system components. Analyses specifically comparing racial differences did not emerge as significant.

5. Next Steps

Next steps in the cross-site evaluation include additional data collection, including a comparison cohort, which will allow us to determine with more confidence whether disparities in diabetes were reduced. Each site will also be providing more clinical and patient-reported outcome data as the programs come to a close in 2013. In addition, a final site visit with grantees at the end of their intervention programs will allow us to better understand program process improvements over the course of the initiative that may have helped contribute to program success. A detailed process evaluation will describe process improvements and accomplishments across the sites that contributed to changes in clinical outcomes.

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