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Early Lessons From An Initiative On Chicago's South Side To Reduce Disparities In Diabetes Care And Outcomes

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Abstract

Interventions to improve health outcomes among patients with diabetes, especially racial or ethnic minorities, must address the multiple factors that make this disease so pernicious. We describe an intervention on the South Side of Chicago—a largely low-income, African American community—that integrates the strengths of health systems, communities, and patients to reduce disparities in diabetes care and outcomes. We report preliminary findings, such as improved diabetes care and diabetes control, and discuss lessons learned to date. Our initiative neatly aligns with, and can inform the implementation of, the accountable care organization -- a delivery system reform in which groups of providers take responsibility for improving the health of a defined population.

Racial and ethnic disparities in diabetes care and outcomes arise from multiple causes. These include differential access to high-quality health care, healthy food and opportunities for safe recreation; cultural traditions regarding cooking; beliefs about disease and self-management; distrust of medical providers; and socioeconomic status. Consequently, the solution must be multifactorial. Improving patients' knowledge and increasing their motivation to make healthy lifestyle changes will have minimal impact if their limited access to healthy food and physical activity is not simultaneously addressed.

To date, few interventions have taken a multifaceted approach to improving outcomes among African Americans with diabetes.¹ Traditionally, health care interventions have not taken advantage of community-based programs. Nor have quality-improvement efforts typically included a focus on reducing health disparities,² which has probably diminished the benefits of prior efforts to reduce health disparities among racial or ethnic minorities.³

Fortunately, current trends in health policy and practice are encouraging greater interaction and collaboration among health care providers and communities. One driver of this collaboration is the creation of accountable care organizations, as authorized under the Affordable Care Act.⁴ Accountable care organizations will likely have financial incentives to take responsibility for broad health care outcomes and costs for a defined population. Thus, accountable care organizations are potentially motivated to prioritize evidence-based prevention strategies that build on community resources and create a continuum of care from community settings to health care systems.

Because racial or ethnic minorities are disproportionately represented among high-risk patients with complex medical conditions, accountable care organizations have the potential to improve minority health and reduce health disparities. Two recent reports from the Department of Health and Human Services—“A Nation Free of Disparities in Health and Health Care”⁵ and “National Strategy for Quality Improvement in Health Care”⁶—recommend that efforts to reduce disparities involve both health care systems and community-based organizations. Important regional strategies to improve health care quality, such as the Robert Wood Johnson Foundation’s Aligning Forces for Quality initiative and the Department of Health and Human Services’ Chartered Value Exchanges, also encourage health care and community partnerships.

Although these policies and programs hold great promise, to date there are limited real-world examples of approaches that combine quality improvement efforts, disparities interventions, and community partnerships to reduce disparities.

South Side Diabetes Initiative

We believe that such a multifactoral approach offers the best chance to address the multiple causes of disparities in diabetes care and outcomes. Therefore, we focused our initiative on the South Side of Chicago, a predominantly working-class African American community with significant diabetes disparities. For example, the prevalence of diabetes on the South Side is 19.3 percent, compared with a national prevalence of 10.7 percent and an average prevalence in Chicago of approximately 7 percent.⁷ In Chicago overall, those neighborhoods that are primarily African American have five times the rate of diabetes-related leg amputations as primarily white neighborhoods.⁸ There are also other racial or ethnic disparities in diabetes care, such as the proportion of African Americans and Latinos receiving eye examinations and influenza vaccinations compared to non-Hispanic whites.⁹

Chicago’s South Side faces many challenges, including a relative dearth of outlets selling a broad range of healthy foods, as well as crime and safety issues. But it also has many community strengths, such as community-based organizations, whose capacities can be harnessed in addressing diabetes outcomes. In 2009, we developed a collaborative community-based intervention that employed a multifaceted, integrated approach to address many of the root causes of health disparities.

Now in its third year, the intervention consists of efforts to achieve system-level quality improvement within six health centers, four of which are federally qualified health centers and two of which are academic clinics affiliated with the University of Chicago; culturally tailored patient education; provider communication training; and community partnerships that support diabetes self-care at home. To assess the impact of the intervention, we are tracking key intermediate health outcomes—for example, the control of glucose, blood pressure, and cholesterol—that are associated with diabetes complications such as leg amputations, renal failure, and heart attacks.

We describe our intervention in detail, report preliminary findings (primarily process measures), and discuss early lessons learned. Our work may inform the planning and development of accountable care organizations and other organizations that seek to integrate health care and community approaches with the goal of improving health and reducing disparities.

The Intervention

Our intervention focuses on people with diabetes on the South Side of Chicago. It contains four overlapping core components reflecting key elements of the MacColl Institute Chronic

Care Model, which identifies patients, practice teams, the community, and health systems as four necessary elements in the successful management of chronic diseases such as diabetes (Exhibit 1).¹⁰

Six health centers are part of the intervention (Exhibit 2). Researchers at the University of Chicago received grant funding from the Merck Company Foundation's Alliance to Reduce Disparities in Diabetes¹¹ and the National Institutes of Health to implement and evaluate the intervention. The research and implementation team includes faculty and staff members with expertise in quality improvement, behavioral change, community outreach, patient education, and research methods.

Quality Improvement Collaborative

The first of the four intervention components is a quality improvement collaborative (Exhibit 1). Such collaborative undertakings, which typically bring together staff members from different health care sites to learn better care techniques and share best practices, have been shown to improve diabetes care in safety-net clinics.^{12,13}

Each of the six clinics formed a quality improvement team of clinicians, clerical staff members, and leaders. A project coach from the research and implementation team provided basic quality improvement training—for instance, on how to map the process of diabetes care at each health center. Initial projects used the “plan, do, study, act” methodology—designed to support rapid cycles of change—to implement small-scale, projects with achievable outcomes identified by the quality improvement teams. One such project created wallet-sized medication cards that listed patients' medications to increase patients' knowledge about their prescription medications and also reduce medication errors.

These early projects were followed by more patient-focused interventions such as the “Diabetes All-Stars,” a peer support group that encouraged patients to identify and use community resources including local walking programs.

Experience with these quality improvement efforts taught QI team members how important team-based care and care integration are. We have convened ten half-day meetings at which the quality improvement teams come together for collaborative learning and the sharing of best practices. Quality improvement projects that are planned or currently underway are utilizing diabetes registries (e.g. to identify high-risk diabetes patients), using nurses to coordinate the care of complex diabetes patients, training community health workers to help patients navigate the health care system, and setting up regular diabetes ‘group visits’ where clinic patients simultaneously receive medical care, diabetes education and peer-support in a group setting within a health center.

We use the Assessment of Chronic Illness Care tool,¹⁴ a validated instrument that we modified for diabetes, to track the effectiveness of organizational changes in diabetes care. Each quality improvement team completes the Assessment of Chronic Illness Care survey twice a year, and scores are averaged across the groups and compared over time. To date, the teams have reported steady improvements in the organization of the health care system, community linkages, delivery system design, clinical information systems, and integration of care delivery (Exhibit 3).

Patient Activation

The second of the four intervention components is patient activation (Exhibit 1). Few diabetes interventions are tailored for low-income groups or minorities, or address issues of patients' mistrust of the health care system or patients' perceived discrimination within the health care system. Furthermore, although shared decision-making, in which patients are

equal partners with their physicians in discussions and decisions about care, is associated with positive diabetes outcomes, African Americans are less likely to be engaged in shared decision-making than their white counterparts.¹⁵ Therefore, we developed a patient activation intervention combining culturally tailored patient education with skills training in shared decision-making.

First, we developed the diabetes education portion of the patient intervention by adapting the International Diabetes Center's BASICS curriculum, which covers diabetes basics (such as treatment and complications), nutrition, physical activity, and diabetes self-management (such as glucose monitoring and goal setting). We made the curriculum's sessions shorter and more frequent, and we used audiovisual aids to address potential literacy barriers. We also tailored the nutritional education to address common shopping and dietary patterns in the African-American community. For example, we created a mock grocery store with food items from a local low-cost grocer.

We also developed the shared decision-making portion of the patient intervention (based on our prior qualitative research¹⁶) that included problem-based learning, group discussions, role-playing, individual testimonies, and experiential learning. We also created a culturally tailored video and an interactive game about shared decision-making.

After three months, class participants transition to quarterly diabetes support groups to help maintain what they have learned. Among the first thirty-four participants, there were significant improvements in patients' confidence in managing their diabetes, patients' self-care behaviors such as glucose monitoring and foot care (as measured by patient surveys), and glucose control (as measured by hemoglobin A1c).¹⁷

Training For Clinicians

The third intervention component is clinician training that complements our patient education effort. We developed four ninety-minute workshops for the clinical staff to build their skills in cultural competency, communication (for example, reflective listening and open-ended inquiry), helping patients change their behavior (for example, through motivational interviewing), and shared decision-making. The workshops incorporated role-playing, group discussions, exercises, and reflection.

To date, more than ninety staff members have taken the workshops. In surveys after training, participants reported improved ability to use techniques to improve communication and clinical outcomes.

Community Partnerships And Outreach

The fourth component involved community partnerships and outreach activities that engaged diabetes patients in community settings.

These outreach activities have enabled us to identify more than 4,000 people with diabetes who did not have a regular source of medical care and to link them to a medical home. These efforts occurred primarily through our collaboration with the University of Chicago's Urban Health Initiative, which seeks to increase access to quality care on the South Side of Chicago. Its patient advocates work with frequent visitors to the emergency department at the University of Chicago Medical Center to establish ongoing primary care for them within the Urban Health Initiative's South Side Health Collaborative, a network of twenty-five health centers and local hospitals. All four community health centers in our intervention are members of the South Side Health Collaborative.

We have also established partnerships with community-based organizations and businesses. We are working with a local farmer's market, a major national pharmacy chain, and the city food bank to create a pilot program of "food prescriptions" that would grant patients access to free or discounted healthy food, such as fresh produce. We collaborate with a national grocery store chain to provide educational tours around one of its stores in Chicago. In addition, the store donates healthy food for our outreach efforts.

In one collaborative effort, we partner with a high-use community center that has a popular monthly food pantry. We provide healthy cooking demonstrations using donated food, conduct diabetes and cardiovascular disease screening, disseminate health information, and make referrals to medical homes. This ongoing effort has reached more than 600 members of the community thus far.

Finally, our research and implementation team and our quality improvement team educate the public about diabetes through local media and community venues. For example, team members have been frequent guest speakers on two prominent African American radio stations, presented a thirteen-week educational series on a cable network with an estimated viewing audience of half a million households, and have discussed diabetes in lectures tailored for community members.

Integrating The Components

Our observations suggest that integrating the four intervention components increases the power of each component to improve diabetes outcomes. For example, patients are more likely to engage in shared decision-making if both patients and providers receive communication training. Thus, the workshops for health care providers include content about shared decision-making that echoes what patients learn in the diabetes activation classes.

In addition, patients who enroll in the activation classes are encouraged to make use of community resources. Many have visited the food pantry, participated in grocery store tours, and joined public fitness centers. These resources bolster their ability to sustain the behavioral changes taught in class. One of the nurse practitioners who helps teach patient classes also provides care management, which allows her to reinforce class teachings in one-on-one clinical visits.

Integrating community resources with the health care delivery system is a key goal of our intervention. Not only do community partnerships provide resources to diabetes patients already receiving care, but they also allow us to link people without a provider to comprehensive medical care.

We are currently exploring the use of community health workers and patient navigators within our health centers. One potential approach identifies community health workers from the pool of patients who have completed the diabetes activation classes. This strategy could further integrate the intervention components and reduce the need for duplicative training in diabetes education.

Other measures to increase patient communication and outreach include communicating with patients via text messaging through mobile phones. We piloted an interactive text-message-based intervention providing automated, patient-selected diabetes care reminders. Most patients reported that they were "highly satisfied" (94 percent) with the program, and their self-reported self-management confidence and skills improved during the study period.¹⁸ We are currently piloting the use of such technology by a nurse care manager who coordinates care with providers at the two university-based clinics, acting as an intermediary

between providers and patients and using the technology to send alerts and reminders to patients. Such technology could also be employed by community health workers.

Challenges And Lessons Learned

We describe here preliminary lessons learned from our early work. For more details, see online Appendix Exhibit 1.¹⁹

Start Small

Initially, we envisioned the quality improvement teams as developing team-based care that integrated health systems and community resources. However, each health center chose to start with more narrowly focused quality improvement projects, which proved to be the best strategy. Starting with smaller projects allowed teams to build quality improvement infrastructure and healthy team dynamics. In addition, early successes enhanced the teams' efficacy and ownership of the projects. By the second year, after working on smaller tasks, each health center realized that larger system changes, such as team-based care and care coordination, were important goals.

Similarly, we began with small projects with our community partners, and we expanded the range and depth of activities over time.

Include Coaching

We underestimated the need for regular, personalized quality improvement coaching and had to quickly increase support in this area. Each health center had an interest in improving diabetes care and some prior quality improvement experience. However, the centers' baseline capability and readiness to change varied. All of them benefited from coaching on fundamental issues such as forming a working team, getting leadership buy-in, analyzing fundamental problems, brainstorming about innovations, and dealing with team turnover.

Each health center had competing priorities and pressures. For all of them, the basic instruction, encouragement, and deadlines were critical for moving the project ahead.

Work With Staff Champions

Identifying and working with staff champions has been vital for the project's survival and progress. For example, although we initially got the approval of each health center's chief executive officer or executive director, we quickly learned that it is critical to involve champions at all levels, including providers, nurses, and front office staff. Similarly, identifying key champions within community organizations and businesses has been crucial.

Even with multiple champions, however, it is important to remember that building relationships takes time and commitment. This is particularly true when academic centers partner with organizations in low-income, minority communities where mistrust of academic institutions is strong. Key members of our research team are African- Americans with strong ties to the South Side, and we drew on their social capital and the community's trust in them to develop strategic partnerships. Relationships were also critical in linking patients to community resources. Patients who attended classes were more likely to make use of a resource such as a food pantry if a patient champion or research team member organized a visit to it for the class.

Understand Organizational Culture

It is important to understand the organizational and political climate when working with clinical organizations, community groups, and local businesses. If their organizational

missions were not aligned with our project's goals, health centers were reluctant to implement quality improvement projects, and community partners resisted starting new programs.

To more effectively execute their projects, it has been helpful for our quality improvement teams to identify organizational barriers to change—for instance, infrastructure or institutional culture—and how organizations adjust to external developments, such as economic pressure. Within the community, our research/implementation team have found it helpful to understand the local political landscape as we worked to gain the support of local aldermen and other elected officials.

Follow The Principles Of Community-Based Research

Principles of community-based research were relevant to our work with community organizations and our quality improvement work.²⁰ These principles include mutual respect, trust, equal partnerships, shared learning, demonstration of the value of the intervention, and commitment to a long-term partnership. We found them to be fundamental to building a successful relationship.

Keep The Grand Vision In View

Complexity, workload, and the need for buy-in from the QI teams made it impossible to implement all components of our intervention simultaneously. Yet having a phased implementation reduced the potential impact of individual components, and often left the quality improvement teams feeling as though the project was unfocused and had shifting priorities.

It is important to present the grand vision at the beginning of a project, and to develop shared expectations of the entire project as early as possible. It is also important to refer to the vision regularly to keep it fresh in participants' minds.

Provide Communication Training

Despite improved confidence in their ability to participate in shared decision-making, patient behaviors in this regard did not substantially change after the activation classes. Qualitative interviews suggested that patients were concerned that their providers would discourage them from taking a more active role in their own care.

We realized that we needed to implement the provider workshops simultaneously with the activation classes and to better integrate the communication curricula of patients and providers. In addition, we now send providers a notification letter when a patient enrolls in the class and ask them to encourage the patient's efforts to increase self-management.

Identify Personnel Committed To Community Engagement

Clinical staff did not generally view community education as core to their mission or part of their job description. Consequently, it was often challenging for the quality improvement teams to use information about community resources and to participate in community-based outreach. A survey revealed that front desk staff and medical assistants in the health centers were more likely than nurses and physicians to report that their practice used community resources to help meet patients' health care needs ($p < 0.0001$), suggesting that such personnel (who were also more likely to be African-American [$p < 0.001$]) may be more familiar with community resources and more comfortable engaging patients in community settings. One potential strategy is to create parallel community engagement teams to work in conjunction with the quality improvement teams and to spearhead the community outreach activities of their health centers.

Align With Other Major Strategic Initiatives

Our project is part of the University of Chicago's Urban Health Initiative, which has the support of the university president and the dean of the Biological Sciences Division. As a result, our project has received financial, infrastructural, and political support from the university.

In addition, obesity, cardiovascular disease, and diabetes are major health priorities of the city's government and are aligned with its economic goals. Accordingly, we are initiating collaborations with the Chicago Department of Public Health.

Be Persistent

Each core intervention component requires large investments of time and resources. Treating them as stand-alone projects ignores the complex context that gives rise to health disparities. Yet integrating the four components requires additional investments of time and resources, such as relationship building between health center staff and community partners.

Our experience has been that virtually everyone on the clinical and community sides of our partnerships recognizes the value of an integrated approach and is driven by the same vision, yet daily implementation challenges make persistence a key factor in determining success of the program.

Focus On Sustainability From The Start

Our project is currently supported through two external grants, and its sustainability has been a priority for the research and implementation team. We have sought to incorporate changes into the existing infrastructure and protocols of the health centers so that changes become "business as usual." For example, the patient education classes will continue to be the primary means of diabetes education at several of the centers.

In addition, we have sought to link community organizations directly to health center staff so that the collaborations and partnerships can be sustained over time. We have also invested a great deal of time in coaching the quality improvement teams to ultimately become self-sufficient. However, health policy changes—such as increased reimbursement for diabetes education and bundled payment systems—will give other health centers additional incentives to initiate and sustain efforts similar to our work on Chicago's South Side.

CONCLUSION

The fact that racial and ethnic minorities in the United States experience disparities in the health care they receive and their health outcomes compared with white Americans is an important problem with multiple causes. Only by creating integrated systems that address those multiple causes will we begin to see real progress in reducing disparities. Our approach to reducing diabetes disparities among people living on the South Side of Chicago combines the strengths of health systems, communities, and patients and shows evidence of effectiveness.

However, our findings are only preliminary. Future analyses of data that compare diabetes care and outcomes at our six intervention health centers to six control clinics will better allow us to assess the impact of our program. Our initiative neatly aligns with the potential of accountable care organizations, or integrated health care teams serving particular populations. Our approach to reducing diabetes disparities and the lessons we have learned along the way can inform the implementation of accountable care organizations and other

programs that seek to improve health care quality and reduce disparities with the assistance of community partners.

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Appendix: Lessons Learned and Illustrative Quotes

Lesson Learned	Illustrative Quote
<i>Start small, focus on participants' priorities, and build from there.</i>	“We are moving in that direction of finally rallying our resources, understanding what we want to do ...Everybody I think started with smaller simpler projects but are sort of building up to this.” (Medical Director)
<i>Coach. We grossly underestimated the need for quality improvement coaching and had to quickly increase support in this area.</i>	“The program team plays an invaluable role in keeping clinics organized, setting goals, supporting forward movement on QI initiatives in small bites (here is how to process map, can't do it? Then we will meet with you and teach you), and in bringing the disparate clinics together.” (Medical Director)
<i>Work with champions and build meaningful relationships.</i>	“Interest dwindles when the champion provider leaves. We've lost four since 2004. We really need a consistent champion provider to assist with buy-in from other providers, to explain what we're doing and why. They won't listen to me.” (QI Team Leader)
<i>Understand organizational and political dynamics and culture.</i>	“Change is kind of threatening to a lot of people around here....We're famous for lack of sustainability, because everybody's super busy....And everybody's got their own agenda, right? ...Everybody's got their own agenda!” (CEO / Executive Director)
<i>Follow the principles of community-based research.</i>	“If they're brought in and your opinions are asked and they're part of the change, then they would be much more likely to wanting to have it; or you know they would continue rather than fizzle out if they are part of the change” (Nurse)
<i>Keep the grand vision and roadmap in view to aspire to.</i>	“So I felt for a long time that it was ‘a little of this’ and ‘try this and try that’ and it was very frustrating personally. I will say for the first time, now I can see how all these little projects and little discussions are leading up to these big things that we want to do and now I can see how there is more coming.” (CEO / Executive Director)
<i>Provide communication training simultaneously to patients and providers.</i>	“[Doctors] want to just turn in and turn you out and when you try to talk to them, they've got their and I've got my way, so why don't you hear me out and I hear you out. I think that's one thing doctors need to start working on with the patient...I think some of those physicians should come in here and look at the tape...Learn from Dr. Peek and then come back to me.” (Patient)
<i>Identify personnel at clinics who view Community Engagement as a core component of quality improvement efforts</i>	“It's important to have this greater mission to promote diabetes education in the greater community whether they come through our doors or not.” (CEO / Executive Director)
<i>Align with other major strategic initiatives that support integrative approaches</i>	“Five or six of our docs have been involved with the Urban Health Initiative. One of our docs is double appointed with the University of Chicago and X. We're excited about our participation.... And, diabetes is the darling of the Bureau of Primary Health Care, so we want to do the best we can with those patients.” (CEO / Executive)

Lesson Learned	Illustrative Quote
	Director)
<i>Do not give up - integrating community and health care system is time-consuming and challenging, but support and payoffs are substantial</i>	“Think of a 1000 piece puzzle. You can’t really see the final product until you have the edges done and some of the major figures in the puzzle complete. Then it starts to come together. Unlike a puzzle- you will never finish your QI efforts.” (Medical Director)

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Exhibit 1

Intervention Components

Component	Activities	Goals
Quality Improvement Collaborative	<ul style="list-style-type: none"> •Quarterly QI collaborative meetings •Clinic teams using rapid cycle change model •Learning sessions and QI coaching 	<ul style="list-style-type: none"> •Improve clinic operations, service, and quality •Develop clinic QI team and skills
Patient Activation	<ul style="list-style-type: none"> •10-week series of classes •Culturally tailored diabetes self-management education •Skills training in patient/provider communication and shared decision-making 	<ul style="list-style-type: none"> •Improve shared decision-making •Address historical mistrust of the healthcare system •Increase diabetes knowledge and self-management skill •Empower patients to care for selves and interact with clinics/providers
Training for Clinicians	<ul style="list-style-type: none"> •4-workshop series for clinical and front-office staff on patient-centered communication, cultural competency, behavioral counseling, shared decision making 	<ul style="list-style-type: none"> •Build provider skills •Ensure provider readiness to engage with empowered patients •Deepen provider engagement with community
Community Partnerships and Outreach	<ul style="list-style-type: none"> •Recruit patient advocate outreach workers •Partnerships with organizations and business •Radio/TV public education campaign 	<ul style="list-style-type: none"> •Connect individuals to medical homes •Support patients in managing diabetes in community settings •Educate the public regarding diabetes self-management and health disparities

SOURCE: Wagner EH, Chronic Disease Management: What Will It Take To Improve Care for Chronic Illness? *Effective Clin Pract* 1998;1(1): 2–4; Authors' original content.

Exhibit 2

Clinical Intervention Sites

	Health Center					
Characteristic	1	2	3	4	5	6
Clinical staff (number of full-time equivalents) ^a						
Physician	23.0	23.0	2.0	2.5	4.0	6.0
Nurse practitioner/physician assistant	0.0	0.8	1.0	1.0	3.0	0.0
Nurse (RN)	3.0	6.0	0.0	0.0	3.0	1.0
Nurse (LPN, MA)	4.0	8.0	6.0	8.0	20.0	1.0
Endocrinologist	29	0.0	0.0	0.2	0.0	0.0
Diabetes educator	3.0	0.0	0.6	0.5	0.0	1.0
Nutritionist	0.0	0.0	0.6	0.2	1.0	1.0
Annual patient volume ^b						
Total patients	6,817	19,052	3,440	2,468	9,786	6,310
Total encounters	15,575	62,690	11,133	7,095	31,393	20,444
Diabetes patients ^c	2,107	3,549	364	218	293	690
Diabetes encounters ^c	5,479	9,601	825	541	570	1,795
Demographics of patients ^b						
Mean patient age (years)	55	56	39	37	33.8	42
Female (%)	71	67	76	73	88	72
African American (%)	37	52	89	91	89	34
Patient insurance status						
Medicaid (%)	8	10	60	59	65	50
Medicare (%)	37	36	11	9	4	5
Private insurance (%)	55	54	12	12	12	8
Uninsured (%)	<1%	<1%	16	20	13	37
Clinical characteristics of diabetes patients ^d						
Mean body mass index (kg/m ²)	31.9	30.8	33.9	34.3	38.4	33.1
Percent with hemoglobin A1c < 7.0%	35.8	57.1	44.9	33.3	39.5	41.7
Percent with blood pressure < 130/80 mm Hg	39.6	36.1	31.4	23.5	31.3	41.2
Percent with low density lipoprotein < 100 mg/dL	69.9	66.2	37.8	35.6	41.8	41.5

SOURCE: Authors' analysis.

NOTES RN is registered nurse. LPN is licensed practical nurse. MA is medical assistant.

^a Full-time equivalent staffing by role was reported by health centers and reflects current (2011) staffing.

^b Annual patient volume and demographics of patients were reported by health centers and reflects baseline (2008) data. Where 2008 data were not available for a particular data point, health centers reported data from the closest available year. Where site-specific data were not available, health centers extrapolated site-specific estimates from multisite data.

^c *Diabetes patient* was defined as any patient with at least one encounter in the reporting year with a primary diagnosis of diabetes—that is, with an *International Classification of Diseases*, Ninth Revision (ICD-9), code in the 250.XX range.

^d Clinical characteristics were assessed via chart reviews of 100 charts per health center, randomly sampled from diabetes patients with encounters in the baseline year (2008).

Exhibit 3**Changes in Six Health Centers' Ability To Provide Chronic Illness Care**

Area of Chronic Illness Care	Mean score (lowest score, highest score)			
	June 2010	December 2010	June 2011	June 2010–June 2011 change, mean (%),
Organization of the health care system System	5.5 (3.2, 7.0)	7.1 (5.0, 9.3)	7.6 (5.8, 8.5)	+2.1 (38)
Links to community resources	3.8 (2.3, 5.3)	5.1 (2.7, 6.3)	5.8 (5.0, 8.3)	+2.0 (53)
Diabetes self-management support	6.1 (4.0, 7.5)	6.8 (4.3, 10.0)	7.1 (5.8, 8.5)	+1.0 (16)
Decision support	5.2 (3.3, 6.5)	6.2 (4.8, 10.0)	6.1 (4.5, 8.5)	+0.9 (17)
Delivery system design	4.9 (4.0, 6.7)	7.0 (6.0, 9.3)	7.2 (5.8, 8.8)	+2.3 (47)
Clinical information systems	5.0 (1.4, 6.6)	5.8 (4.6, 7.8)	7.2 (6.0, 8.0)	+2.2 (44)
Integration of Chronic Care Model elements	4.3 (3.0, 6.2)	5.2 (4.0, 6.3)	6.1 (5.2, 7.7)	+1.8 (42)
Average Program Score	5.0 (3.6, 5.7)	6.1 (4.9, 7.2)	6.7 (6.1, 7.6)	+1.7 (34)

SOURCE: Assessment of Chronic Illness Care (ACIC v3.5) – a validated survey instrument that was completed by the clinic quality improvement teams. See: Bonomi AE, Wagner EH, Glasgow RE, VonKorff M. Assessment of chronic illness care (ACIC): a practical tool to measure quality improvement. *Health Serv Res.* 2002; 37(3):791-820.