Equal Care, Unequal Outcomes: Experiences of a REACH 2010 Community

Diane Neal, Medical University of South Carolina
Barbara Carlson, Medical University of South Carolina
Carolyn Jenkins, Medical University of South Carolina
Gayenell Magwood, Medical University of South Carolina

Abstract

Diabetes is growing in prevalence and costs. Guidelines for care have been available since 1983, yet diabetes care and outcomes remain less than ideal. CDC’s Racial and Ethnic Approaches to Community Health 2010 (REACH 2010) identified diabetes in African Americans as a priority for action. This article documents the activities, interventions, and current progress of the REACH 2010 diabetes coalition formed in Charleston and Georgetown counties, South Carolina, in reducing health care disparities and describes next steps for improving outcomes. The Chronic Care Model guided many of the implementation activities, and chart audits were used to document outcomes. Ambulatory care visits (N = 1522) between 2000 and 2004 were reviewed. Significant progress has been made in reducing disparities in process measures, but similar reductions for intermediate outcomes have not been observed.

Key Words: diabetes, racial disparities, processes of care, intermediate outcomes

Introduction

Diabetes is now commonly called a public health epidemic, a chronic illness with growing costs for individuals, families, communities, and the U.S. health care system. American Diabetes Association guidelines for diabetes prevention, care and control are widely disseminated to both the health care community and its patients.1,2 Research studies document that control of A1C, blood pressure, and lipids improve outcomes.3–6 As the base of scientific evidence expands and supports clinical care standards, a growing body of evidence confirms the complexity of translating the science of diabetes into effective interventions for improving health outcomes.7,8 Increasingly, researchers and health systems are joining forces with communities to find effective methods...
for diabetes care and management. Optimum diabetes outcomes from clinical best practices require the collaborative partnership of all stakeholders.

The Centers for Disease Control and Prevention’s (CDC) Racial and Ethnic Approaches to Community Health 2010 (REACH 2010) identified diabetes as one of six priority conditions that poses a greater burden for minorities. The CDC issued a call for proposals, in which communities nationwide, representing minority populations, competed for funding and technical assistance to design, implement, and evaluate community-based programs to decrease health disparities. Twenty eight partner-organizations in Charleston and Georgetown counties, South Carolina, formed the REACH 2010 Charleston and Georgetown Diabetes Coalition to reduce diabetes-related disparities for the area’s African Americans with diabetes by focusing on improving care and outcomes.

An overview of the Coalition’s activities and organizational structure is described elsewhere. The organizing framework of the Coalition’s program is community-driven, participatory action research, wherein community members and organizations are active participants in identifying problems, developing and implementing methods for addressing the problem, and evaluating the results. Among the Coalition’s stated goals is a reduction in racial disparities in both process (diabetes testing of A1C, blood pressure, lipids, and diabetes education) and intermediate health outcome measures (A1C, blood pressure, and lipid control) through health systems change. Like all coalition partners, health systems participate as active members in support of a wide range of activities.

Other researchers and health systems have undertaken similar projects with comparable approaches and results; however, the uniqueness of this Coalition’s approach is that the participants entered this project not as researchers but as nurses, clinicians, and community leaders focused on improving diabetes care and outcomes. Further, the project encompasses a two-county area, covering about 1600 square miles along coastal South Carolina, and includes more than 12,000 African Americans diagnosed with diabetes in the participating health systems. The purpose of this paper is to document activities, interventions, and current progress, and to describe next steps for improving outcomes.

**Methods**

**Intervention**

In 1999, Coalition findings documented the following disparities for African Americans living in Charleston and Georgetown counties in
South Carolina: decreased funds, reduced access to care, less care, poorer health outcomes, less trust in and satisfaction with their care, increased diabetes care costs, greater prevalence of diabetes and complications, and a higher death rate than their white counterparts. Disparities were identified by the following methods: (1) surveying African Americans and whites, (2) conducting focus groups with African Americans and whites with diabetes, community leaders, and health professionals; (3) auditing medical records; and (4) analyzing secondary data, including census, vital statistics, and health information.

The Chronic Care Model was applied to organize intervention activities to promote health systems change leading to improved diabetes care and control. Coalition-supported strategies using this model included: (1) self-management support with weekly group education series, assisting patients in finding lower-cost medications and diabetes supplies (on-site representative from meter companies), and more recently, walking groups in some sites; (2) community linkages with medical supply, pharmaceutical, and other supporting agencies which were offered in health care and community facilities and community outreach through health fairs and lay community health advisors; (3) health care organization, including the enrollment of two sites in the Chronic Care Collaborative, and integrated quality improvement programs; (4) clinical information systems, including electronic registry using the Diabetes Electronic Management System (DEMS), the Chronic Disease Electronic Management System (CDEMS), and most recently, the Patient Electronic Care System (PECS); and (5) decision support, including the use of electronic registry for monitoring patient progress, implementing regular chart reviews with providers and site-specific feedback. Also, decision support was offered to patients and providers by testing a patient-held mini-record of test results (Gold Card) developed by the Coalition and the Diabetes Initiative of South Carolina. Some of the health care facilities worked on delivery system design including a more population-based management and follow-up system. Results of site-specific chart audits were shared with each health system; each site could compare itself with every other site, but all other sites’ identities remained anonymous.

To track progress in the reduction of disparities, four Charleston facilities affiliated with the Coalition’s health systems partners participated in medical chart audits. Participating facilities included two Federally-Qualified Health Centers (FQHC), an academic endocrinology clinic, and an academic internal medicine site. Both academic sites included medical residents and students. Table 1 presents statistics on
racial composition and insurance status of the population served at these four sites.

**Table 1. Racial and Insurance Profile of Audited Clinics**

<table>
<thead>
<tr>
<th></th>
<th>CLINIC A</th>
<th>CLINIC B</th>
<th>CLINIC C</th>
<th>CLINIC D</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number (%) African American</strong></td>
<td>6 (8.7)</td>
<td>72 (78.3)</td>
<td>60 (95.2)</td>
<td>75 (90.4)</td>
</tr>
<tr>
<td><strong>Number (%) Uninsured</strong></td>
<td>6 (8.7)</td>
<td>75 (81.5)</td>
<td>14 (22.2)</td>
<td>40 (48.2)</td>
</tr>
<tr>
<td><strong>Number (%) Insured with Medicaid</strong></td>
<td>1 (1.6)</td>
<td>5 (29.4)</td>
<td>11 (22.4)</td>
<td>8 (18.6)</td>
</tr>
</tbody>
</table>

Starting in 2000, chart audits were completed annually to monitor measurements of A1C, blood pressure, lipid levels, and Microalbumin levels, as well as frequency of foot care and other process measures. Although pilot tests of the audit system and outcomes were conducted in 1999, pilot data are not reported here. Data from the chart audits were compiled and analyzed by an epidemiologist, and the results of the chart audits were presented to each health system partner. Results were used for continuous quality improvement (CQI) of diabetes care.

The Gold Card for monitoring the ABCs (A1C, blood pressure, and cholesterol/lipids) of diabetes care is frequently requested by people with diabetes and their health care providers in the Coalition area. This patient-held mini-record is an ongoing monitoring tool that empowers the patient to be an active participant in his or her care management. More than 6,000 copies of the card have been distributed in local communities throughout the Coalition area, and people with diabetes report high levels of satisfaction with its use.

In 2000, the two academic sites started the process of switching from paper to electronic records. The two FQHCs used funding from REACH to assist in creating a registry and reminder system for patients with diabetes (DEMS/CDEMS/PECS). Thus, both academic and FQHC sites have clinical information systems that support process improvements. Additionally, the two FQHC sites have joined the Bureau of Primary Health Care National Health Disparities Collaborative.18

The health systems worked with other coalition partners to support ongoing diabetes self-management education classes at several health facilities, and sponsor educational opportunities at community events. For example, one health system held an annual Community Health Day
that educated the public on meal planning, exercise, eye and foot care,
and other health related issues.

**Data Collection and Analysis**

The results of annual audits of patient records of ambulatory visits
for the treatment of diabetes during the period from January 1, 2000,
to March 31, 2004, a historical cohort, were used to examine changes
in health care disparities related to diabetes care and control during
five years of the REACH 2010 demonstration project. Records were
restricted to those of non-pregnant adult (18 years old or older) patients
with at least one diabetes-related visit to one of four partner health
centers during the period covered by each annual audit. As described
previously, all four of the sites audited were in Charleston County; two
facilities were ambulatory care clinics and two were Federally Qualified
Health Centers. With IRB approval from the Medical University of
South Carolina, random samples were drawn from each site’s registries.
No attempt was made to follow individual patients prospectively;
rather, each audit was a cross-section of the ambulatory visits during
that period. Each of the four facilities was sampled in proportion to its
patient load, at the time of the audit, to yield a representative sample
with a 95% certainty of findings within 10% of the true rate. Among
the data collected were information on demographics, documented
co-morbidities, process of care indicators, and selected outcomes. The
extraction of data from the medical records was conducted by trained
medical reviewers using a Microsoft Access-based extraction tool, and
the mean inter-rater reliability on categorical variables was 0.96 (range
0.88 to 1.00).

Process of care indicators and thresholds for control of the
intermediate outcomes collected were based on indicators collectively
known as the Diabetes Quality Improvement Project (DQIP), established
by the National Committee for Quality Assurance (NCQA). They
include the process and intermediate outcome measures described in
Table 2. Only those process measures that were reported consistently in
the patient record during the five years are included in this study. These
are annual testing of hemoglobin A1C (A1C), low density lipoproteins
(LDL), Microalbumin, and foot exams. The intermediate outcome
measures described are those that have been previously demonstrated as
associated with better long-term health: A1C levels representing blood
glucose control, LDL results representing cholesterol control, and blood
pressure (BP). A1C and LDL results were transcribed directly from the
lab report, while BP was copied from documentation of the visit. Where
Table 2. Description of Diabetes Care Process and Intermediate Outcome Measures

<table>
<thead>
<tr>
<th>TYPE OF MEASURE</th>
<th>MEASURE</th>
<th>CRITERIA FOR MEETING THE STANDARD (NUMERATOR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process</td>
<td>A1C Measured</td>
<td>Patients who received at least one A1C in the past year</td>
</tr>
<tr>
<td></td>
<td>LDL Measured</td>
<td>Patients who received at least one lipid profile in the past year</td>
</tr>
<tr>
<td></td>
<td>Foot Exam</td>
<td>Patients who had a visual inspection of their feet in the past year</td>
</tr>
<tr>
<td></td>
<td>Microalbumin</td>
<td>Patients who received at least one Microalbumin test in the past year</td>
</tr>
<tr>
<td>Outcome</td>
<td>A1C &lt; 90%</td>
<td>Patients whose most recent A1C result was less than 9</td>
</tr>
<tr>
<td></td>
<td>LDL &lt; 130 mg/dL</td>
<td>Patients whose most recent LDL result was less than 130</td>
</tr>
<tr>
<td></td>
<td>Blood Pressure</td>
<td>Patients whose most recent recorded BP was less than 140/90</td>
</tr>
</tbody>
</table>

more than one intermediate outcome was available in a patient’s records for that year, the most recent result was used.

Analyses were stratified by year and race. The data were analyzed using SAS statistical software. Frequencies by race were compared within each time period using Chi square (ChiSq) to estimate the significance of any observed disparities. Absolute and relative changes in levels of disparity from 2000 to 2004 were calculated using these formulas:

Absolute change = % disparity in 2004 – % disparity in 2000
Relative change = (% disparity in 2004 – % disparity in 2000)/% disparity in 2000

To estimate the association of process and intermediate outcome measures in this population, logistic regression was performed on the data collected from the 2003 and 2004 visits. The dependent variable was glycemic control defined as an A1C ≤ 7. Univariate analyses, conducted using Chi Square and t tests of the independent association of selected characteristics with A1C ≤ 7, were used to identify the dependent variables included in the analysis.

Results

A total of 1,522 patient records of ambulatory care visits for diabetes between January 1, 2000, and March 31, 2004 were reviewed. Demographic characteristics of the population sampled each year are presented in Table 3.
Sample size increases reflect changes in the number of people with diabetes seen in the four partner health centers over time. Each year, the majority of the records reviewed were for African American women. There were significant variations in the proportions of African Americans, females, uninsured, and number of visits from year to year during the study.

Table 4 presents the aggregate records for 2000–2004 after stratification by race. African Americans were significantly older, more likely to be female, and more often uninsured than others. It is of note that there was no significant difference in average number of visits per year based on race.

The changes observed in racial disparity for process objectives are presented in Table 5. In 2000, 87% of the African American medical records reviewed listed an annual A1C compared to 94% of all other
records. By 2004, 97% of African American and 95% of others had a documented annual A1C. This represents a reduction in absolute disparity of 9%. The reduction in relative disparity of 129% suggests that, not only was the racial disparity effectively eliminated, but in 2004, African Americans had a higher percentage of annual A1C than others. This same pattern was observed for annual LDL. Annual foot exams were initially higher in African Americans’ records than others, 64% to 50%, a disparity in the reverse direction of 14%. In 2004, while African Americans still had higher rates of annual foot exams, the disparity was only 1%. For Microalbumin, a racial disparity of 4% remained in 2004. This represents an absolute reduction of 24% and a relative reduction of 86%. In 2004, there were no significant disparities in the process of care measures of A1C, LDL, Microalbumin, or foot exams, and in three of

<table>
<thead>
<tr>
<th>MEASURE</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>ABSOLUTE CHANGE IN DISPARITY</th>
<th>RELATIVE CHANGE IN DISPARITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% African American</td>
<td>87%</td>
<td>92%</td>
<td>96%</td>
<td>91%</td>
<td>97%</td>
<td>-9%</td>
<td>-129%</td>
</tr>
<tr>
<td>% Other</td>
<td>94%</td>
<td>91%</td>
<td>98%</td>
<td>95%</td>
<td>95%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disparity</td>
<td>7%</td>
<td>(1%)</td>
<td>2%</td>
<td>4%</td>
<td>(2%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significance (p)</td>
<td>.08</td>
<td>.97</td>
<td>.46</td>
<td>.37</td>
<td>.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LDL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% African American</td>
<td>71%</td>
<td>77%</td>
<td>74%</td>
<td>73%</td>
<td>81%</td>
<td>-18%</td>
<td>-106%</td>
</tr>
<tr>
<td>% Other</td>
<td>88%</td>
<td>78%</td>
<td>80%</td>
<td>78%</td>
<td>80%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disparity</td>
<td>17%</td>
<td>1%</td>
<td>6%</td>
<td>5%</td>
<td>(1%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significance (p)</td>
<td>.001</td>
<td>.98</td>
<td>.30</td>
<td>.22</td>
<td>.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foot Exam</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% African American</td>
<td>64%</td>
<td>92%</td>
<td>74%</td>
<td>82%</td>
<td>97%</td>
<td>-(13%)</td>
<td>-93%</td>
</tr>
<tr>
<td>% Other</td>
<td>50%</td>
<td>84%</td>
<td>77%</td>
<td>92%</td>
<td>96%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disparity</td>
<td>(14%)</td>
<td>(8%)</td>
<td>3%</td>
<td>10%</td>
<td>(1%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significance (p)</td>
<td>.028</td>
<td>.077</td>
<td>.62</td>
<td>.038</td>
<td>.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microalbumin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% African American</td>
<td>32%</td>
<td>54%</td>
<td>58%</td>
<td>53%</td>
<td>53%</td>
<td>-24%</td>
<td>-86%</td>
</tr>
<tr>
<td>% Other</td>
<td>60%</td>
<td>47%</td>
<td>66%</td>
<td>58%</td>
<td>57%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disparity</td>
<td>28%</td>
<td>(7%)</td>
<td>8%</td>
<td>5%</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significance (p)</td>
<td>&lt; .0001</td>
<td>.32</td>
<td>.18</td>
<td>.44</td>
<td>.56</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
the four measures, the slight disparities that persisted favored African Americans.

Table 6 lists the intermediate outcome measures—A1C < 9%, LDL < 130 mg/dL, and BP < 140/90 mmHg—and the racial disparities associated with them. In 2000, 70% of African Americans had an A1C < 9, while 82% of others did for a racial disparity of 12%. After five years of intervention, the disparity increased by 4% to 16%, a relative increase of 33%. This increase in disparity resulted from an increase of 4% in African Americans with A1C < 9, with a concurrent increase of 8% among others. Similar increases in levels of disparity were observed with LDL < 130 and BP < 140/90; however, for these results, the percent of African Americans (and others) achieving these levels decreased from 2000 to 2004.

Of 606 records used in the logistic regression, 42% demonstrated glycemic control (A1C ≤ 7). No association, using either univariate or multivariate analysis, was found between this intermediate outcome and any of the process measures discussed in this paper.

Table 6. Changes in Racial Disparity in Intermediate Outcome Measures 2000–2004

<table>
<thead>
<tr>
<th>MEASURE</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>ABSOLUTE CHANGE IN DISPARITY</th>
<th>RELATIVE CHANGE IN DISPARITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1C &lt; 9.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% African American</td>
<td>70%</td>
<td>74%</td>
<td>75%</td>
<td>72%</td>
<td>74%</td>
<td>+4%</td>
<td>+33%</td>
</tr>
<tr>
<td>% Other</td>
<td>82%</td>
<td>84%</td>
<td>88%</td>
<td>85%</td>
<td>90%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disparity</td>
<td>12%</td>
<td>10%</td>
<td>13%</td>
<td>13%</td>
<td>16%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significance (p)</td>
<td>.042</td>
<td>.068</td>
<td>.011</td>
<td>.013</td>
<td>.002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LDL &lt; 130 mg/dL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% African American</td>
<td>79%</td>
<td>72%</td>
<td>81%</td>
<td>59%</td>
<td>72%</td>
<td>+2%</td>
<td>+22%</td>
</tr>
<tr>
<td>% Other</td>
<td>88%</td>
<td>77%</td>
<td>84%</td>
<td>77%</td>
<td>83%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disparity</td>
<td>9%</td>
<td>5%</td>
<td>3%</td>
<td>18%</td>
<td>11%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significance (p)</td>
<td>.062</td>
<td>.45</td>
<td>.62</td>
<td>.002</td>
<td>.052</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood Pressure &lt; 140/90 mmHg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% African American</td>
<td>58%</td>
<td>56%</td>
<td>56%</td>
<td>54%</td>
<td>50%</td>
<td>+4%</td>
<td>+21%</td>
</tr>
<tr>
<td>% Other</td>
<td>77%</td>
<td>64%</td>
<td>84%</td>
<td>72%</td>
<td>73%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disparity</td>
<td>19%</td>
<td>8%</td>
<td>28%</td>
<td>18%</td>
<td>23%</td>
<td></td>
<td></td>
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<tr>
<td>Significance (p)</td>
<td>.002</td>
<td>.23</td>
<td>&lt;.0001</td>
<td>.004</td>
<td>.0002</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Discussion

These results suggest that significant progress has been made in reducing racial disparities in the process measures related to diabetes care, as observed in the patient record. Further, significant progress has been made in the Coalition’s efforts to meet the standards of care outlined by Healthy People 2010. It is not clear whether feedback from annual chart audits, use of the Gold Card, educational efforts directed to the African American population, or some combination of these interventions is responsible for these reductions in disparity of care. It is clear that intervention in this population was successful in both eliminating observed disparities and improving the care offered to people with diabetes in the four partner health facilities.

Similar reductions in racial disparity for intermediate outcome measures have not been observed. Progress remains slow in the Coalition’s efforts to improve intermediate health outcomes for African Americans. Neither these patterns of change nor the logistic regression performed with A1C ≤ 7 as a dependent variable suggest any association between process and outcome measures in diabetes.

Other studies have observed similarly discordant results, suggesting that reductions of racial disparities in process measures do not lead independently to reductions in racial disparities in intermediate or long-term health outcomes. The complexity of variables contributing to health disparities requires multifaceted approaches to their elimination. Other mechanisms for continued outcome (intermediate and long-term health) disparities must be considered. While the improvement of diabetes care is an important element in the equation, further health care system improvements will come from work in tandem with patient, community, and cultural interventions. The Institute of Medicine’s (IOM) Unequal Treatment: Confronting Racial and Ethnic Disparities in HealthCare suggests some contributing factors including cultural, environmental and socioeconomic factors, differences in patient–provider interactions, health literacy and levels of self-care, and insurance status.

Socioeconomic differences are often associated with race and health care outcomes. While we were unable to adjust for socioeconomic status (SES) in this study due to lack of information on education and economic status in the patient record, differences in SES based on race do exist. A large majority, 97%, of the African Americans whose records were analyzed in this study attended 3 of the 4 partner facilities. These facilities offer care to individuals on Medicaid, Medicare, or those currently uninsured. The fourth facility, which serves primarily whites
(91%), was also the only site where the majority of patients had private insurance. While site of care, representing SES, did not directly influence quality of care in our population, IOM suggests that SES may influence more than just access to and quality of care. It may also determine levels of social support and availability of resources. Low SES, which may be a marker for lower educational opportunities, can also lead to reduced health literacy, poor patient–provider communication, and a reduced ability to self-manage diabetes. Socioeconomic status may also affect the ability to adhere to treatment regimens due to lack of funds to purchase medications and strips, less availability of nutritious foods, and fewer opportunities for physical fitness.26

Patient–provider interactions may influence intermediate, as well as long-term, health outcomes. A recent study by van Ryn found differences in provider perceptions based on both race and SES. African American patients were less likely to be rated at no risk for substance abuse and noncompliance than whites. They were also less likely to be perceived as desiring an active lifestyle.27 Another study found that the treatment of diabetes was perceived by physicians to be more difficult if the patient was African American.28 A study of the role of physician and patient characteristics on foot care found that patient attitudes also affect care and outcomes.29 A study found that a patient’s perceptions of discrimination are associated with both satisfactions with care and intermediate outcomes.30 African Americans may also be more likely to distrust health institutions and providers based on a history of neglect and abuse.26 Further research findings have shown similar results concerning the effect of the patient–provider interaction on outcomes.31-34 Health literacy may also affect this interaction as well as contribute to persistent outcome disparities. In a recent study of older African Americans diagnosed with diabetes in our population, health literacy among the sample was low to marginal, implying difficulties with reading and comprehending written health materials, as well as communicating with providers.35

No information on the level of self-care was available in the patient record, although the interventions offered by REACH were designed to increase the knowledge and practice of self-care. De Rekeneire et al. used the indirect measures of participation in a physical activity and history of smoking to estimate self-care and found that these did not affect glycemic control.36 The Coalition plans to further investigate self-care practices by linking chart audits with a survey. Further study may help clarify the relationship of self-care to intermediate outcomes.
Insurance status has also been suggested as a factor in health outcomes. However, a study conducted using chart audit data from 2002 to 2004 failed to find any association between insurance status and either the care received or the outcomes achieved.

Another possible explanation for the discordant results might be that the process measures of annual A1C, annual LDL, annual foot exams, and annual Microalbumin are only one dimension of diabetes care, and reductions in disparity for these measures do not imply a lack of disparities in the intensity of the treatments offered in response to the results of these tests. Several studies have demonstrated differences in the intensity of treatment based on patient race, site of care, insurance status, or some combination of these. Additional analysis of the data extracted from the patient records regarding medications prescribed may offer some insights.

This study contributes new insights into the complex issue of health disparities, however, it had several limitations. The use of patient records, while informative, imposes some restrictions—for example, no data was available on SES or levels of self-care. In addition, some studies have suggested that the patient record may not always reflect care provided. As with all observational studies, this study is limited by the lack of a randomized design. The observed association of site of care, race, and SES makes it difficult to estimate the contribution of each of these factors individually. Another limitation is the lack of chart audits from Georgetown County, although one of the audited facilities does serve populations from both counties. REACH activities in Georgetown have focused on patient education and efforts to increase self-care activities. Results of chart audits from that area might reflect these efforts. Finally, in the past we have not linked patient surveys to patient records. With IRB approval, the Coalition plans to do so in the future. This linkage may offer a greater understanding of the impact of health literacy, diabetes education, self-care, and satisfaction with care on intermediate outcomes.

**Conclusion**

Efforts by the REACH 2010 Charleston and Georgetown Diabetes Coalition have resulted in significant improvements in the quality of care provided by partner health systems. Racial disparities in level of care have been eliminated. Despite these changes in care, racial disparities in intermediate outcomes persist. Future evaluation efforts will focus on other factors in the complex issue of racial health disparities, including patient–provider interactions and intensity of treatment.
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References


**Dr. Diane Neal**, PhD, RN, Medical University of South Carolina, Charleston

**Ms. Barbara Carlson**, MLIS, Medical University of South Carolina, Charleston

**Dr. Carolyn Jenkins**, DrPH, FAAN, APRN-BC-ADM, RD, CDE, Medical University of South Carolina, Charleston

**Dr. Gayenell Magwood**, PhD, MSN, RN, Medical University of South Carolina, Charleston