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Abstract

Introduction: The purpose of this study was to examine the effect of payer status on indicators of the quality of diabetes care delivered in four health care systems that participated in a REACH Coalition's efforts to eliminate health care disparities for African Americans with diabetes.

Design and Methods: Secondary analyses of data from 899 health care records of people who received diabetes care were conducted to determine differences in

quality of care by payer status. Extracted information included process information related to frequency of A1C, lipid, and kidney tests, foot examinations, and blood pressure measurements, as well as intermediate health outcomes for blood pressure control, A1C results, lipid results, and kidney tests. Multivariate logistic regression, which included variables that had a change >10% for any payer status (based on odds ratio), was used to predict the likelihood of a person with diabetes receiving a care measure and/or achieving desired health outcomes related to diabetes control.

Results: There were no significant differences observed except: (1) LDL cholesterol control where Medicare enrollees and Medicaid recipients experienced poorer outcomes than those with commercial insurance ($p = 0.04$ for both); and (2) foot exams where Medicaid recipients received fewer annual exams than those with no insurance ($p = 0.034$).

Conclusions: Payer status had little effect on quality of diabetes care among this population. Other influences not accounted for in this study apparently have a great impact on quality of care in these four health systems.

Keywords: Diabetes, Health Insurance, Health care, Diabetes Outcomes, Quality Care

The Effect of Payer Status on the Quality of Diabetes Care: Results from a REACH 2010 Project

Diabetes mellitus (DM) is a growing public health epidemic. Approximately 23.6 million Americans have diabetes, and this number will likely double by 2050.¹ Previous large studies^{2,3} have identified methods to prevent or delay development of diabetes and its complications. Several national organizations and federal agencies such as the Centers for Medicare and Medicaid (CMS), American Diabetes Association (ADA), and National Committee for Quality Assurance (NCQA), have focused on improving the quality of care for people living with diabetes⁴⁻⁷ and have identified and widely disseminated evidenced-based guidelines for the management of diabetes. Current practices, however, remain suboptimal, and disparities in diabetes care are common.⁸⁻¹¹

REACH 2010: Charleston and Georgetown Diabetes Coalition (REACH) is a demonstration project funded by the Centers for Disease Control and Prevention. Formed in 1999 as a broad-based, community-driven coalition incorporating the principles of community-based participatory research, the coalition focuses on improving health for African Americans (AfA) living with diabetes in Charleston and Georgetown Counties.

Literature Review and Background

Many people with diabetes lack necessary resources for adequate health care. An estimated 47 million Americans are without health insurance costing the US public more than 130 billion dollars annually.¹² Uninsured adults are greater than

three times more likely to lack a regular source of health care resulting in poor continuity; thus, many have reported that the uninsured are far less likely to receive evidence based care. For example, uninsured persons with diabetes have been shown to receive significantly fewer preventive measures deemed essential for quality diabetes care by the ADA.¹²⁻¹⁷

Health related outcomes are highly influenced by health care access and use, which have been shown to be greatest among those with any healthcare payer compared to those without any third party payer. The quality of health care is influenced by complicated payment systems, multiple payment types, and use of reimbursement as either incentives or disincentives.¹⁸⁻²⁴ Based on the theoretical framework presented in his book “The theory of demand for health insurance”, John A. Nyman theorizes that consumers purchase health insurance so that they can purchase high-value care when they become ill. They pay a premium in exchange for health care when needed. Private health insurance and Medicare Part B (covering 80% of customary costs of physician services, diabetes care, supplies and education) fall into the consumer purchased health insurance, while Medicaid falls into a government funded health insurance for specific groups of those unable to pay. Those who have no private or government funded health insurance usually bare the full cost of their care when ill or free or sliding scale costs are based on the health care facility’s policies and abilities to provide care.²⁵

The effects of payer status have been shown to independently influence diabetes care and outcomes,^{14,24} but little research has been done to examine the effect that different payer types may have on diabetes care and outcomes. Furthermore, no studies were identified that included data for South Carolina, a state that has a disproportionate percentage of the population affected by diabetes.

The purpose of this study was to examine the effect of payer status on indicators of the quality of diabetes care delivered in four health care systems (two federally qualified health centers, a primary care center in the community, and an academic medical center specialty clinic) that participated in REACH Charleston and Georgetown Diabetes Coalition (REACH) efforts to eliminate health care disparities for African Americans with diabetes. REACH is a demonstration project funded by the Centers for Disease Control and Prevention. Formed in 1999 as a broad-based, community-driven coalition incorporating the principles of community-based participatory research, the coalition focuses on improving health for African Americans (AfA) living with diabetes in Charleston and Georgetown Counties.

The null hypotheses of this study were: There are no differences in the quality of care for diabetes between/among:

- Medicare enrollees compared to commercial insurance enrollees.

- Medicaid recipients compared to commercial insurance enrollees.
- Medicare enrollees and those with no insurance.
- Medicaid recipients and those with no insurance.
- Those with no insurance compared to commercial insurance enrollees.
- Those with Medicaid compared to those with Medicare.

Methods

This quantitative, non-experimental study used a retrospective, cross-sectional secondary analysis of REACH health record audit data to assess the quality of care received by persons with diabetes in two counties in South Carolina during the years 2001 to 2003. First, we present a brief overview of the methods for the collection of the original data, and then discuss the methods for this secondary analysis (current study design). Both studies were approved by the Institutional Review Board for Human Research at the Medical University of South Carolina.

The primary dependent variables to determine quality of care based on payer status were annual A1C and lipid testing, foot exams (≤ 1 or ≥ 2 per year), LDL-C value (≤ 100 mg/dl; > 130 mg/dl), A1C value ($> 9.0\%$; $\leq 7.0\%$) blood pressure control ($\leq 130/80$ mm Hg), and microalbumin results (+ or -). The primary independent variables were Medicare, Medicaid, commercial insurance, and no third party payer. Covariates identified through the literature review and previous REACH data analyses included age, race, gender, and clinic or health system site.

Data Collection: Data were collected from a randomly selected list of all patients with diabetes served by four different health systems: two federally qualified health centers, a primary care center in the community, and an academic medical center specialty clinic. Inclusion criteria were: adult ≥ 18 years, diagnosis of diabetes prior to study year, ≥ 1 visit to health provider within study year. Exclusion criteria were: prisoner, documented pregnancy, non-community dwelling (ex. nursing home), or terminal illness (ex. hospice referral). Mitchell's sample size calculator was used to determine the number of subjects needed from each clinical site. The total needed for each site was then divided into the total number of patients actively managed at each site, and random selection was made based on a table of random numbers.

Data were entered into Microsoft Access via laptop computers using a REACH data collection instrument. Utilizing a 15 month collection timeframe allowed documentation of patient's annual care and time for providers to document results of tests ordered throughout the previous year, and approximately three months into the following year (to allow for appointments slightly beyond the 12 month period for annual tests). Data collection was completed by trained abstractors. A reviewer independently re-abstracted a randomly selected sample (10% of total from each site) of medical records and compared the data to initial abstraction and all differences were resolved by consensus; average interrater

reliability on all categorical variables was high (96%) as assessed by the Kappa statistic.

In this secondary analysis, data for the study were generated by the REACH data analyst from all de-identified patients' records in the REACH database. The data set was electronically transferred into SPSS. No personal identifiers were attached to the data set. Data for years 2001, 2002, and 2003 were combined into one data set. Power calculations for this study used SPSS PowerSample 12. With a total of 899 subjects, this study could detect a difference of 6% with a power of 80% and α of 0.5.

Variables: Variables used to measure quality of care in the settings included both using process measures (A1C testing, lipid testing, and number of foot examinations) and intermediate outcomes measures (A1C results, LDL-C results, kidney test results [microalbumin], and last recorded BP results). These indicators of quality were chosen based on definitions provided by the Diabetes Quality Improvement Project (DQIP),⁴ 4 Health Effectiveness Data and Information Set (HEDIS),²⁶ the Foundation for Accountability, and accepted standards of diabetes care from the ADA. Data from both the process and the intermediate outcome measures were analyzed first as a composite score for all subjects and then stratified by payer type for each quality measure. The data were then further disaggregated by demographic variables (age, race, gender, and clinic site) where categories provided sufficient sample size.

Data Analysis: Continuous demographic data (age) were analyzed using ANOVA for differences between groups. Data analyses on categorical demographics (race, sex, clinic site), as well as the proportion of patients receiving diabetes care measures (diabetes related testing and results), were completed using the χ^2 statistical test. To assess if payer status was independently associated with the likelihood of receiving quality diabetes care for each indicator collectively and individually, multivariate logistic regression analysis was performed with a focus on the variable for payer type.

Absolute percentages and proportions for each measure are reported as the percent of patients receiving recommended care. Absolute measures for each independent health care payer type and by health care facility are also reported. Disaggregating by payer type, gender, race, and age where appropriate was completed for each variable. Appropriateness for inclusion of all demographic variables (with exception of continuous data, i.e. age) was completed using stratification and non-stratification methods. An odds ratio (OR) or the probability of occurrence over the probability of non-occurrence for obtaining selected health care services or outcomes was provided for each measure of quality for each individual payer source. The OR represented the probability of an individual receiving quality diabetes care.

Potential confounders were evaluated to determine which covariates were to be included in these analyses. Possible covariates identified in the literature included race, gender, age, payer source, income, geographical location of care, comorbid conditions, and clinic setting.^{26,27} Variables whose addition changed the OR for diabetes care >10% were included in the models used to test the hypotheses of this study.²⁹

Statistical Analyses

Multivariate logistic regression models were completed for each of the five hypotheses in exactly the same manner; only the payer focus in each of the regression models changed to reflect comparisons between groups by payer status.

The statistical analyses of the data were examined first by demographics and process measures and intermediate outcomes by payer status. Covariates were then determined by literature search and knowledge of the most frequent comorbidities within this population. After inclusion of the selected covariates, multivariate logistic regression models were completed to determine the likelihood (OR) of an individual receiving process measures and achieving the desired intermediate outcomes related to diabetes. The likelihood of receiving a process of care measure or attaining the desired intermediate outcome was represented by an OR of the dependent variable (process measures and intermediate outcomes) given the influence of the independent variable and the effects of the selected covariates.

Results

There were a total of 899 records included in the study, representing about 34% Medicare, 32% with no insurance recorded, 24% with commercial insurance and 10% with Medicaid. Approximately 62% were female and 27% were males, and 11% did not identify gender (table 1).

Results of the multivariate logistic regression model to determine the OR for receiving each of the quality of care measures are displayed in table 2. The first number represents the adjusted OR for receiving measures of care or obtaining recommended levels of test results. The adjusted OR is followed by the 95% CI and the final column is the p-value for significance.

Null Hypothesis 1: For the intermediate outcome measures, Medicare enrollees were 2.0 time more likely to have an LDL-C >130 mg/dl than those with commercial insurance (p=0.04) (table 2). There were no significant differences in the process measures for quality of diabetes care for Medicare enrollees when compared to those with commercial insurance.

Null Hypothesis 2: For outcome measures, Medicaid enrollees were 1.8 times more likely to have an LDL-C > 130 mg/dl than those with commercial insurance (p=0.04) (table 2). There were no significant differences in the process of care measures for quality diabetes care for Medicaid recipients when compared to those with commercial insurance.

Null Hypothesis 3: There are no differences in either process of care measures or outcome measure when assessing the quality of diabetes care for Medicare enrollees when compared to those with no insurance (table 2).

Null Hypothesis 4: For process measures used to assess the quality of diabetes care, those with no insurance were 1.6 times more likely to have the recommended ≥ 2 annual foot examinations than Medicaid enrollees (p=0.03) (table 2). There are no differences found among process of care measures for the quality of diabetes care for Medicaid recipients when compared to those with no insurance.

Null Hypothesis 5: There were no differences found in either process of care measures or outcome measures used to assess the quality of diabetes care among those with no insurance when compared to those with commercial insurance (table 2).

Null Hypothesis 6: There were no differences in process of care or outcome measure used in this study to assess the quality of diabetes care for Medicaid recipients when compared to Medicare enrollees (table 2).

Summary of findings: When accounting for race, gender, age, type of diabetes, type of clinic where care was received, geography, and co-morbidities of care, this study found few differences in the quality of diabetes care based on payer status. Among the process of care measures, when compared to those with commercial insurance or those with no insurance provider, Medicaid enrollees were significantly less likely to receive ≥ 2 foot examinations annually (p = 0.03). For outcome measures, Medicare (p = 0.04) and Medicaid (p = 0.04) enrollees were more than twice as likely to have an LDL-C level of >130 mg/dl when compared to those with commercial or no insurance.

Discussion

The findings of this study are not consistent with other published findings that found payer status had greater influences on the quality of diabetes care and outcomes. [14-17,28,30](#) Among the subjects in this study, regardless of payer status, those having fewer apparent resources were found to receive equal quality of care. Care was taken to account for potential extraneous variables in each of the regression models. Thus, it is plausible that additional avenues of support other than payer status exist for the persons in this study.

Applying Nyman's theory of demand for health insurance,²⁵ private insurance and Medicare Part B were purchased by individuals to access high-value care and could assist the individuals in accessing higher quality care for diabetes when needed. However, the government sponsored Medicaid and the government supported care in state supported academic institutions (academic health centers) and the HRSA supported community health centers may also have contributed to quality care. And when care guidelines are established by national organizations and widely promulgated at local, state and national levels, we theorize quality of diabetes care improved for all.²⁵

Although the findings of significant differences by payer were few (Medicaid enrollees less likely to receive foot exams and Medicare and Medicaid enrollees less likely to have controlled LDL-C), they are serious. People with diabetes experience higher rates of cardiovascular events such as strokes, heart failure, vascular disease and myocardial infarctions and as many as 80% of persons with diabetes will die as a result of coronary and vascular diseases.¹¹ Even small improvements in A1C and lipid controls can significantly reduce these morbidities.

This study was designed to detect differences in lipid control among different payer sources through carefully constructed multiple regression modeling. However, there are some potential explanations not accounted for in the regression models utilized such as adherence to the providers' recommendations, diet, and exercise. Although REACH does not have a direct measure of adherence to medical therapy, 70% of all Medicare enrollees in this study had at least one annual lipid test ordered and completed. This is well above the national averages of 31-56%.

Exercise and diet are known to improve lipid control. Within the population for this study, Medicaid recipients and Medicare enrollees were significantly older (average 8 years) than those with commercial insurance. Adults with Medicaid self-reported fewer days of physical activity than other groups. Information on physical activity, however, was limited in the REACH database. Although providers often mentioned self-reported activity, there were little data regarding the intensity of such activities. Although infrequently recorded in the patient records in broad terms, specific information on diet therapy was not available for this study.

One major difference identified between this and previous studies, is we collected data from health centers and clinical sites where REACH is actively engaged in improving care for persons with diabetes. We postulate that the impact of REACH within each of these sites may have influenced the quality diabetes care provided to all individuals regardless of the payment structure. Based on earlier reports of analyses of the data,³¹ significant improvements in reducing racial disparities have occurred for both the insured and uninsured.

However, it should be noted that initial data collected “insurance” or “no insurance” but did not collect type of insurance until 2001.

Since 1999, REACH, a nurse-led project, and its community-based coalition partners, have been involved with each of the four affiliated healthcare sites, and designed and implemented, in conjunction with each site, interventions aimed at reducing disparities in diabetes care and outcomes. For example, over 150 nurses were trained to conduct diabetes related foot examinations at the time of visit. This frees the provider to focus on other issues while assuring that each patient received the recommended foot care.

REACH expands its efforts beyond the structure of the site of care by making patients partners in their healthcare. Examples of patient directed quality of care issues include “Gold Cards” which are cards patients carry to document individual goals and outcomes as well as providing information on recommended frequency of tests; on-site lay led diabetes classes; and courses on client/provider communications in an effort to improve overall self-management skills and knowledge among those with diabetes.

Conclusions and next steps

In summary, the conclusions of this study are not consistent with the findings of other published studies. Among this population, few differences in the quality of diabetes care by payer status were identified. It is likely that among this population, factors other than payer status had a greater influence on the quality of diabetes care than payer status. Whether these factors include provider practice habits, patient compliance, or self-management skills cannot be determined from this study.

Repetition of this study in similar populations with a larger sample size would help to determine if current quality of care by payer differs in other communities, as had previously been reported in earlier studies in the literature. Additionally, testing each specific REACH intervention in other populations and states is recommended to determine efficacy and effectiveness for improving care among other populations. Our next steps are to explore further improvements in diabetes control as evidenced by improved A1C, blood pressure and lipid outcomes.

Studies are also needed to evaluate the effect of provider teams designed to provide quality medical care based on ADA guidelines, as well as comprehensive disease management education to both the patient and the family caregivers. Nurses are a crucial, but under-used component of this type team approach, especially in primary care settings where most diabetes care takes place.

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Table 1

Sample Size by Race, Gender, and Payer Status for Chart Audit Data of People with Diabetes seen in Health Systems Participating in REACH Charleston and Georgetown Diabetes Coalition (2001-2003)

Sample by Race and Gender	Payer Status				
	Medicare # (%)	Medicaid # (%)	None # (%)	Commercial Insurance # (%)	Total # (%)
African American female	181 (77)	66 (85)	134 (72)	72 (81)	453 (50.4)
African American male	55 (23)	12 (15)	52 (28)	17 (19)	136 (15.1)
Non- Hispanic White female	27 (55)	4 (67)	20 (59)	58 (48)	109 (12.1)
Non- Hispanic White male	22 (45)	2 (33)	14 (41)	64 (52)	102 (11.3)

Race and Gender not documented	18 (6)	3 (3)	70 (24)	8 (4)	99 (11.0)
Total	303 (34)	87 (10)	290 (32)	219 (24)	899 (100)a

^a Total is actually 99.9% but rounded to 100%

Table 2
Comparison of Process and Outcomes Measures Disaggregated by Payer Status

<i>Process Measures</i>																		
<i>Payer Status</i>	<i>Medicare vs. Comm.</i>			<i>Medicaid vs. Comm.</i>			<i>Medicare vs. uninsured</i>			<i>Uninsured vs. Medicaid</i>			<i>Uninsured vs. Comm.</i>			<i>Medicaid vs. Medicare</i>		
Statistical Measures	OR	CI	Sig.	OR	CI	Sig.	OR	CI	Sig.	OR	CI	Sig.	OR	CI	Sig.	OR	CI	Sig.
A1C test ≥ 1 annually	1.00	0.40,2.53	0.98	1.05	0.37,0.92	0.93	0.7, 2.97	0.96	1.3	0.6, 2.8	0.51	0.9	0.28, 1.64	0.39	0.9	0.4,1.8	0.98	
A1C test ≥ 2 annually	0.99	0.53,1.9	0.99	1.4	0.71, 3.1	0.29	0.9	0.53, 1.6	0.80	1.4	0.7, 2.7	0.36	1.1	0.6, 2.0	0.8	1.2	0.5,1.2	0.51
A1C test ≥ 4 annually	0.92	0.78,4.9	0.15	1.14	0.37, 0.54	0.81	0.96	0.4, 2.3	0.93	1.3	0.6, 2.8	0.50	1.1	0.43, 2.7	0.87	1.1	0.5,1.8	0.58
Lipid test ≥ 1 annually	0.81	0.31,2.1	0.81	1.18	0.38, 3.62	0.77	0.79	0.3,1.99	0.62	0.66	0.3, 1.4	0.29	1.3	0.51, 3.2	0.59	1.1	0.4,2.2	0.90
Foot exam ≥ 2 annually	0.50	0.22,1.17	0.11	2.02	0.74, 5.54	0.17	0.94	0.4, 2.0	0.87	1.62	1.0, 2.7	0.03c	1.0	0.47, 2.45	0.86	0.8	0.4,1.6	0.60
B/P check ≥ 1 annually	0.39	0.09,1.7	0.21	0.41	0.08, 2.0	0.27	0.63	0.1, 3.9	0.10	0.24	0.04, 1.3	0.10	1.5	0.25, 9.97	0.62	0.1	0.03,1.1	0.06
Microalbumin test ≥ 1 annually	1.45	0.7,2.97	0.31	0.86	0.36, 2.1	0.75	0.84	0.4, 1.7	0.62	1.2	0.64, 2.3	0.55	1.2	0.6, 2.4	0.62	1.1	0.5,1.9	0.87
<i>Outcome Measures</i>																		
<i>Payer Status</i>	<i>Medicare vs. Comm.</i>			<i>Medicaid vs. Comm.</i>			<i>Medicare vs. uninsured</i>			<i>Uninsured vs. Medicaid</i>			<i>Uninsured vs. Comm.</i>			<i>Medicaid vs. Medicare</i>		
Statistical Measures	OR	CI	Sig.	OR	CI	Sig.	OR	CI	Sig.	OR	CI	Sig.	OR	CI	Sig.	OR	CI	Sig.
A1C ≤ 7.0%	0.68	0.37,1.2	0.22	1.3	0.6, 2.9	0.45	1.5	0.65, 3.4	0.34	0.64	0.37, 1.1	0.11	1.0	0.5, 1.9	0.84	0.2	0.1,1.5	0.46
A1C > 9.0%	1.1	0.41,2.95	0.84	0.674	0.22, 2.06	0.48	0.70	0.3, 1.8	0.46	1.0	0.5, 2.4	0.83	1.6	0.6, 4.2	0.33	0.9	0.5, 1.8	0.98
LDL-C ≤ 100 mg/dl	0.61	0.4,1.0	0.69	0.48	0.2, 0.9	0.37	0.8	0.4, 1.8	0.60	0.9	0.5, 1.9	0.93	0.7	0.42, 1.2	0.25	0.8	0.4,1.6	0.56
LDL-C > 130 mg/dl	2.0	0.66,4.47	0.04c	1.8	0.7, 4.8	0.04c	0.56	0.2, 1.5	0.23	1.3	0.56, 3.0	0.32	1.7	0.66, 4.5	0.26	1.0	0.4,2.3	0.91
BP > 130/80 mm Hg	0.69	0.38,1.26	0.22	1.06	0.51, 2.2	0.87	1.1	0.6, 2.0	0.72	0.77	0.45, 1.3	0.33	0.9	0.5, 1.6	0.72	0.8	0.2,2.9	0.75
Nephropathy	1.4	0.37,5.4	0.61	0.88	1.7, 4.5	0.88	0.45	0.09, 2.1	0.31	0.64	0.14, 3.0	0.57	2.2	0.5, 10.2	0.31	0.9	0.2,3.4	0.93

Comm. = Commercial Insurance

OR = Odds Ratio

CI = Confidence Interval (95%)

Significance at α 0.05