Diabetics at the Charitable Clinic of Hot Springs, AR

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ABSTRACT

The Cooperative Christian Ministries and Clinic (CCMC, prior to 2014 the Charitable Christian Medical Clinic) in Hot Springs, AR, serves adults without healthcare reimbursement plans with medical, dental, and pharmacy services. This study was designed as a records review and was undertaken in 2005 as free diabetes education classes were offered on a weekly basis to augment disease management. The patients were managed with lower cost medications such as metformin, glipizide, sitagliptin, and glargine, insulin.

OBJECTIVES

The study was planned to observe outcomes of diabetes care: hemoglobin A1c(HgbA1c), body mass index (BMI), and blood pressure (BP); to compare readings from patients who had attended diabetes education classes with those who had not; and to identify one or more variables that could predict control of blood sugar as measured by over time.

METHOD

Five hundred seventy diabetics were followed from 2005 to 2014. Of these, 300 attended at least one of eight classes on management of diabetes. HgbA1c, blood pressure (BP) readings were recorded before treatment and periodically throughout care at the clinic. Comparison of outcomes was carried out with the student t test among those who had attended classes or not and among patients on entry and later in care. Linear regression was used to examine the effects of BMI on HgbA1c over a five year period.

RESULTS

Overall, the patients averaged acceptable BPs, but unacceptably high BMIs and HgbA1c throughout their care. We saw the Year 2 HgbA1c values the lowest throughout the data collection period. Those attending class did show lesser HgbA1c values through to Year 5 as compared to those not attending class. Blood pressure readings were, on average, within an acceptable range throughout the data collection period. Paired samples t tests for hemoglobin A1c revealed significant reductions in Years 2 and 3 for all patients, and for those attending class in Year 4, compared to entry. Linear regression for the entire sample revealed that entry body mass index was significantly predictive of Year 3 hemoglobin A1c.

CONCLUSION

These findings may inform providers to patients now accessing care as part of Affordable Care Act plans, but who have limited out of pocket funds for newer medications and additional interventions that might result in better diabetes control. In view of the current trends in obesity and the prevalence of diabetes, we can recommend early population education for healthier diets and lifestyles among youth and adults to increase prevention and limit advancing healthcare costs in the future.

1. INTRODUCTION

According to the Centers for Disease Control, there are an estimated 29 million diabetics in the United States (9.3% of the population) as of 2012 (*National Diabetes Statistics Report, 2014).*The financial burden including total costs of treatment, lost work and wages, was estimated at $245 billion by the Centers for Disease Control in 2012 (The Diabetes Report Card, 2014). Multiple studies have confirmed the link between Type 2 Diabetes and obesity as measured by BMI (Must & McKeown, 2012).

Prior to the implementation of the Affordable Care Act, signed into law by President Obama in 2010, many diabetics did not have access to healthcare services. Management of their conditions often occurred in fee-for-service clinics, emergency rooms, and related resources, creating unaffordable and/or unpaid financial burdens for some. Today, indigent patients with plans under the Affordable Care Act may face expensive co-pays for diabetes management, including newer pharmaceutical agents (Norris, Lee, Severance, Thakurta, & Chan, 2008) and surgical interventions for weight reduction (Rubino, Nathan, Eckel, Schauer, Alberti, Zimmet, et al, 2016).

At the Cooperative Christian Ministries and Clinic (CCMC, prior to 2014 the Charitable Christian Medical Clinic), patients without any source of insurance or reimbursement who fell below 200% of the federal poverty line could access care for $5 per visit and $5 per month for medication refills. Between 2005 and 2014, 570 patients with diabetes received care, largely by the same team of MD and RNs. At each clinic visit, patients were assessed by an RN, managed by an MD, and counseled as to diabetes care after completion of the MD visit. Patients were managed with lower cost pharmaceuticals such as metformin, glipizide, sitagliptin, and glargine, insulin. In addition, eight classes covering diabetes management were offered on a weekly basis free of charge. Class topics included diabetes as a disease entity, diet recommendations, exercise, stress management, reading food labels and preparing meals. This report will present a summary of findings from clinic records during this ten year period.

2. METHODS

The CCMC board of directors supported this study which was a chart records review designed to record findings during routine clinic visits. Body mass index (BMI), hemoglobin A1c(HgbA1c), blood pressure (BP) readings were recorded before treatment and periodically throughout care at the clinic. The readings recorded prior to care were labeled "ENTRY" and those recorded after completion of classes or a comparable time period were labeled "CLASS END." Statistical analysis of findings included paired sample t tests (comparison of patients prior to onset of care, upon completion of classes (if attended), and annually for a five year period. Recording of findings from patients who did not attend classes were made at approximately comparable intervals. Linear regression was used with BMI and systolic and diastolic BP as independent variables and HgbA1c as the dependent variable for the second through fifth years of care.

3. RESULTS

Among the 570 patients, there were 61% females, 39% males, with an average age of 48.5 years. There were 72% White, 19% African American, and 8% Hispanic Americans in the sample. The average level of education completed was 11.8 years. Three hundred attended at least one of eight classes on management of diabetes. All patients averaged BMI of 34.6, HgbA1c of 8.94%, and BP of 133/84 prior to initiation of care (see Table 3). Most of the patients kept unacceptably high BMI and HgbA1c readings throughout their care. We saw the Year 2 HgbA1c values the lowest throughout the data collection period for all the patients in the data set. Those attending class did show lesser hemoglobin A1c values through to Year 5 as compared to those not attending class. We noted improvements in blood pressure after several months of care. Paired samples t tests for hemoglobin A1c revealed significant reductions in Years 2 ($t = 5.13$, $p < .001$), and 3 ($t=3.93$, $p < .001$). Linear regression for the entire sample revealed that after consideration of HgbA1c values, entry body mass index was significantly predictive of Year 3 hemoglobin A1c (adjusted R squared = 0167, beta=0.22, $p = .048$).

4. DISCUSSION

The findings revealed that while BMI and HgbA1c remained unacceptably elevated for most patients, systolic and diastolic BP were, on average, within an acceptable range throughout the data collection period. The basic task of weight control as integral to management of diabetes was largely substantiated by the prediction of HgbA1c by BMI after three years of care. In other words, it appears that BMI upon initiation of diabetes diagnosis and management is predictive of disease control after three years. Providers may be able to advise patients that, despite medications, without weight loss, surgical interventions are to be considered according to the work of Rubino and co-workers who recommend inclusion of surgical options in diabetes treatment algorithms (Rubino, Nathan, Eckel, Schauer, Alberti, Zimmet, et al, 2016).

These findings may inform providers in long term management of patients now accessing care as part of Affordable Care Act plans, but who have limited out of pocket funds or cannot meet co-pay requirements for newer treatments that might result in better diabetes control. Also, early prevention measures are called for as we witness increasing obesity and diabetes prevalences today. Measures such as education for lifestyle modification should be part of school curricula for youth and community programming for adults and seniors across the lifespan.

TABLE 1. Diabetics at the Charitable Clinic of Hot Springs, AR (patients attending class)

	ENTRY	EXIT	YEAR 2	YEAR 3	YEAR 4	YEAR 5
BMI	34.9	34.24	34.19	35.24	35.53	36.35
HbgA1c	9.18	9.74	7.97	8.05	7.77	8.77
Systolic BP	131.66	126.64	126.56	131.79	130.72	125.5
Diastolic BP	83.66	81.48	80.97	82.13	82.28	81.5

TABLE 2. Diabetics at the Charitable Clinic of Hot Springs, AR (patients not attending class)

	ENTRY	EXIT	YEAR 2	YEAR 3	YEAR 4	YEAR 5
BMI	.34.01	33.52	34.02	32.35	33.54	32.64
HbgA1c	8.47	9.27	7.77	8.16	10.51	9.02
Systolic BP	134.63	128.77	130.52	131.4	131.09	134.63
Diastolic BP	84.99	82.78	79.93	81.85	80.22	83.15

TABLE 3. Diabetics at the Charitable Clinic of Hot Springs, AR (all patients)

	ENTRY	CLASS END	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Mean BMI	34.6	33.99	34.1	33.7	34.25	33.97
Mean HbgA1c	9.04%	9.57%	7.87%	8.11%	9.49%	8.94%
Mean HbgA1c mmol/mol (approximately)	75	81	63	65	80	74
Mean Systolic BP	132.75	127.5	128.64	131.58	130.96	131.51
Mean Diastolic BP	84.1	82.31	80.42	82	80.94	82.57

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