

EVOLVING DEMOGRAPHICS AND DISPARITIES IN AN URBAN DIABETES CLINIC: IMPLICATIONS FOR DIABETES EDUCATION AND TREATMENT

Objectives: To compare demographics and disease characteristics in a multiethnic diabetes clinic population to identify changes over time.

Design: Analysis and comparison of demographics and disease characteristics of diabetes patients, recorded electronically at intake over 10 years.

Setting: An urban outpatient diabetes clinic.

Patients: A total of 8,551 African-American (88%), White (7%), or Hispanic (3%) patients (average age, 52 years; mean diabetes duration, 5.1 years; 59% women).

Main Outcome Measures: Proportion of patients by ethnic group, age, diabetes duration, initial hemoglobin A_{1c}, and body mass index.

Results: Between 1992 and 2001, the percentage of African-American patients was relatively unchanged (from 87.6% to 87.2%; $P=.2$), White patients decreased (from 9% to 5%; $P=.0006$), and Hispanic patients increased (from 1.3% to 5.5%; $P<.0001$). Among African-American patients, average age decreased from 52 to 50 years ($P=.015$), diabetes duration decreased from 5.6 years to 4.3 years ($P=.0003$), initial hemoglobin A_{1c} decreased from 9.3% to 8.8% ($P<.0001$), and body mass index increased from 31 kg/m² to 32.1 kg/m² ($P=.0001$). Compared with African-American and White patients, Hispanic patients were younger ($P<.0001$) and had a lower body mass index ($P<.0001$) but had hemoglobin A_{1c} comparable to that of African-American patients (9.3% vs 9.1%; $P=.45$) and higher than that of White patients (9.3% vs 8.7%; $P=.0022$).

Conclusions: The demographic and disease profiles of patients in this urban diabetes clinic have shifted, and disparities in glycemic control and obesity exist. Modifications in treatment and education approaches may be necessary to compensate for a changing patient population. (*Ethn Dis.* 2005;15:173–178)

Key Words: Demography, Diabetes Mellitus, Ethnic Groups, Hyperglycemia, Obesity, Patient Education

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INTRODUCTION

The prevalence of diabetes mellitus is increasing,¹ and the anticipated rise in incidence during the next few decades² suggests that this chronic illness will place an even greater burden on the United States healthcare system far into the future. The disease, especially in its most common form of type 2 diabetes, is associated with extensive morbidity³ and high healthcare costs.⁴ Minority populations are at increased risk for type 2 diabetes and its complications,^{1,3,5} and they tend to have poorer glycemic control than Whites.^{6,7}

Census 2000 data indicate that the ethnic mix of the US population has changed since the 1990 survey, with an increase in groups that are particularly susceptible to diabetes (eg, Hispanic).⁸ Recent comparisons of data from sequential National Health and Nutrition Examination surveys (NHANES) indicate changes in the characteristics of the US diabetes population.⁹ For instance, the number of non-Hispanic Whites affected by diabetes has decreased, and the percentage of non-Hispanic Blacks and Mexican Americans has increased. Other observable changes include increases in body mass index (BMI) and hemoglobin

A_{1c} (HbA_{1c}) among diabetes patients and a decrease in the average duration of disease.⁹

It is not known how these shifts in national demographics in general and of diabetes in particular will be reflected in the composition of clinical patient populations. Since 1992, we have compiled and analyzed data on patients from an urban diabetes clinic that is part of a large county hospital.¹⁰ This public hospital system serves a predominant minority patient population. Evaluating for possible changes in patient profiles and disease characteristics over an extended period can better inform diabetes educational and treatment teams, thus allowing them to better prepare their interventions for differences in the patient mix that might be occurring. We analyzed demographic changes in the African-American, White, and Hispanic patients newly presenting to the diabetes program between 1992 and 2001, and considered the implications of these changes for program development in diabetes education and management. In addition, we compared patient characteristics to search for differences that might suggest the presence of disparities in disease variables.

METHODS

Overview of Program

The outpatient diabetes clinic is part of a two-county public health system comprising a main hospital campus, outpatient clinics spanning all medical specialties, and several community-based primary care sites throughout the area.

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Referrals to the clinic come from all these sites plus the emergency/urgent care center and patient self-referral. The mandate of this healthcare system is to provide care for the uninsured and indigent residents of the referral area. The education and treatment paradigms have been described extensively elsewhere.¹⁰⁻¹⁴ Briefly, the clinic is staffed by diabetes nurse educators (the principal providers of care), dietitians, podiatrists, clinical pharmacologists, a social worker, support staff, and endocrinologists.

An electronic patient database (Diabetes Patient Tracking System) was developed and implemented in April 1991. Demographic and disease characteristics, therapeutic information, and laboratory data for every patient at every visit are routinely input into this database. Data consists of a combination of self-reported measures (eg, ethnicity, date of diabetes onset, medication use) and objective measures (eg, age, sex, height, weight) recorded on the clinical note. Clinical notes are reviewed for completeness by a data analyst (author VGB), then entered into the system by hand. The same data analyst has been entering the data since the inception of the system. Laboratory data is directly downloaded into the tracking system. The tracking system has been an important infrastructure tool for analyzing outcomes and evaluating the results of quality improvement programs in this patient population.¹⁰⁻¹⁴

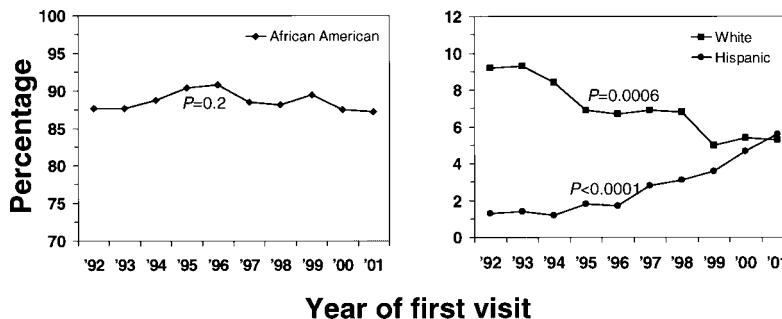


Fig 1. Changes in the ethnic profile of diabetes patients from 1992 to 2001

Data Extraction and Analysis

Data were extracted from the Diabetes Patient Tracking System for an analysis and comparison of the demographics and disease characteristics recorded for all patients whose first (intake) visit was between calendar years 1992 and 2001. Demographic variables included age, sex, and race. Disease characteristics included duration of diabetes (self-reported) at intake, BMI and HbA_{1c} levels, and mode of diabetes therapy. Differences in continuous variables and changes in patient characteristics recorded at the time of the initial visit were assessed across time (1992 to 2001) by analysis of variance, and differences between proportions were evaluated using the χ^2 test. Mean values were expressed as plus or minus standard deviation. Analyses were conducted using StatView (SAS Institute, Inc, Cary, North Carolina).

RESULTS

General Characteristics

Data on 8,551 patients were retrieved for analysis. At the intake visit, the average age of these patients was 52 ± 14 years, mean diabetes duration was 5.1 ± 0.1 years, average BMI was 31.9 ± 0.1 kg/m², and HbA_{1c} was $9.1\% \pm 0.03\%$. Of these patients, 59% were women, 90% had a diagnosis of type 2 diabetes, and 53% were already taking insulin therapy. Overall, 88% of the patients were African-American, 7% were White, 3% were Hispanic, and 2% belonged to other groups.

Changes in Demographic Characteristics of Clinic Population

Between 1992 and 2001, the proportion of diabetes patients who were African-American remained unchanged (from 87.6% to 87.2%; $P=.2$). In contrast, the Hispanic patient population increased 4-fold (from 1.3% to 5.5%; $P<.0001$), while the proportion of White patients declined (from 9.2% to 5.3%; $P=.0006$) (Figure 1). There were no changes in the way ethnicity was classified during this period.

Among African-American patients, a slight but significant decline ($P=.015$) was observed in patient age over time (Figure 2, top panel). The mean (standard deviation) age of African-American patients at the time of their first visit to the diabetes clinic was 52 ± 14 years in 1992 and 50 ± 13 years in 2001. The average reported duration of diabetes also declined significantly ($P=.0003$); in 1992, the average duration of diabetes was 5.6 ± 1 years, which decreased to 4.4 ± 0.6 years by 2001.

A decrease in HbA_{1c} values was detected among African-American patients over time ($P<.0001$). The average (standard deviation) HbA_{1c} at intake was $9.4\% \pm 2.8\%$ in 1992 and $8.9\% \pm 2.6\%$ in 2001 (Figure 2, top panel). The severity of obesity increased during the same period ($P=.0001$); mean BMI was 31.1 ± 6.9 kg/m² in 1992 and 32.4 ± 7.8 kg/m² in 2001 (Figure 2, bottom panel). No differences over time in age, duration, BMI, or HbA_{1c} were detected among the White or Hispanic patient populations.

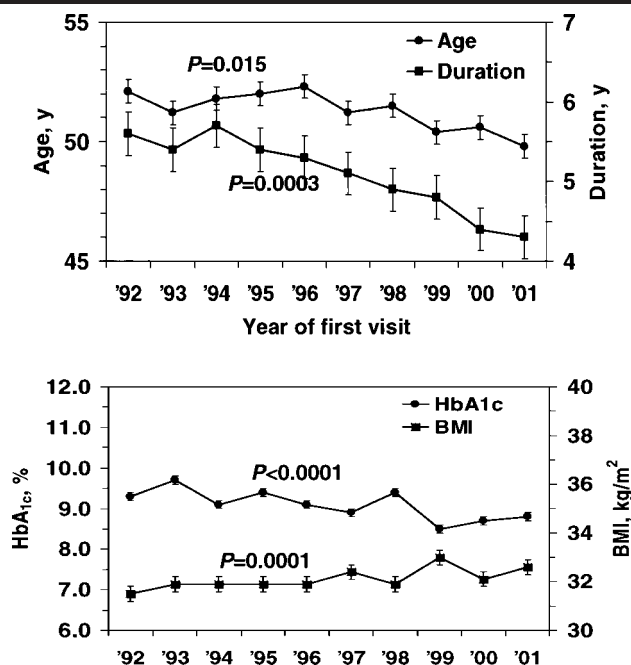


Fig 2. Changes (mean \pm SEM) for African-American patients in the average patient age and diabetes duration (top panel) and in HbA_{1c} and BMI (bottom panel), 1992 to 2001, as recorded at the time of the intake visit. BMI, body mass index; HbA_{1c}, hemoglobin A_{1c}; SEM, standard error of the mean

Changes in Two-County Referral Area Demographics

In order to place the demographic changes of the clinic in context of the changes that occurred in the two-county referral area, we obtained data on race from Census 1990 and Census 2000. We also examined age distribution for 1990 and 2000 for the African-American population; because the clinic delivers care to persons ≥ 18 years old, we examined age distributions in this group only. Between 1990 and 2000, there was a reduction in the percentage of the general population that was White, an increase in the proportion that were African-American, but a marked rise in the percentage of the two-county population that was Hispanic (Figure 3, top panel).

There were slight shifts in the age distribution of the African-American population in the two-county referral area (Figure 3, bottom panel). Compared to 1990, fewer African-Americans were in the 18 to 44 year age groups, while more were ≥ 45 years of age.

Ethnic Differences in Demographic and Disease Characteristics

Comparisons in patient and disease characteristics were first made between groups for the entire 1992 to 2001 cohort. Hispanic patients were significantly younger (46 ± 0.83 years) on average than either the African-American patients (51 ± 0.15 years, $P < .0001$) or the White patients (51 ± 0.47 years, $P < .001$). On average, White patients had the longest duration of diabetes (6.5 ± 0.34 years). Hispanic patients had diabetes for significantly less than Whites (5.0 ± 0.45 years, $P = .0009$) and a duration comparable to that of African-Americans (5.0 ± 0.08 years, $P = .51$). On average, Hispanic patients had an HbA_{1c} comparable to that of the African-American patients ($9.3\% \pm 0.18\%$ vs $9.1\% \pm 0.03\%$, $P = .45$) but higher than that of White patients, who presented with the lowest HbA_{1c} value ($8.7\% \pm 0.09\%$, $P = 0.0022$). Hispanic patients had a BMI (29.5 ± 0.34 kg/m²) significantly lower than that of African-American

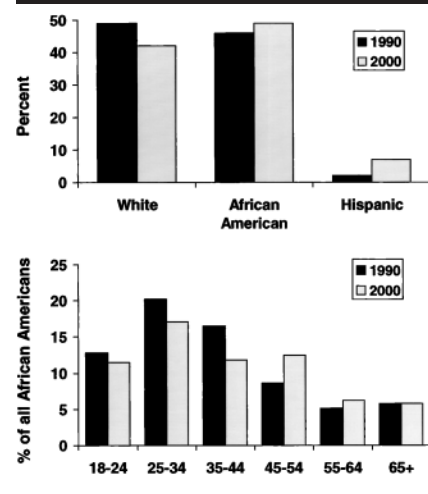


Fig 3. Race distribution (top panel), and age distribution of African Americans (bottom panel) for two-county diabetes clinic referral area, 1990 and 2000

ican patients (32.2 ± 0.09 kg/m², $P < .0001$) or White patients (31.4 ± 0.31 kg/m², $P = .0012$).

We also performed an analysis to assess for differences between ethnic groups in age, diabetes duration, BMI, and HbA_{1c}, this time comparing time periods. Because of the small numbers of Whites and Hispanics in our patient population, we compared 5-year aggregates (years 1992 to 1996 with years 1997 to 2001). Hispanics were statistically younger on average, had lower BMI values, and higher mean HbA_{1c} levels compared to Whites (Figure 4) both during the first 5-year period (1992 to 1996) and the latter 5 years (1997 to 2001). Hispanics had an average diabetes duration that was shorter than Whites during the earlier years, but became statistically similar during 1997 to 2001 (Figure 4).

When comparing Blacks and Hispanics (Figure 5), Hispanics were consistently younger on average and had lower BMI levels during both 1992 to 1996 and 1997 to 2001. Mean diabetes duration was comparable between Blacks and Hispanics during both periods. Average HbA_{1c} levels were similar during 1992 to 1997, but in the later 5 years Hispanics were presenting with higher values compared to Blacks (Figure 5).

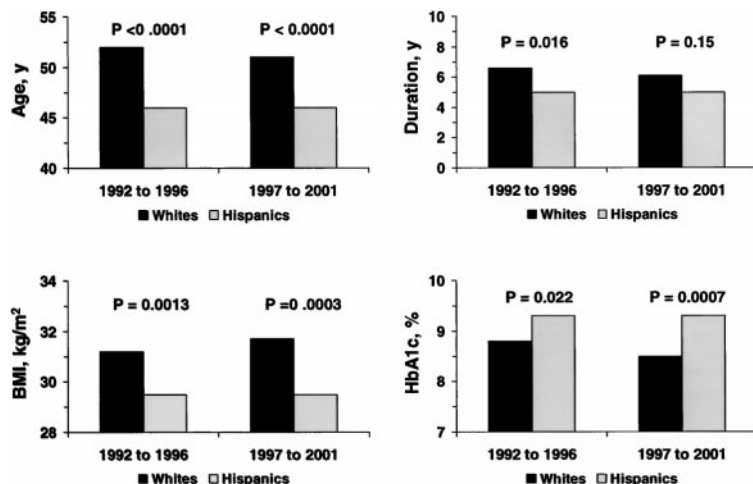


Fig 4. Differences in mean age, diabetes duration, BMI, and HbA_{1c} levels between White and Hispanic patients at the time of their first visit to the diabetes clinic during two 5-year time periods

DISCUSSION

Structured diabetes care programs that incorporate a multi-interventional approach to therapy can improve overall diabetes outcomes.¹⁵⁻²¹ Evidence suggests that minority patient populations can also benefit from integrated diabetes care.^{13,22-24} Our review and analysis of the demographic and disease characteristics of patients seen in a large urban outpatient diabetes clinic during a 10-year period identified changes in this diverse patient

population that will likely have important implications for ongoing education and treatment paradigms.

One distinct change is in the ethnic mix of the persons entering the program. African Americans remain the predominant patient population. The percentage of white patients declined, which mirrors a national trend with fewer white persons affected by diabetes. In the case of this clinic population, the decline in White patients may be more of an effect of migration of these persons outside the referral

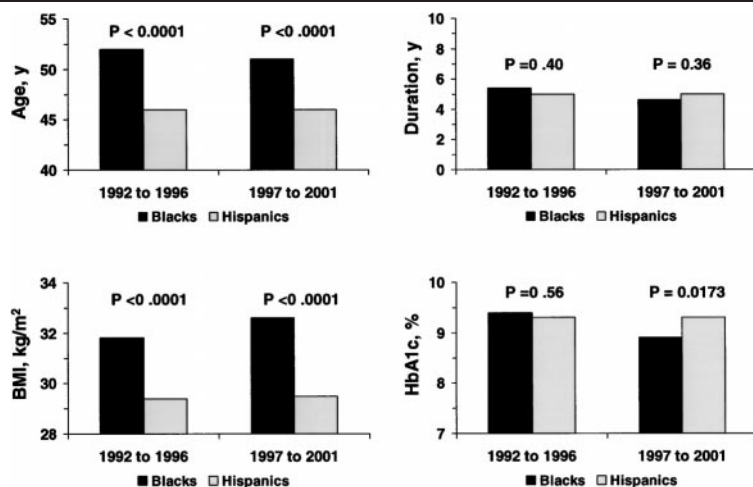


Fig 5. Differences in mean age, diabetes duration, BMI, and HbA_{1c} levels between Black and Hispanic patients at the time of their first visit to the diabetes clinic during two 5-year time periods

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area of the two-county public health network. In support of this possibility, review of Census data did show that the proportion of Whites in the two-county referral area did decline between 1990 and 2000. During the same period, Hispanics were increasingly represented among the persons who sought care in our program. This increase coincides with the rise in the Hispanic population of our two-county referral area. The increased number of Hispanic patients will pose special challenges to the delivery of diabetes care. Hispanic Americans face greater barriers to health insurance than other ethnic groups in the United States. Moreover, a substantial proportion live in linguistically isolated households.²⁵ These barriers will require adjustments in diabetes education and treatment programs that care for patient groups similar to the one analyzed here.

In response to the growing number of Spanish-speaking patients, the diabetes clinic now has translators available to provide assistance. We attempt to facilitate care by having an accessible nurse educator, a dietitian, and an endocrinologist who all speak Spanish; however, because it cannot be guaranteed that such Spanish speaking personnel will always be available, English-speaking friends and family are encouraged to accompany the patient. Increasing the number of clinic employees proficient in Spanish should be a goal of the health system, and some providers in the diabetes clinic have elected to take Spanish classes. In addition, educational

handouts, pamphlets, and videotapes are available in Spanish.

Despite the adaptations already in place, continued expansion of services will probably be necessary in the near future to accommodate the increasing Hispanic patient population. Some additional programmatic changes that can be considered include having on staff Spanish-speaking personnel at patient registration and Spanish-speaking financial counselors and social workers. Also of benefit would be increased provider education to enhance sensitivity to the cultural differences faced by Hispanic patients. For example, by conducting live Latino cuisine cooking classes similar to those currently conducted for the African-American patient population, the clinic could better illustrate the principles of the dietary management of diabetes once more specific detail on the predominant Hispanic place of origin can be obtained. Forming alliances with other healthcare centers in the metropolitan area that serve a similar patient population would also facilitate exploration of additional methods to improve outcomes. Finally, avenues for including Hispanic patients routinely in outcome analyses as we have done for the African-American patients should be explored.¹⁰⁻¹⁴

Although absolute changes are small, our data suggest that demographic transformations within our predominantly African-American clinic population are under way. For instance, the average age of these diabetes patients at the time of the intake visit has declined over time. During the period included in this analysis, the age distribution of the African-American population in our referral area has actually shifted toward older groups. The gradually younger age of diabetes at the time of presentation to our clinic, therefore, may not be due to an increased numbers of younger African-Americans in the general population, but possibly secondary to an earlier age of disease onset. We recently demonstrated that younger persons with diabetes who come to the clinic have more severe hyperglycemia than older persons throughout the course of their treatment.²⁶ Thus, alterations in treatment algorithms to include more aggressive pharmacotherapy may be required to ensure optimal outcomes in an increasingly younger African-American patient population.

Recent NHANES data indicate that the duration of diagnosed diabetes is declining.⁹ In this study, we noted a decrease in the duration of diagnosed diabetes reported at the time of the initial visit to the diabetes clinic among the African-American patients. This finding may indicate that patients are being referred earlier to this specialty clinic and therefore should receive the benefits of intensive therapy and education sooner. The gradual but significant decline in mean HbA_{1c} values noted at the time of the initial visit among African Americans could be a sign that external healthcare providers are either becoming more aggressive in their management of diabetes in this population or that patients within this health system are being diagnosed earlier before the onset of severe hyperglycemia.⁹ This latter possibility could be the result of greater awareness on the part of the medical community of the need for early screening for diabetes or a reflection of the reduction in the fasting glucose criteria for a diagnosis of diabetes.²⁷

An increase in BMI over time was noted in recent NHANES data.⁹ Our data suggest that the severity of obesity is also worsening, at least among the African-American patients seen in the diabetes clinic. Although the increasing prevalence of obesity is well-documented nationally,¹ changes in the severity of obesity have not been well studied. A trend toward greater degrees of obesity may lead to greater future challenges in controlling the metabolic derangements associated with type 2 diabetes.

Certain differences were detected between ethnic groups. Hispanic patients were the youngest of the three ethnic groups, which mirrors the youthfulness of the US Hispanic population in general, or may represent earlier disease onset compared to other ethnic groups.⁸ In addition, African-American and Hispanic patients presented to the diabetes clinic with evidence of worse glycemic control than did White patients. Hispanic patients had the lowest BMI, and they had HbA_{1c} levels as severe as those of African Americans. The disparities in glycemic control and the degree of obesity are likely caused by multiple complex and interdependent factors,²⁵ including variations in socioeconomic characteristics,²⁸⁻³⁰ ecological or environmental

influences,³¹ inequities in delivering recommended care,³² and differences in access to health care that have been observed in minority populations.³³⁻³⁵

There are some limitations to the current analysis. First, the data are retrospective. Second, actual numbers of non-African-American patients are small, so changes in demographic characteristics over time, such as age, diabetes duration, BMI, or HbA_{1c}, may not have been detectable within the other groups. Third, the Hispanic population is diverse, comprised of individuals that may have diverse places of origin, cultural backgrounds and immigration history. Although data on ethnicity was captured in a consistent manner, the heterogeneity of the Hispanic population was not historically obtained during the period encompassed by this analysis. Historically, the Hispanic population comprised only a small part of our practice; however, as a result of this analysis, a need for greater detail is recognized. Therefore, after 2001, more data on Hispanic place of origin has been included in our data capture and, preliminary analysis indicates the majority (60%) derive from Mexico. Greater detail about the diversity of the Hispanic population would be of great importance so that the most effective and culturally sensitive education and intervention programs for this ethnic group could be implemented.

Finally, the data presented here represent a single clinical site, so findings may not be relevant to other settings. Nevertheless, minority patient populations typically seek and obtain health care from public health systems similar to the one described here.²⁵ Therefore, it is very possible that health systems that serve patients similar to the ones examined here have also been observing comparable shifts in the demographic picture of their diabetes cases.

In summary, our review of the demographic and disease characteristics of this diabetes patient population spanning 10 years shows small but statistically distinct shifts in demographic profiles and disease characteristics. Being cognizant of and understanding these trends can facilitate adjustment of educational and treatment paradigms to compensate for the needs of this changing and ethnically diverse group of patients.

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AUTHOR CONTRIBUTIONS

Design and concept of study: Dunbar, Cook, Ziemer, Gallina, George

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Data analysis and interpretation: Dunbar, Cook, El-Kebbi

Manuscript draft: Dunbar, Cook, El-Kebbi

Statistical expertise: Dunbar, Cook

Administrative, technical, or material assistance: Dunbar, King, El-Kebbi, Ziemer, Gallina, George

Supervision: Cook

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