**Journal of Student-Run Clinics**
Original Study

# How Well Does a Student-Run Free Clinic Care for Diabetic Patients?

## A Retrospective Study of the East Harlem Health Outreach Partnership

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**Published:** August 6, 2017

**Abstract**

**Background:** Student-run free clinics are an integral safety net for the uninsured, particularly for managing chronic conditions such as diabetes. A previous study of diabetes care at the East Harlem Health Outreach Partnership (EHHOP) demonstrated that patients receive comparable care to insured patients. In this study we explore the clinic's achievement and maintenance of glycemic targets in adult type II diabetes patients.
**Methods:** This was a retrospective study examining hemoglobin A1c (A1c) values from 2009-2012. Patients with baseline A1c ≥7.0% and ≥2 A1c values recorded were included in this study. Data was analyzed at baseline, 6 months, 1 and 2 years from diagnosis, and at final recorded visit. Prescribed medications were also assessed. Results were compared with other published diabetes quality-of-care metrics.
**Results:** Forty-four patients met entry criteria. Mean baseline A1c was 10.1%±2.3% and decreased to 8.3±2.3% by 6 months of treatment. By their final recorded visit, 40.9% (n=18) of patients achieved an American Diabetes Association A1c goal of ≤7.0%. Of those patients with A1c values above target, 15 reduced their A1c to ≤8.0%. Patients whose A1c values reached ≤7.0% maintained stable low A1c levels for the remainder of follow-up. Over 90% of patients achieved targets with ≥1 hypoglycemic medication. Patients least able to achieve goal A1c were more likely to take a greater number of medications. These results are comparable to other published metrics.
**Conclusions:** Despite resource limitations, uninsured patients at student-run free clinics are able to reach and maintain target A1c at comparable rates to their insured counterparts.

## Introduction

Student-run free medical clinics have emerged as an important component of the medical safety net for many of the millions of uninsured people living in the United States.[1-3] While these clinics provide formative educational experiences to medical students as well as critical healthcare for marginalized persons,[2,3] their ability to offer appropriate standards of care is often scrutinized.[2,4] This is particularly salient given that uninsured patients nationally are less likely than the insured to receive recommended care for chronic conditions.[1,5,6] Multiple clinics,[7-10] including our own,[11] have begun to reveal quality of care metrics for chronic and preventable conditions.

The East Harlem Health Outreach Partnership (EHHOP) is a medical student-run, attending-supervised, free clinic at the Icahn School of Medicine at Mount Sinai in New York City. Founded in 2004, the clinic's mission is to address the acute and chronic health needs of the surrounding uninsured community. EHHOP offers a broad range of medical care and prescription drug coverage to uninsured East Harlem residents at no cost. It operates every Saturday by appointment, and is staffed by medical and nursing students at all levels of training, volunteer attending physicians, and paid social workers and nutritionists. EHHOP also operates several cohabiting specialty clinics in mental health, women's health, cardiology, and ophthalmology.

East Harlem has one of the highest rates of uninsured residents (24%) in New York City.[12] In a population of 123,579 people, approximately one quarter (26%) are foreign born, 50% are Hispanic, 31% black, and 12% white, with 20% of residents possessing limited English proficiency.[12] Importantly, 31% of residents live below the poverty level and 11% have reported going without needed medical care from 2011-2013. Chronic diseases, such as diabetes, are a significant problem in East Harlem—13% of its residents are diabetic, compounded further by a third being obese, statistics greater than New York City averages.[12]

EHHOP's previous examination of diabetes process measures of care in 2009 found that 96% of patients received Hemoglobin A1c (A1c) monitoring, 92% were screened for retinopathy, 88% received diabetic foot exams, and 80% had nephropathy monitoring—rates which were all higher than or comparable to both insured and uninsured metrics.[11] Given that we know EHHOP provides appropriate process measures of diabetes care,[11] we questioned the clinical outcomes of this care through the relevant intermediate outcomes of achieving and maintaining a target A1c. Hemoglobin A1c provides a reliable marker of glycemic control,[13] lowering of which is associated with possible health benefits, including a reduction in risk of vascular disease and myocardial infarction.[14,15]

## Methods

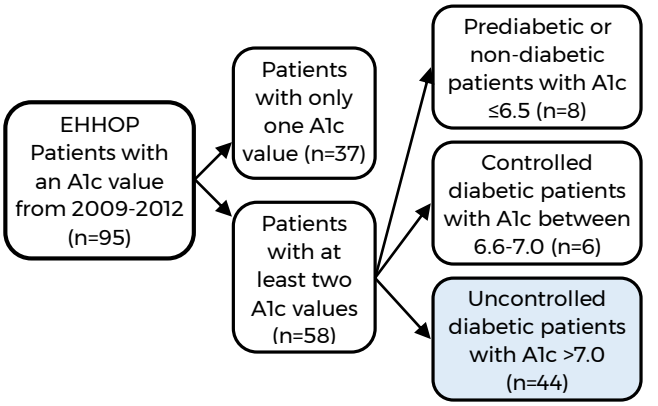
### *Protocol Approvals*

This study was approved by the Icahn School of Medicine at Mount Sinai Institutional Review Board and adhered to its guidelines.

### *Inclusion Criteria*

Medical records of adult patients seen at EHHOP from 2009-2012 with a documented A1c were reviewed. Ninety-five patients had at least one documented A1c in their charts. Patients with only one A1c value recorded (n=37) were excluded from the study, as their changes in A1c, and thus quality of diabetes care, could not be accurately assessed. Of the remaining patients, at baseline 8 were prediabetic or non-diabetic (A1c <6.5%), 6 were controlled diabetics (A1c 6.5%-7.0%), and 44 were uncontrolled diabetics (A1c >7.0%). This last category was used for further analysis (Figure 1). None of the patients examined carried a type I diabetes mellitus diagnosis.

***Figure 1.*** Inclusion Criteria




*Medical records of adult patients seen at EHHOP from 2009-2012 with a documented hemoglobin A1c (A1c) were reviewed. Ninety-five patients had at least one documented A1c in their charts. Patients with only one A1c value (n=37) were excluded from the study. Of the remaining patients, 44 were diabetics with A1c >7.0%, and this last category was used for further analysis.*

### *Data Collection*

Demographics of age, sex, and ethnicity were recorded for each patient. Baseline A1c, body mass index (BMI), blood pressure (BP), cholesterol (total cholesterol, LDL, and HDL), triglycerides, serum creatinine, alcohol use status, and smoking status were also established. To assess glycemic control over time, we extracted all A1c levels throughout treatment for each patient from date of diagnosis or first visit. Specific attention was given to the 6-month, 1-year, 2-year, and final recorded follow-up visit (including those with more than 2 years of follow-up). We additionally ascertained which hypoglycemic medications—namely metformin, sulfonylureas, and insulin—were prescribed to EHHOP patients over the course of their treatment.

### *Quality of Care Assessment*

From extracted A1c values, we calculated change in A1c (ΔA1c) from baseline at the 6-month, 1-year, 2-year, and final visit time-points. We subsequently queried if patients reached an A1c goal of ≤7%, as defined by the American Diabetes Association (ADA),[16] as well as an alternative goal of ≤8%, by the end of the study. Moreover, the association of baseline A1c to these metrics was determined. We next evaluated the kinetics of achieving these targets, as well as their maintenance, by examining whether patients hit the goals within the previously defined timelines, as well as if they were actually at goal at the defined

time-points (6-month, 1-year, and 2-year visits). Diabetic medication prescriptions were separately assessed, examining both the quantity and identity of the medications patients were given, and how this related to their ability to achieve the ADA-recommended ≤7.0% target. Lastly, the proportion of EHHOP patients with A1cs in specific ranges were compared with those reported by the University of California-San Diego (UCSD) student-run free clinic[8] and the National Health and Nutrition Examination Survey (NHANES 1999-2000)[17] to see how EHHOP's diabetes quality of care compared with that given in different settings.

*Statistics*

Statistics and graphs were generated using Microsoft Excel 2011 (Microsoft, Seattle, WA) and GraphPad Prism 6 software (GraphPad Software, Inc., La Jolla, CA, USA). A $p<0.05$ was considered significant. Data is presented as mean ±standard deviation (SD) unless otherwise indicated. For the assessment of changes in A1c, values at 6 months, 1 year, 2 year, and final recorded (2+ year) time-points were compared to baseline A1c values by Wilcoxon matched-pairs signed rank test with Bonferroni post-test to adjust for multiple comparisons. Comparisons between A1c values for those patients who achieved an ADA-recommended ≤7.0% target versus those who did not were assessed by the Mann-Whitney test. Associations between groups of data were determined by Spearman correlations. Comparisons between EHHOP patient baseline A1c values and those reported by the UCSD free clinic were performed by the Student's t-test. Fisher's exact test was used to compare percent of EHHOP patients at, above, or below specific A1c levels to published outcomes provided in other studies. In addition, Fisher's exact test was used to assess the odds that patients who failed to hit target A1c were prescribed more medications, alongside calculation of an odds ratio (OR).

## Results

*Baseline Characteristics*

Demographics and patient health metrics, including results regarding A1c, are outlined in Table 1. Patients with uncontrolled diabetes were at a mean age of 49.6 ±8.5 (range: 28.2-64.1 years). Half of this population were women and 83% was Hispanic. The mean baseline A1c value of this group was 10.1 ±2.3% (range: 7.1-15.9%) (Figure 2A), with an average of 7.1 ±4.2 A1c readings over 2.1 ±1.4 years obtained per patient. Most of these patients were obese (BMI: 30.6 ±5.9 kg/m$^2$) and not hypertensive (BP: 126/77 ±21/10 mmHg), with marginally elevated LDL cholesterol (112.7 ±31.7 mg/dL). Kidney function was normal in the vast majority of our patients (serum creatinine: 0.79 ±0.19 mg/dL). Approximately 40% (n=17) patients endorsed drinking alcohol on regular basis, while 6.8% (n=3) were current smokers and 36.4% (n=16) were former smokers.

***Table 1.*** Baseline Patient Characteristics

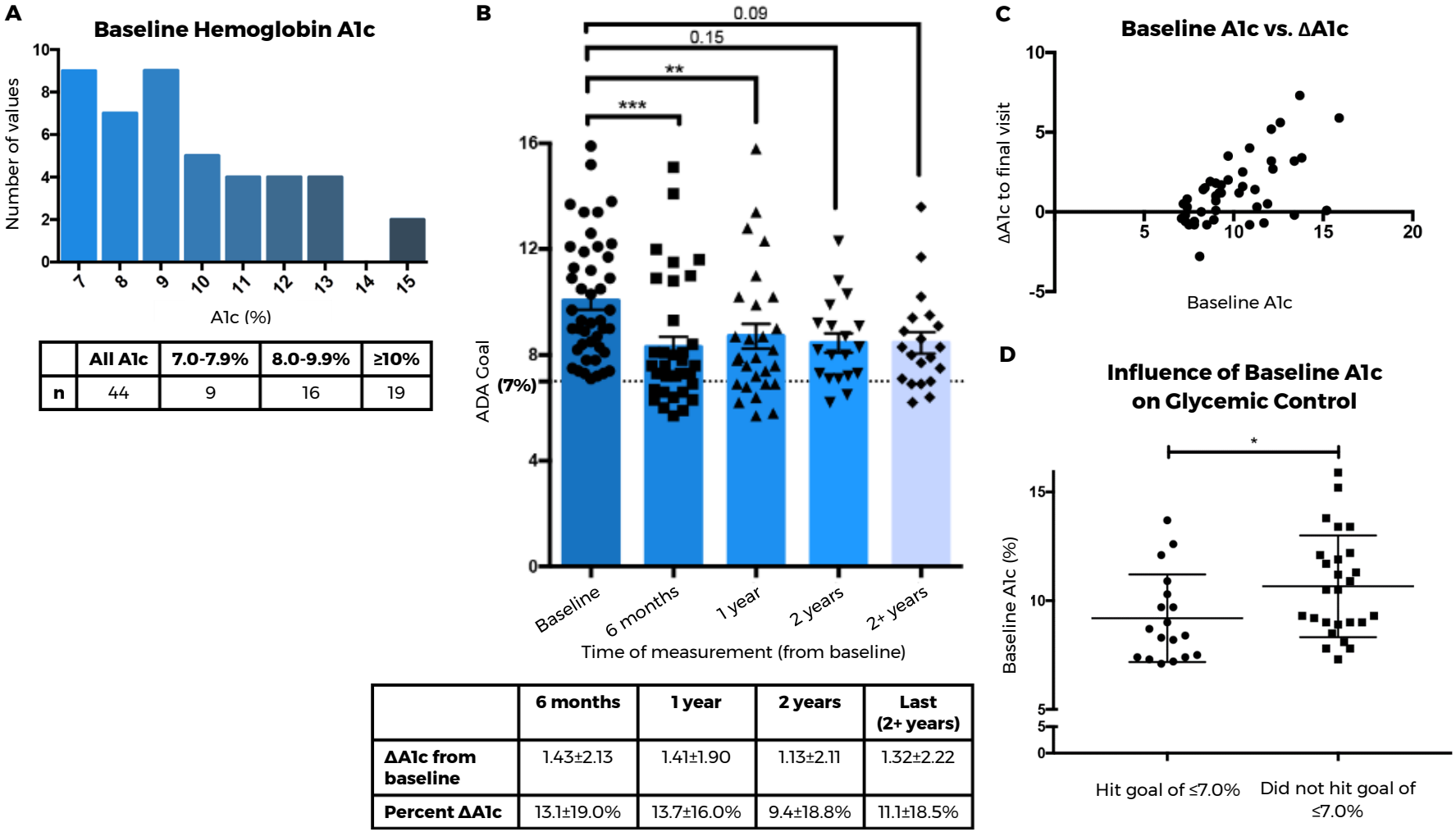
| Patient Characteristics | Mean ±SD (Range) |
|---|---|
| Age (years) | 49.6 ±8.5 (28.2-64.1) |
| Sex | 50% M (n=22) 50% F (n=22) |
| Ethnicity | 83% Hispanic (n=37) |
| **Diabetes** | |
| Baseline A1c (%) | 10.1 ±2.3 (7.1-15.9) |
| Number of A1c readings per patient | 7.1 ±4.2 |
| Length of follow-up (years) | 2.1 ±1.4 |
| **Health Metrics** | |
| BMI (kg/m$^2$) | 30.6 ±5.9 |
| Blood pressure (mmHg) | 126/77 ±21/10 |
| Total cholesterol (mg/dL) | 190.8 ±36.0 |
| LDL (mg/dL) | 112.7 ±31.7 |
| HDL (mg/dL) | 48.5 ±15.4 |
| Triglycerides (mg/dL) | 152.2 ±87.0 |
| Serum creatinine (mg/dL) | 0.80 ±0.19 |
| Alcohol use | 39.5% (n=17) |
| Current/former smoker | 6.8% (n=3)/36.4% (n=16) |

*Demographics and health metric data extracted from patient charts at date of diagnosis or first visit. Details on the length of follow-up and number of A1c readings per patient are also included. Units for each value are indicated in parentheses. Data is presented as mean ±SD or percentage of patients with associated sample size.*

*Improvements in Glycemic Control Over Time*

To assess glycemic control, we extracted A1c values at the 6-month, 1-year, 2-year, and final recorded visit (for those with more than 2 years of follow-up) and compared these to baseline levels. While A1c was high at baseline, it significantly decreased over time in our patients (Figure 2B). From a mean baseline value of 10.1%, A1c dropped in our patient population to 8.3 ±2.3% at 6 months ($p<0.001$, n=36), to 8.7 ±2.5% at 1 year ($p=0.002$, n=28), to 8.5 ±1.6% at 2 years ($p=0.15$, n=19), and to 8.5 ±1.8% at 2+ years ($p=0.09$, n=20). The differences in sample size at time points measured is due to

***Figure 2.*** Improvements in A1c over Time




| | All A1c | 7.0-7.9% | 8.0-9.9% | ≥10% |
|---|---|---|---|---|
| n | 44 | 9 | 16 | 19 |

| | 6 months | 1 year | 2 years | Last (2+ years) |
|---|---|---|---|---|
| **ΔA1c from baseline** | 1.43±2.13 | 1.41±1.90 | 1.13±2.11 | 1.32±2.22 |
| **Percent ΔA1c** | 13.1±19.0% | 13.7±16.0% | 9.4±18.8% | 11.1±18.5% |

(A) Histogram of baseline A1c patients for all 44 patients studied. Bin center is at the 0.5 point of each integer listed (e.g. 7.5), with a bin width of 1. Baseline A1c values ranged from 7.1-15.9%. Of the 44 patients, 9 had baseline A1cs in the 7.0-7.9% range, 16 had values in the 8.0-9.9% range, and an additional 19 had results ≥10.0%. (B) A1c values were compared to baseline A1c at the 6-month, 1-year, 2-year, and final recorded (2+ year) follow-up visit. Reductions were seen in A1c by 6 months continued throughout the treatment. The dotted line indicates the ADA-recommended target A1c of ≤7.0%. ΔA1c and Δ%A1c are provided in the table below graph for each time point. (C) Baseline A1c values plotted against the ΔA1c from baseline to the final visit. A positive correlation was determined with higher baseline A1cs associated with greater reductions over time ($r=0.57$, $p<0.0001$). (D) Baseline A1c values for those who achieved and failed to achieve the ADA-recommended target. Those who did not hit the goal had, on average, a higher baseline A1c. Data are presented as mean ±SD. Statistics, (B) Wilcoxon matched-pairs signed rank test with Bonferronni post-test to adjust for multiple comparisons, (C) Spearman correlation, (D) Mann-Whitney test. *$p<0.05$, **$p<0.01$, ***$p<0.001$.

***Table 2.*** A1c Target Achievements

| Baseline A1c | % Achieved ADA Goal A1c ≤7% | % Achieved A1c ≤8% |
|---|---|---|
| **All (n=44)** | 40.9 (n=18) | 75.0 (n=33) |
| **7.0-7.9% (n=9)** | 66.7 (n=6) | 100.0 (n=9) |
| **8.0-9.9% (n=16)** | 43.8 (n=7) | 81.3 (n=13) |
| **≥10% (n=19)** | 26.3 (n=5) | 57.9 (n=11) |

*Percentage of patients that either achieved the American Diabetes Association (ADA)-recommended target of ≤7.0% or an alternative goal of ≤8.0% at any visit after baseline is provided. Data is additionally stratified by baseline A1c.*

absence of patient measurement at the time point indicated. The greatest changes in A1c occurred in individuals who had higher baseline A1c values, observed as a positive correlation between baseline A1c and ΔA1c from baseline to the patient's final recorded value (r=0.57, p<0.0001) (Figure 2C).

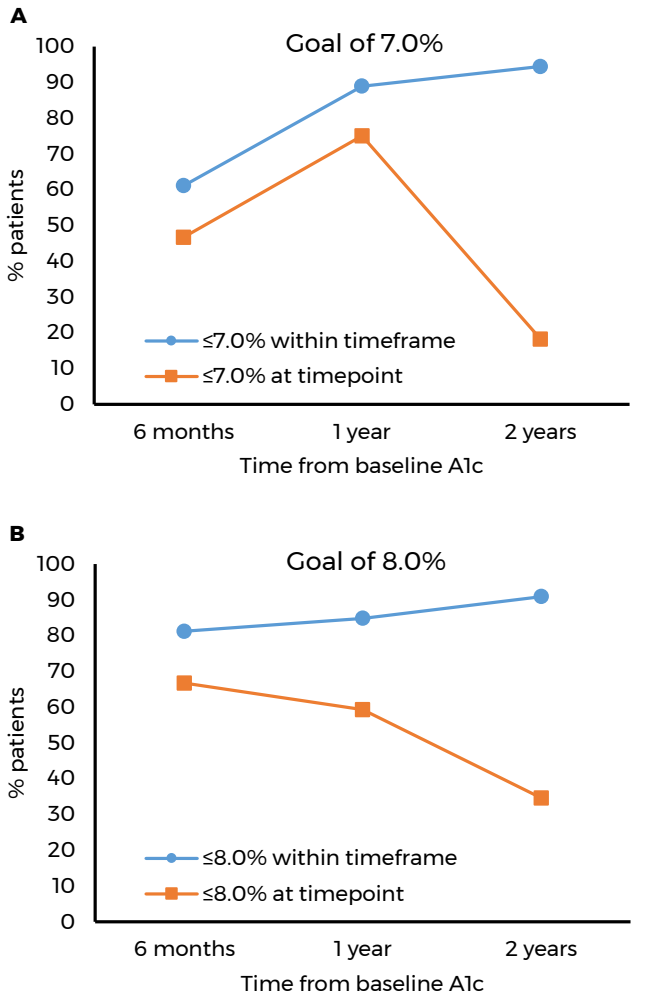
Achievement of ADA recommended guideline A1c goals of ≤7.0%[16] was also queried throughout the period of study. We found that 40.9% (n=18) of our patients hit an ADA goal of ≤7.0% at some point before or by their last recorded visit. Those with lower baseline A1c values were more likely to achieve an ADA goal of 7.0% (p=0.027) (Figure 2D and Table 2).

While almost two thirds of patients achieved this goal (61.1%, n=11) within 6 months of the baseline visit, 88.9% (n=16) reached it within 1 year, and nearly all patients (94.4%, n=17) reached it within 2 years (Figure 3A). It took an average of 288.35±233.60 days (range: 1007.40-83.95 days; 2.76-0.23 years) for the majority of patients to successfully achieve this target A1c. Of the 26 patients who did not reach goal, 15 were still effectively able to reduce their A1c to at least 8.0%. In total, 75.0% (n=33) of patients hit a target of 8.0; 81.2% (n=27) of these patients hit it within 6 months, 84.8% (n=28) within 1 year, and 90.9% (n=30) within 2 years (Figure 3B). Thus, we found that patients significantly lowered their A1cs over time, with many able to bring values to ≤7.0% or ≤8.0%.

### *EHHOP Patients Maintain Reduced A1c Levels after Reaching Targets*

On average, the A1cs of patients that reached a goal of ≤7.0% would rise above 7.0% in approximately 1 year from achieving it (0.99 ±0.88 years, range: 3.07-0.08, n=14). When we examined values

***Figure 3.*** A1c Kinetics and Maintenance




(A,B) Of those that hit a goal of (A) ≤7.0% or (B) ≤8.0%, the proportion of patients that achieved these goals within (blue) or at (red) indicated timelines from baseline A1c is provided. (A) 61.1% (n=11) of patients reached ≤7.0% within 6 months of the baseline visit, 88.9% (n=16) within 1 year, and 94.4% (n=17) within 2 years. At the 6-month visit, 46.7% (n=7) of patients actually had an A1c ≤7.0%, 75.0% (n=9) at the 1-year, and 18.2% (n=2) at the 2-year. (B) Within 6 months, 81.2% (n=27) of patients reached ≤8.0%, 84.8% (n=28) within 1 year, and 90.9% (n=30) within 2 years. At the 6-month visit, 66.7% (n=20) of patients actually had an A1c ≤8.0%, 59.3% (n=16) at the 1-year, and 34.6% (n=9) at the 2-year.

of A1c at the 6-month, 1-year, and 2-year visits, 46.7% (n=7) of patients were at or below an A1c of 7.0% at 6 months, 75.0% (n=9) at 1 year, and 18.2% (n=2) at 2 years (Figure 3A). However, at the same time-points, 66.7% (n=20) of patients were still at or below and A1c of 8.0% at 6 months, 59.3% (n=16) at 1 year, and 34.6% (n=9) at 2 years (Figure 3B). Additionally, even though patients would first rise above an A1c of 7.0% approximately 1 year after achieving goal, they maintained mostly stable

values after hitting goal, with many of their A1c levels remaining below the 7.0% or 8.0% marks despite individual values crossing the ADA recommended threshold (Figure 4A-D).

*Medication Management in EHHOP Diabetics*

The correlation between A1c and intensity of medical therapy as measured by numbers of antihyperglycemics prescribed during the study period is provided in Table 3. Of the 44 patients examined, 9.1% (n=4) were never prescribed a hypoglycemic medication. Conversely, 90.2% (n=37) of patients were placed on metformin during the course of treatment, 58.5% (n=24) were prescribed other oral hypoglycemics such as sulfonylureas, and 41.5% (n=17) were prescribed insulin. In total, 25.0% (n=11) of patients were prescribed one medication, 45.5% (n=20) were given two, and 20.5% (n=9) were given three. Those with higher baseline A1c values were more likely to receive a greater number of medications over the course of study (r=0.4553, p=0.0019). For those who achieved an ADA goal of 7.0% (n=18), 22.2% (n=4) were not on any glycemic medication, 44.4% (n=8) were on one medication, 27.8% (n=5) were given two medications, and only 5.6% (n=1) was prescribed three medications.

Conversely, those that failed to reach a goal of ≤7.0% were almost 7 times more likely to be on 2-3 medications (odds ratio: 6.67, 95% CI: 1.75-25.44, p=0.006, see Figure 5)—15.4% (n=3) of patients who did not achieve an ADA goal of ≤7.0% were on one medication, 50.0% (n=13) were prescribed two, and 26.9% (n=7) were prescribed three. The most common prescriptions in patients who achieved goal were metformin (61.1%, n=11), with sulfonylureas (38.9%, n=7) and insulin (16.7%, n=3) less commonly prescribed. In contrast, 84.6% (n=22), 53.8% (n=14), and 53.8% (n=14) of patients who did not reach ≤7.0% were prescribed metformin, sulfonylureas, and insulin, respectively.

*Comparison to Other Clinics*

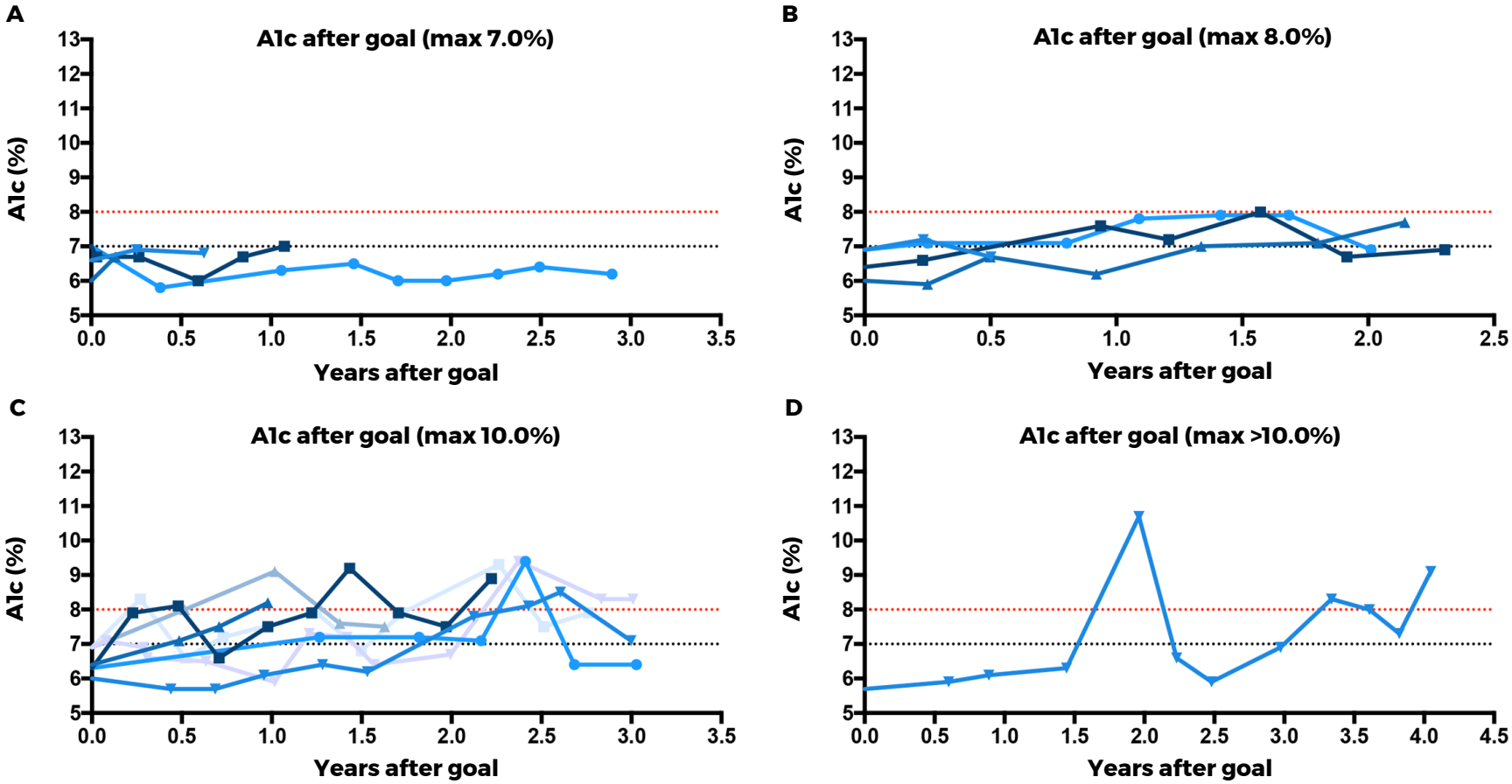
A recent report by the UCSD student-run free clinic[8] provides a good point of comparison for our A1c performance metrics, as their clinic has a similar demographic profile to our own (mean age 53 ±11.5 years old, 59% female, and 75% Hispanic). We compared the percentage of our patients at or below the ADA goal of 7.0%, as well as the percentage of patients with A1c values between 7.0-8.0%, and greater than 8.0%, 9.0%, or 10.0% with metrics reported by the UCSD student-run free clinic. Although our mean baseline A1c was higher than theirs at baseline (10.1 ±0.3 vs. 9.2 ±0.2, p=0.03), our metrics were comparable to data from UCSD's clinic (Table 4). An additional comparison to results of the National Health and Nutrition Examination Survey (NHANES 1999-2000),[17] which contains a different population than our own, including a mix of insured and uninsured patients (mean age of 59.3 ±13.8 years old, with 50% female, but only 6.1% Hispanic), resulted in similar outcomes, albeit with a higher proportion of patients at lower A1c levels noted in their larger population.

***Table 3.*** Diabetes Medications in EHHOP Patients

| **Diabetes Medications** | | | |
|---|---|---|---|
| **All patients (n=44)** | | | |
| No medication | | 9.1% (n=4) | |
| One medication | | 25.0% (n=11) | |
| Two medications | | 45.5% (n=20) | |
| Three medications | | 20.5% (n=9) | |
| Metformin | | 90.2% (n=37) | |
| Sulfonylureas | | 58.5 (n=24) | |
| Insulin | | 41.5% (n=17) | |
| **Achieved A1c ≤7.0% (n=18)** | | **Did not achieve A1c ≤7.0% (n=26)** | |
| No medication | 22.2% (n=4) | No medication | 7.7% (n=2) |
| One medication | 44.4% (n=8) | One medication | 15.4 (n=4) |
| Two medications | 27.8% (n=5) | Two medications | 50.0% (n=13) |
| Three medications | 5.6% (n=1) | Three medications | 26.9% (n=7) |
| Metformin | 61.1% (n=11) | Metformin | 84.6% (n=22) |
| Sulfonylureas | 38.9% (n=7) | Sulfonylureas | 53.8% (n=14) |
| Insulin | 16.7% (n=3) | Insulin | 53.8% (n=14) |

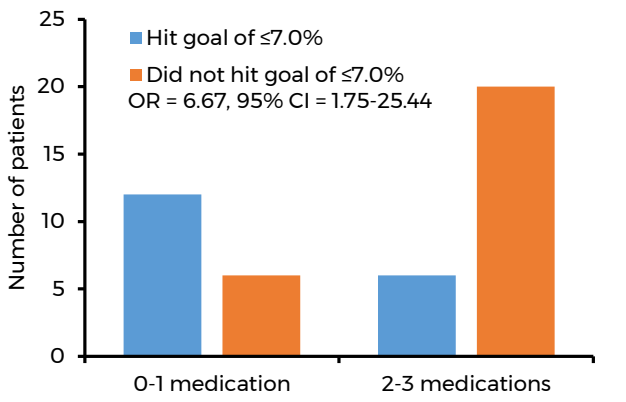
*The percentage of patients prescribed zero, one, two, or three glycemic medications is provided. Additionally, the percentage of patients receiving specifically metformin, sulfonylureas, or insulin, is provided. Medication information is specified for those patients who either reached the ADA-recommended target of ≤7.0% or failed to do so during the period of study.*

***Figure 4.*** A1c Maintenance after Achieving Goal




(A-D) A1c values for individual patients are mapped from the time they hit goal to their final recorded visit. The origin of the x-axis begins at the first time point an A1c ≤7.0% is reached. Black dashed line indicates the 7.0% A1c level; the red dashed line indicates the 8.0% A1c level. Each line represents an individual patient's A1c values. While some patient values remain below 7.0% (A) for the rest of the study, others rise above, but do not cross the 8.0% (B) or 10.0% (C) levels; one patient (D) saw values that rose above 10.0%. Many of the A1c levels remain below the 7.0% or 8.0% levels despite individual values crossing the ADA recommended threshold in each patient.

***Figure 5.*** Medications to Hit A1c Goals




For each patient we determined whether or not they hit an A1c ≤7.0% goal and the number of medications it took to either reach that goal or the number prescribed if they failed to reach it. Medication numbers were then divided into a low (0-1 medications) and high (2-3 medications) category for analysis and odds ratio (OR) calculation. A contingency table was made, and OR was calculated to be 6.67 (95% CI=1.75-25.44, p=0.006). Patients were more likely to be prescribed a greater number of medications if they did not reach an A1c of ≤7.0%. Fisher's exact test was used for comparison.

***Table 4.*** Comparison of Metrics to Other Studies

| A1c Range, % | EHHOP (n=44) | UCSD SRFC[1] (n=182) | NHANES 1999-2000[2] (n=414) |
|---|---|---|---|
| ≤7.0 | **20.5%** | 30.0% | 37.0%* |
| 7.0-8.0 | **18.2%** | 29.0% | 26.0%* |
| ≥8.0 | **45.5%** | 41.0% | 37.0%* |
| ≥9.0 | **34.0%** | 30.0% | 20.0% |
| ≥10.0 | **20.5%** | 19.0% | 12.4% |

*The proportion of EHHOP patients with values at indicated A1c ranges at the final visit in the study window were compared to the University of California-San Diego (UCSD) student-run free clinic (1: reference 8) and the National Health and Nutrition Examination Survey (1999-2000) (2: reference 17). EHHOP values are indicated in bold. Comparisons were done via Fisher's exact test using percentages and sample sizes provided in published studies. EHHOP values were comparable to both UCSD and NHANES, albeit NHANES had higher proportions of patients with A1cs ≤7.0%, 7.0-8.0%, and a lower percentage of those with values ≥8.0%. *p<0.05.*

## Discussion

In this study we show that uninsured adults with type II diabetes are able to lower their A1c levels with treatment at our student-run free clinic. Almost half of our type II diabetes patient population was able to hit an ADA-recommended target of ≤7.0%, and even higher proportions of patients are able to lower their levels to ≤8.0%. Patients who achieved ADA guideline glycemic targets did so on fewer medications, but were also more likely to have a lower baseline A1c. Nevertheless, those with higher baseline values achieved a substantial change in A1c. Once A1c dropped, patients were successfully able to maintain low and relatively stable values. While achieving glycemic control goals is difficult in underserved populations and free clinics,[18] these data suggest that a student-run free clinic such as EHHOP provides effective clinical management for patients with diabetes in achieving and maintaining target A1c goals.

While a substantial number of patients in our clinic were able to achieve the ADA-recommended goal of ≤7.0%, more than half of our patients remained above target. Alternatively, however, we were able to get a larger proportion of EHHOP patients to a less stringent goal of 8.0%. In order to bring a greater number of patients to ADA-recommended targets, we need to examine other aspects of care that we can improve. This may include more aggressive dietary management, home visits, and the engagement of community health workers and other community networks to assist with other strategies that may prove to be more effective than medical management alone. Indeed, since the advent of this study, numerous initiatives in employing students as nutrition-educators and engaging community health workers have been implemented. The effects of these additional resources should be examined in future studies of our care. It is clear that although we provide a multitude of medications for diabetes at low to no out of pocket cost, these are not the sole answer to managing diabetes in any population with a high prevalence of this chronic disease. Our study demonstrates that despite having the resources to prescribe an increasing number of medications to patients with diabetes, such patients were actually less likely to achieve glycemic targets than those on fewer medications. Clearly other more individualized strategies need to be exercised in such circumstances.[19]

As student-run free clinics increasingly become a safety net for uninsured patients,[1-3] it is imperative that these clinics not only strive for the best patient care and student education, but also assess and validate the effectiveness of their care. While previously, some have raised questions to as

to their effectiveness,[2,4] studies such as this join a growing body of literature[7-11] demonstrating that many student-run free clinics provide a high quality of care to the patients they serve. Indeed, despite the limitations inherent in this study's retrospective format, our findings encouragingly show an improvement in patient glycemic control over time. Future studies will continue to examine long-term diabetes quality of care at EHHOP as it is essential to track in the presence of a growing diabetic population.

**Acknowledgements**

We would like to thank Robert Rifkin, David Chiang, and Noa Simchoni from the EHHOP Research team for their guidance and advice throughout this study.

**Disclosures**

The authors have no conflicts of interest to disclose.

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