



Cal Poly Bioinformatics Research Group

A1c in Context: A Community-Based Approach to Addressing Type 2 Diabetes Mellitus Treatment Outcomes in Underserved Populations

Ashley Steenhausen, Tristan Dougherty, Elliot Kunz, Jaydon Chen, Dr. Jean Davidson
Department of Biological Sciences, California Polytechnic State University, San Luis Obispo

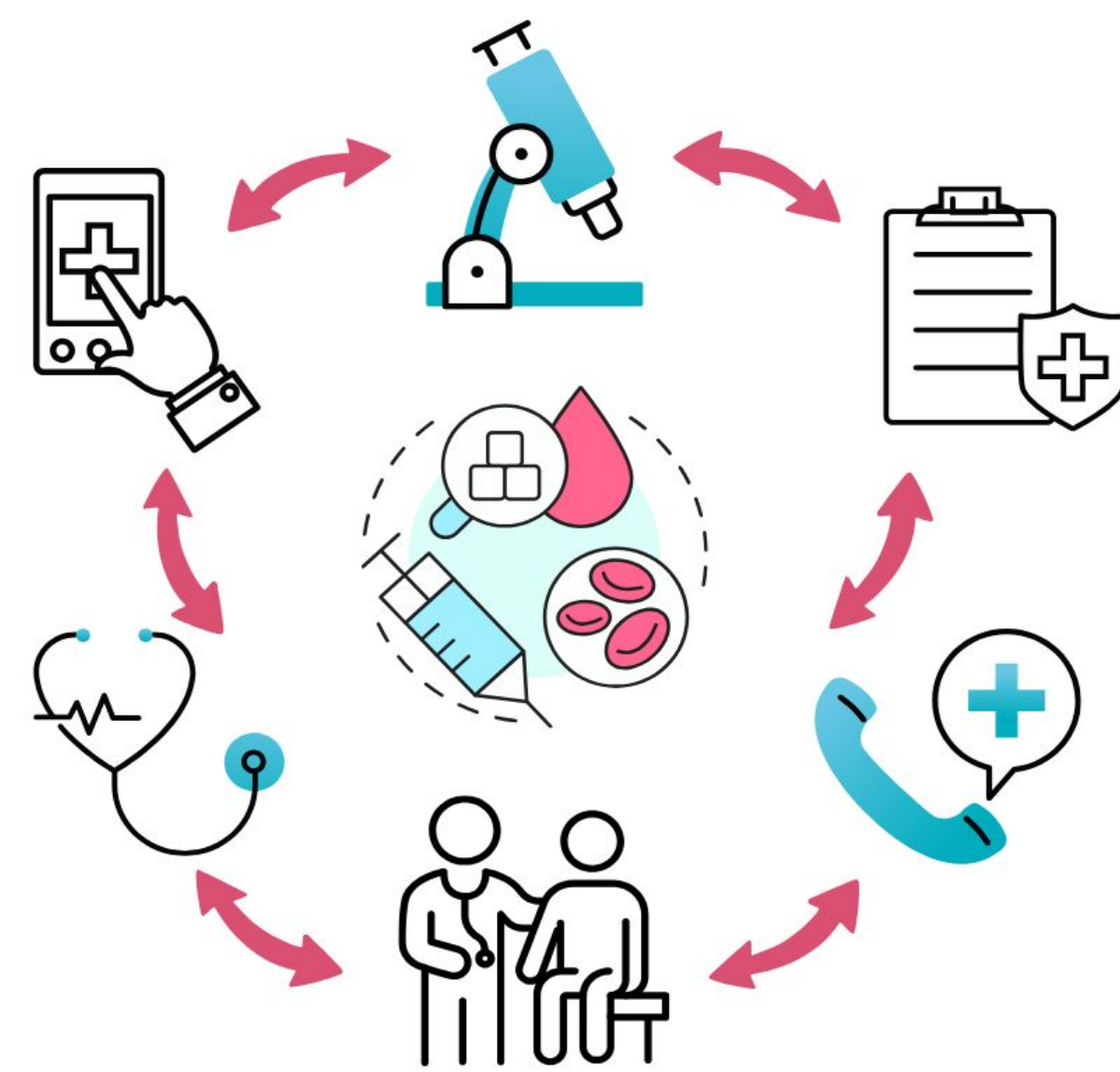


Introduction

SLO Noor Foundation operates free clinics that provide medical, dental, and vision care to uninsured adults in San Luis Obispo County and northern Santa Barbara County. The BiRG Lab (Bioinformatics Research Group) was tasked in tracking A1c levels to enable clinicians to evaluate the impact of prescribed medications and treatment protocols over time.

Methods

Electronic health records (EHR) were obtained from the Noor Clinic to evaluate longitudinal changes in hemoglobin A1c among patients with type 2 diabetes. Patients with at least two recorded HbA1c readings were included to allow evaluation of change over time. For each patient, baseline HbA1c was defined as the first recorded value and the follow up HbA1c as the most recent value. Patients were categorized into baseline glycemic groups based on initial HbA1c. Controlled (<5.5%), diabetic (5.5-8.9%), and at risk/ uncontrolled (≥9.0%). Clinically meaningful improvement was defined as a decrease in HbA1c of at least 0.5 percentage points between baseline and follow-up. Descriptive analyses were conducted to estimate the proportion of patients achieving improvement across baseline risk groups and stratified by age, city, and sex. Mean HbA1c trends across the calendar year were evaluated by baseline group. An interactive dashboard was created to track individual patient data to further assist clinicians in treatment protocol.



Mean HbA1c Over Time by Baseline Group

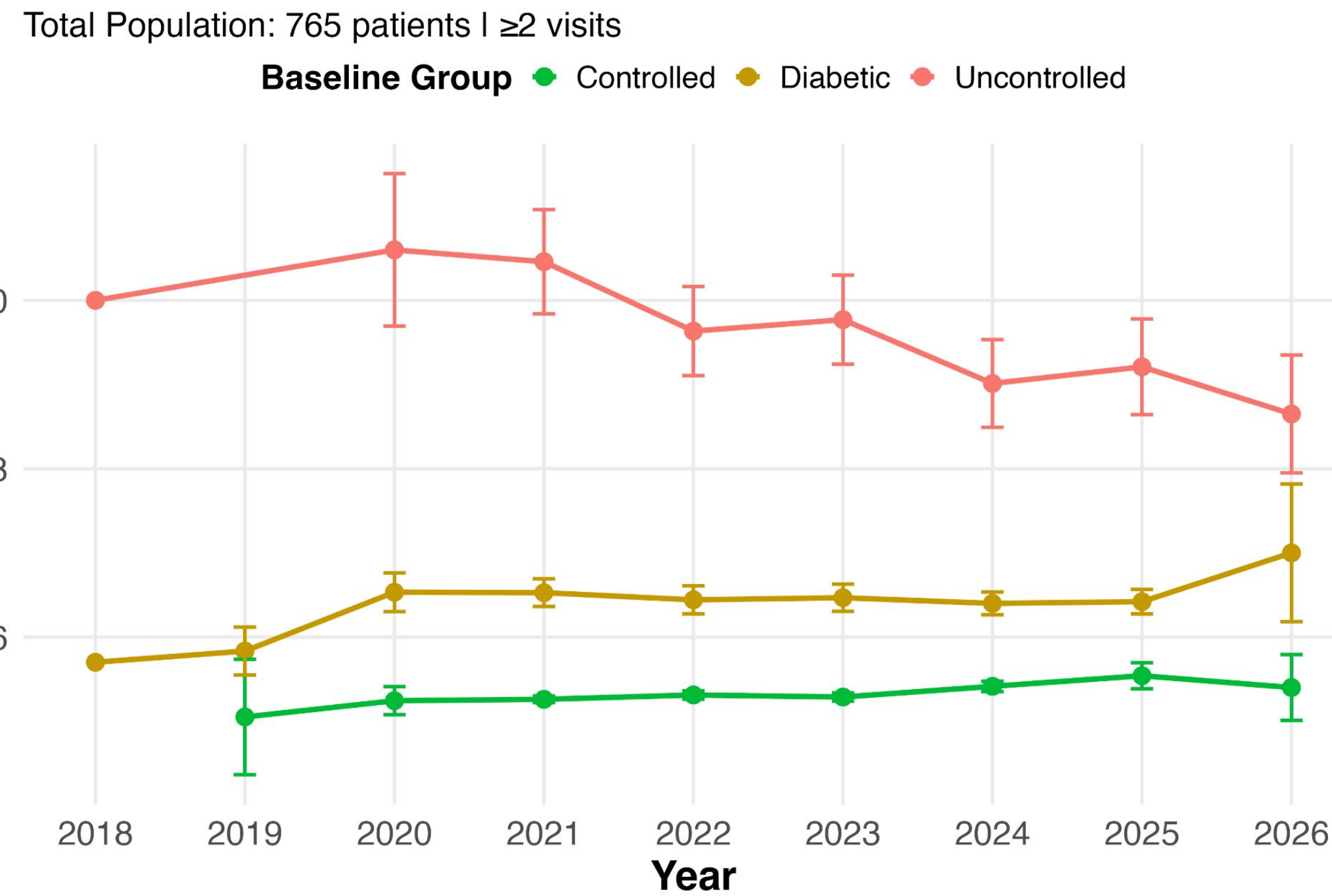


Figure 1: Mean HbA1c over time by baseline group among patients with ≥2 visits (N = 765). HbA1c declined in the At Risk / Uncontrolled group (≥9.0%) and remained stable in the Diabetic (5.5-8.9%) and Controlled (<5.5%) groups. Error bars indicate 95% CIs.

Clinically Meaningful HbA1c Change by Baseline Group

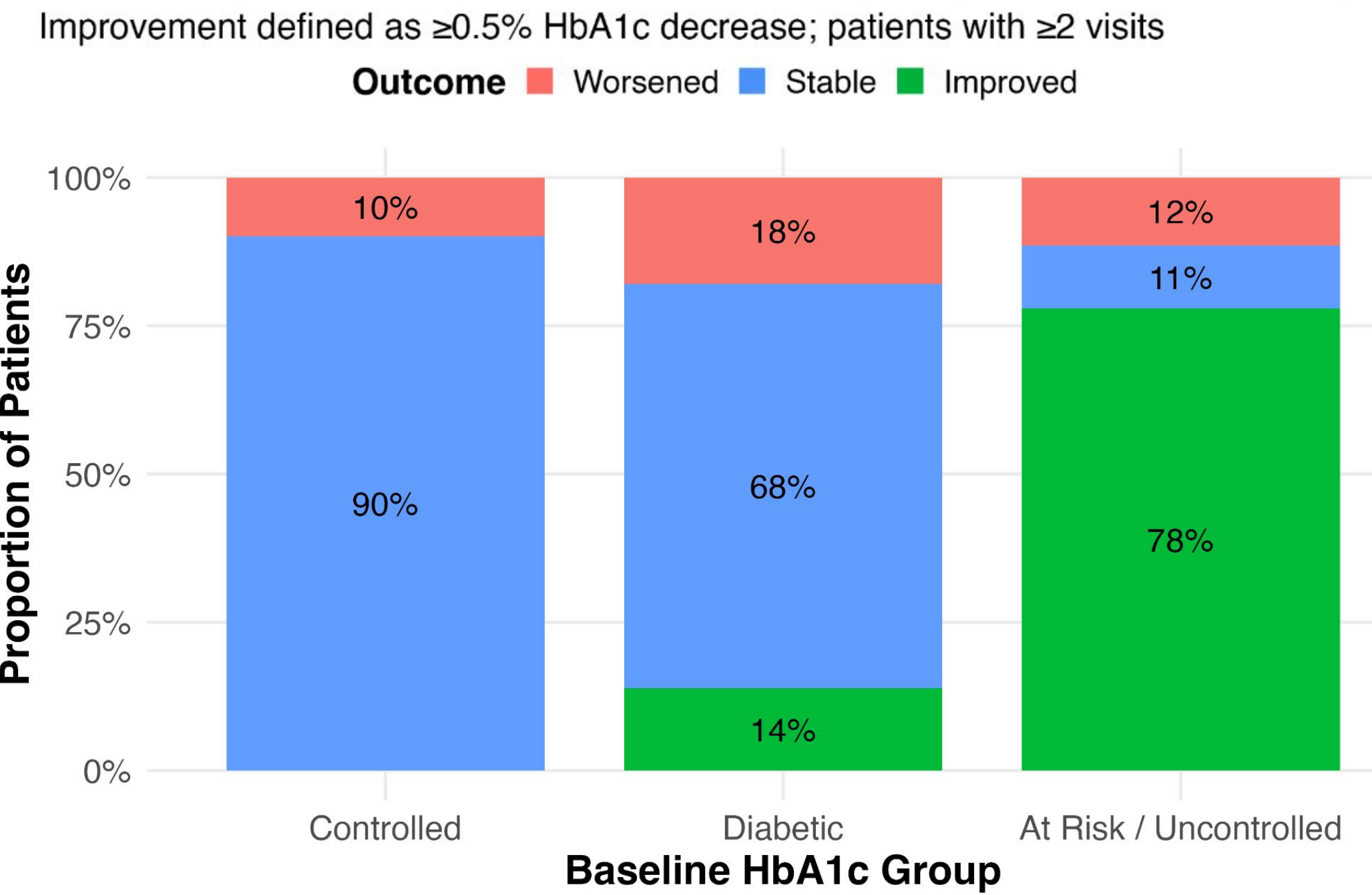


Figure 2: Distribution of HbA1c outcomes by baseline group among patients with ≥2 visits. Improvement (≥0.5% decrease) was highest in the At Risk / Uncontrolled group (~78%), while Controlled patients were largely stable (~90%).

Results

Among 765 patients with ≥2 HbA1c measurements, improvement (≥0.5% decrease) was highest in the At Risk / Uncontrolled group (≥9.0%; ~78%), compared to the Diabetic group (5.5-8.9%; ~14%), while Controlled patients (<5.5%) were largely stable (~90%). Improvement was higher in ages 51-56 (~27%) than <44 (~14%), slightly higher in males than females, and varied by city (~10-29%). Mean HbA1c decreased over time among higher-risk patients and remained stable in lower-risk groups.

Clinically Meaningful HbA1c Improvement by Age and Sex

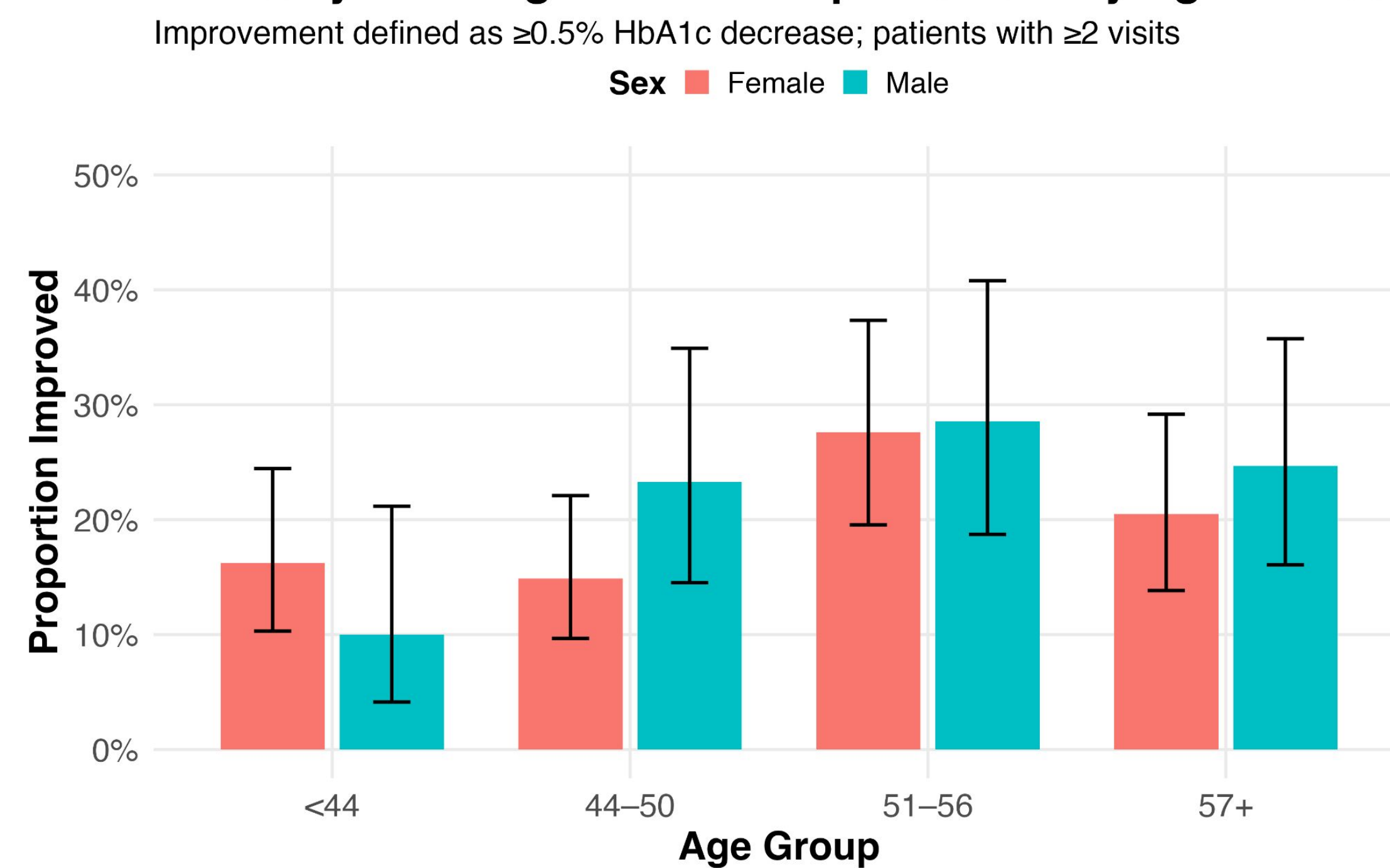


Figure 3: Proportion of patients achieving clinically meaningful HbA1c improvement (≥0.5% decrease) by age group and sex among patients with ≥2 visits. Improvement was highest in ages 51-56 and lowest in <44, with slightly higher rates in males than females. Error bars represent 95% confidence intervals.

Clinically Meaningful HbA1c Improvement by City

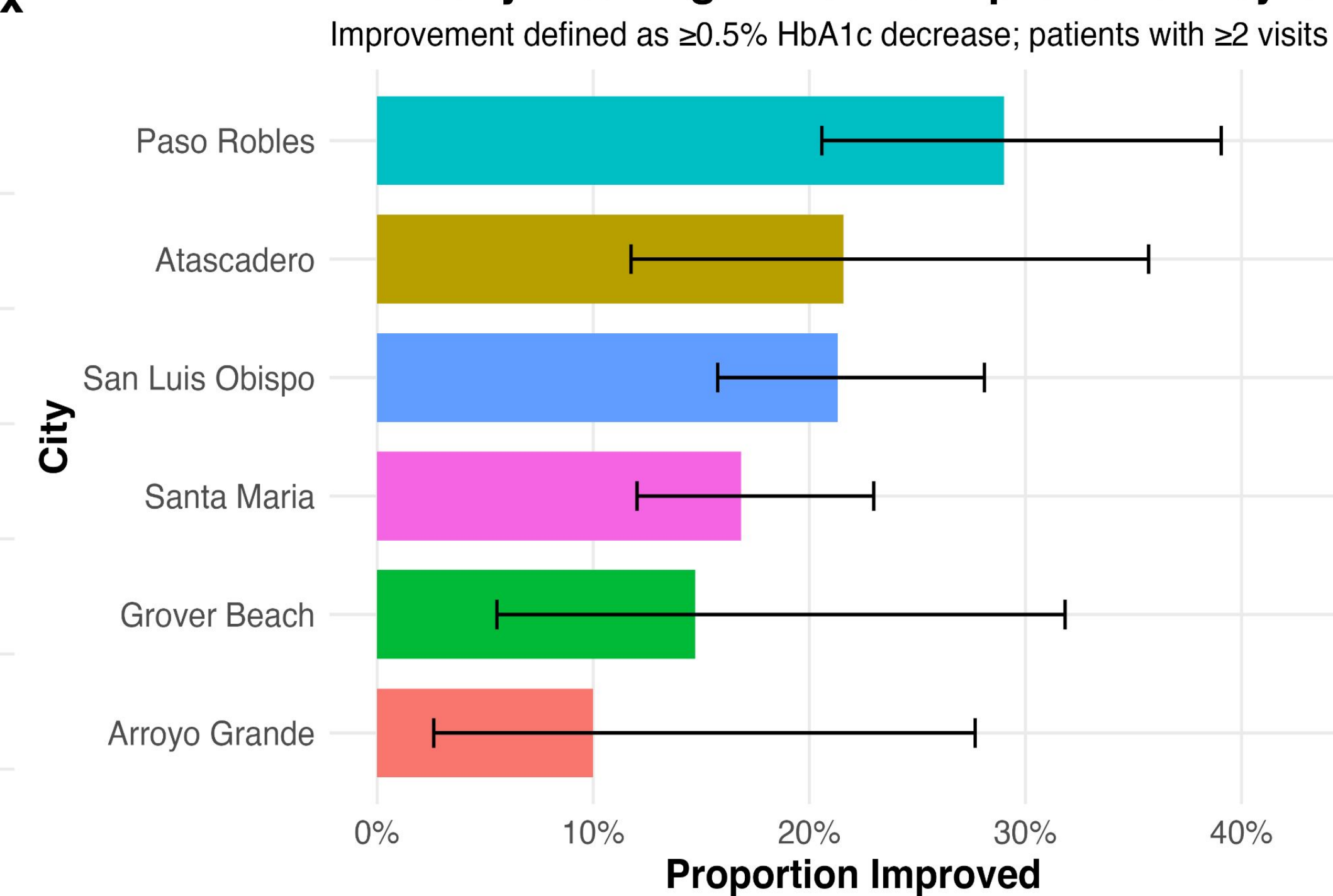


Figure 4: Proportion of patients achieving clinically meaningful HbA1c improvement (≥0.5% decrease) by city (≥30 patients per city) among patients with ≥2 visits. Improvement ranged from ~10% to 29%. Error bars represent 95% CIs.

Discussion

Overall, these results suggest that patients with higher baseline HbA1c who remain engaged in care at Noor Clinic experience meaningful improvements in glycemic control.

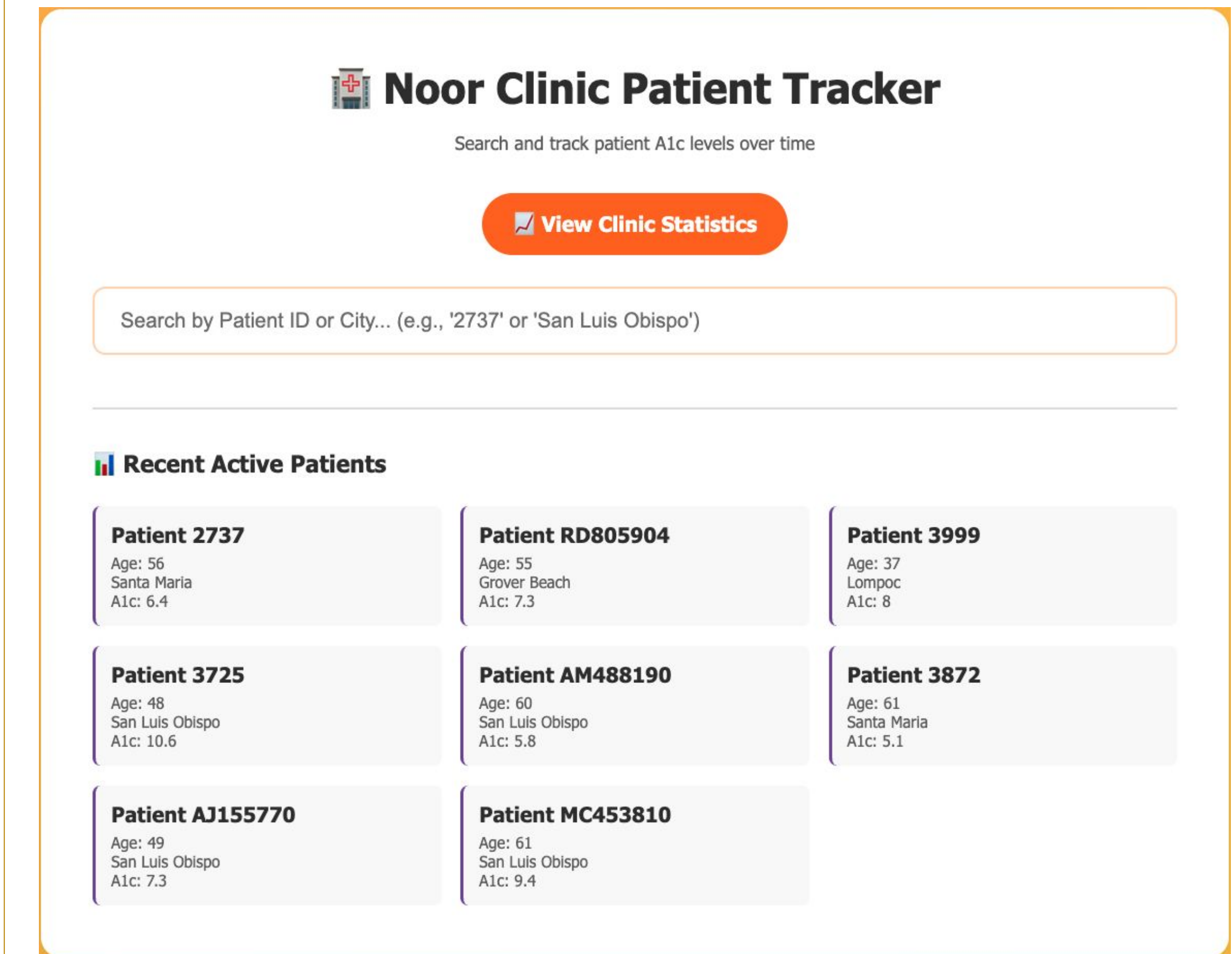


Figure 5: Interactive dashboard to track HbA1c trends for individual patients that can be used by physicians.

Future Directions

The creation of the interactive dashboard will allow clinicians to effectively track glycemic levels of patients with the only requirement being their patient id number. Future evaluations and scheduling will be simplified and make the clinic more efficient.

Acknowledgements

A special thanks to the SLO Noor Foundation, specifically Anne Pagent and Barbara Alarcon. We would also like to thank the William and Linda Frost Fund.

