# Digging Deep into Diabetes: Barriers to Achieve Glycemic Control in Diabetic Patients in a Resident-run Clinic

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## Introduction

Diabetes mellitus (DM) affects over 29 million Americans with an estimated annual cost of $245 billion. Diabetes in young adults, multiple comorbidities, financial and/or social hardships pose challenges to achieve target hemoglobin A1c (HbA1c). We investigated the barriers to achieve the HbA1c goal, and implemented a customized intervention strategy to improve glycemic control in diabetic patients in a federally funded resident-run outpatient clinic in St. Louis, Missouri.

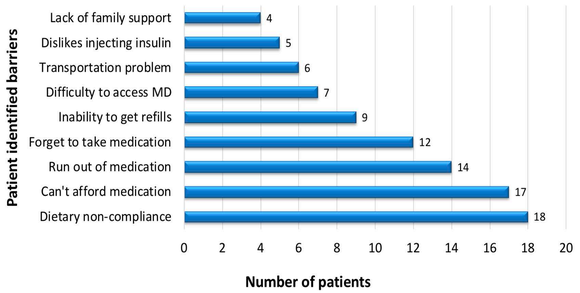
## Methods

Approximately one-fourth of our patients in our clinic have diabetes and 29% of them had a HbA1c ≥ 9.0 in 2016. We reviewed these patients' medical records and interviewed them to identify the barriers in achieving HbA1c of less than 9.0 We aimed to improve hemoglobin A1C levels as well as assess change in patient knowledge of disease, perceived self efficacy of disease management, confidence level regarding treatment plan, and patient's declaration of barriers to self care of diabetic management. Our intervention included telephone follow up to ensure patients had adequate medication and diabetic supplies, they were keeping up with clinic appointments, need for education/counseling sessions with a dietician/nutritionist, diabetes education at clinic visits and offering immediate help during every 5 week follow up phone calls. Social services were also employed to address the issues of transportation, medication costs and insurance coverage.

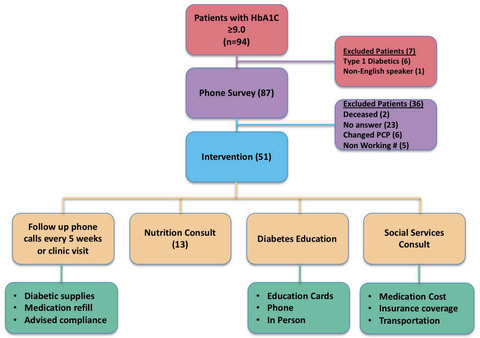
### Table 1: Patient Characteristics

| | Pre-intervention | Post-intervention |
|---|---|---|
| | N = 87 | N = 51 |
| Age (average, in years) | 52 | 53 |
| Gender | Male = 44% (39)<br>Female = 56% (48) | Male = 49% (25)<br>Female = 51% (26) |
| Race | African American = 95% (82)<br>Caucasian = 2% (2)<br>Other = 3% (3) | AA = 92% (48)<br>Caucasian = 2% (1)<br>Other = 6% (2) |
| On statin | 84% (73) | 90% (47) |
| On aspirin | 70% (61) | 81% (42) |
| Podiatry exam within last 12 months | 18% (16) | 21% (11) |

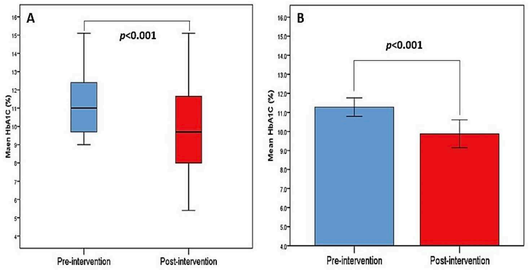
### Figure 1: Patient identified barriers to diabetes control



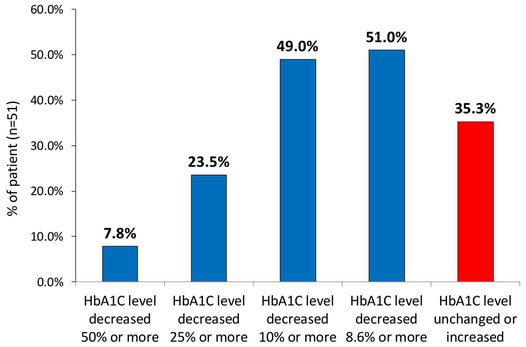

### Figure 2: Intervention Strategy



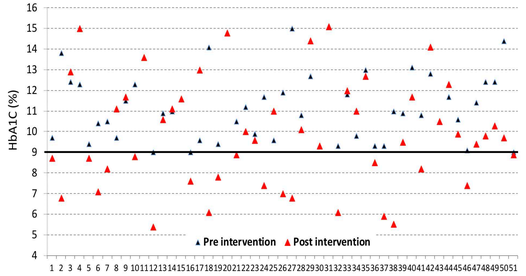

### Figure 3: Changes in HbA1C in paired sample analysis




### Figure 4: Changes in HbA1C from baseline after the intervention phase




### Figure 5: Changes in HbA1c in paired sample (pre-intervention vs post-intervention)




## Results

A total of 94 patients had HbA1C of ≥ 9.0 in 2016. Of them, 87 patients qualified for the study, 95% were African American with a female predominance (56%). Average age was 52 years and average BMI was 33.32 kg/m2. Average HbA1c was 11.5%. We were able to reach 65 patients to interview. Of those reached, 98% knew they had DM, 83% knew what a HbA1c was, but only 32% knew their last HbA1c value, and 83% reported medication compliance. Approximately 64% of these patients were treated with long-acting insulin (40.6% on insulin detemir and 22.9% on insulin glargine). About 67% of patients were on metformin. Major obstacles to compliance included difficulty in following a diabetic diet (28%), inability to afford medications (26%), inadequate supply or running out of medications (22%) and forgetting to take medication regularly (18%). Fourteen percent of patients had difficulty getting medication refills and 11% had difficulty accessing the physician for either medication/ supply refill or to schedule follow up appointments. In the intervention phase, a total of 51 patients were included (thirty-five patients were excluded due to inability to reach them, changing PCP, or deceased). For the next 6 months, we employed customized, patient-directed multi-modal approach. After the intervention phase, re-evaluation of the HbA1C in paired sample comparison showed that the average HbA1C went down by 1.41% (11.28 vs 9.87, p<0.01). Among the patients included in the intervention group, approximately 8% had HbA1C reduced by ≥ 50% from their baseline, 23% had HbA1C reduced by ≥ 25% from their baseline, 49% had HbA1C reduced by ≥10% from their baseline. However, about one-third (35%) of the patients included in the intervention group had HbA1C either unchanged or increased from their pre-intervention baseline. The scatter plot (Figure 5) shows HbA1C for each patient during their pre- and post-intervention phase.

## Conclusions

Our study shows that a strategically designed, patient directed customized intervention can have a strongly positive impact on patient's diabetic control and overall health condition.

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