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# Quality Improvement of Diabetic Care at a Resident Clinic

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# QUALITY IMPROVEMENT OF DIABETIC CARE AT A RESIDENT CLINIC

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## Abstract

Our objective was to develop a quality improvement project on diabetes mellitus at our internal medicine residency clinic. Residents developed projects aimed at improving an aspect of diabetic care. Continuity of care, achievement of clinical targets, no-show rates, patient knowledge of diabetes, and preventive care were evaluated. Our data was obtained with a questionnaire and a retrospective review of medical records. A different provider was scheduled about every 1.78 visit. The no-show rate was 25.4%. About half of patients identified goal hgbA1c and BPs, and 35% and 60% achieved their hgbA1c and SBP goals respectively. Nearly all of the charts planned for screening exams. We concluded that our clinic needs to improve diabetes education, reaching clinical targets, continuity of care and no-shows. Incorporating a QI project into the clinic with one disease such as diabetes is an efficient way to include practice based learning into an internal medicine residency's curriculum.

## Background

To improve graduate medical education, the ACGME developed six core competencies that accredited internal medicine residency programs are required to demonstrate including practice based learning and improvement and systems-based practice. One way in which these competencies are achieved is through quality improvement (QI) initiatives. This paper outlines the experience of the internal medicine residency program at Thomas Jefferson University Hospital (TJUH) in developing a QI project on diabetes mellitus in the resident clinic.

Our internal medicine residents gain continuity clinic experience at three ambulatory sites. The majority of residents (84%) are assigned to work at the Jefferson Hospital Ambulatory Practice (JHAP). Residents are scheduled for approximately 130 half-days over three years, which are organized by day of the week. To incorporate QI into the curriculum, a QI committee consisting of 1-2 leaders per clinic day was created. The committee selected an area of medicine on which to focus the overall project, and each clinic day developed individual projects.

Diabetes mellitus was chosen as the primary disease for the project because it is prevalent in the JHAP patient population. Affecting 23.5 million adults in the U.S., diabetes is primarily treated by primary care providers.<sup>1-2</sup> We anticipated that focusing on this disease would provide the opportunity to improve quality of care for a significant number of patients. Diabetes also has several well-defined clinical targets that could easily be assessed in these patients.

Successful QI projects in residency programs have been reported in the literature. The internal medicine residency program at Yale University implemented a curriculum in which

internal medicine residents were assigned quality care readings, participated in weekly meetings, and were subject to audits of their patients' medical records. Outcomes related to diabetes targets were compared with those of residents who were exposed to the traditional curriculum. The patients of residents in the piloted curriculum had significant improvements in hgbA1c and LDL.<sup>3</sup> Another study by the Northeast Iowa Family Practice Clinic showed that implemented QI interventions improved hgbA1c measurements.<sup>4</sup>

Reaching clinical targets of blood pressure, LDL, and hgbA1c has been shown to improve diabetic comorbidities and complications. Multiple randomized clinical trials including the UK-PDS and ADVANCE have established that lowering blood pressure and LDL of patients with DM decreases the risk of adverse cardiovascular events.<sup>5-9</sup> In addition, hgbA1c is increasingly used to monitor patients' glucose and reflects a patient's risk for microvascular disease<sup>10</sup>. There is evidence of an association between hgbA1c control and decreased progression of nephropathy and neuropathy as well as beneficial effects on cardiovascular disease risk.<sup>11-12</sup>

Care of diabetic patients also includes screening for complications with foot exams, ophthalmology exams, and urine microalbumin. In a systematic review of the literature, comprehensive foot care to prevent diabetic foot ulcers and intensified foot ulcer therapy were cost-effective.<sup>13-14</sup> Microvascular damage to blood vessels in diabetic patients' retinas causes diabetic retinopathy even in patients with optimal glucose control. Routine screening by annual fundus photography or dilated ophthalmologic exams is critical because few symptoms exist before vision loss and early treatment can prevent vision loss.<sup>15-16</sup> Similarly, microvascular damage in the kidney nephrons of diabetic patients causes nephropathy. Early detection of renal damage with urine microalbumin analysis can provide prognostic implications and increase measures to prevent renal failure.<sup>17-18</sup>

The overall goal of our QI project was to investigate and assess care of diabetic patients at the JHAP clinic, and to use this information to improve the quality of their care. Each clinic day developed the following projects related to diabetic patients in order from Monday through Friday: continuity of care, achievement of clinical targets, no show rates, patient knowledge of diabetes care and outcomes, and preventive care.

## Methods

### Participants

Ninety-nine of our 117 categorical residents have continuity clinic at JHAP and participated in one of the QI projects. Residents were grouped according to their clinic day and each

group developed an individual project aimed at improving an aspect of diabetic care. About 30% of our 7,500 JHAP patients have the diagnosis of diabetes. These patients primarily reside in the inner city and are insured through Medicare or Medicaid. Most of our data, except for the questionnaire mentioned below, was obtained through a retrospective review of our patients' medical records. The QI project was approved by the Institutional Review Board.

### Monday Clinic

Residents collected data regarding patients' continuity of care. For three months starting in November 2009, they recorded data for scheduled diabetic patients onto a password protected, shared database. The electronic charts of each scheduled patient were retrospectively reviewed for the number of visits and providers in the past year from the date of the scheduled visit. Each patient was identified with a random three digit number. The first 30 diabetic patients scheduled for a Monday visit at JHAP within the 3 month period were included in the review.

### Tuesday Clinic

Residents examined patients' clinical targets including hgbA1C, LDL, and blood pressure. Each Tuesday, one resident reviewed the chart of each diabetic patient scheduled for a visit. Each patient's most recent 2 blood pressures readings, LDL, and hgbA1C were recorded. The systolic blood pressure, LDL, and hgbA1c goals were <140mmHg, <100mg/dl, and <7mg/dl, respectively. In addition, any documented intervention for unmet targets was also noted.

### Wednesday Clinic

To estimate the clinic's overall diabetic no-show rate, a list of diabetic patients was generated via the electronic medical record. This system was queried for those patients for whom a diabetes mellitus ICD-9 code (250.xx) was billed from December 2009 to April 2010. The electronic charts of these patients were reviewed to determine whether the patient attended the scheduled visits within this time period. Each visit was considered a single entry; cancellations and rescheduled visits were not included in the no-show rate.

We also attempted to contact a small, randomly selected sub-group of 30 patients to determine the reason for the absence.

### Thursday Clinic

To evaluate patients' knowledge of their disease process and goals of care, we developed a questionnaire based on information from the American Diabetes Association's "Standards of Medical Care in Diabetes 2010".<sup>9</sup> The survey consisted of 17 multiple choice questions with 5 themes: diabetic monitoring, symptoms, prevention, treatment, and complications. Questions regarding goal blood glucose, hgbA1c, blood pressure, and preventive

measures were included. The questionnaires were given to 31 participants from January to April 2010. The patients filled out a questionnaire after their appointment and answers were discussed with a QI leader.

### Friday Clinic

We identified 30 diabetic patients by querying the electronic medical record for a diabetes mellitus ICD-9 code. Patient charts were reviewed to determine if residents documented plans for as well as results of foot exams, eye exams, and urine microalbumin within the past year.

## Results

### Monday

Data was collected on 30 patients. Half were male and half were female. Patients were scheduled for 6.41 visits in the past year with a mean of 3.59 providers. Patients were scheduled for a different provider a mean of every 1.78 visits.

### Tuesday

Our patients were 37% male with a mean age of 54.1 years. Less than half met their hgbA1c and LDL goals and only slightly more than half reached their systolic blood pressure goal (Table 1). While an intervention was documented for the majority of patients who did not reach these goals, more than half of those with LDL levels greater than 100 did not have a change in their cholesterol management (Table 2). Patients who had interventions lowered their hgbA1c and LDL but increased their SBP (Table 3).

### Wednesday

During the four month period mentioned above, 205 appointments for diabetic patients were scheduled for visits at JHAP. For 52 (25.4%) of those visits, the patient did not attend and had not cancelled the appointment. A few of the no-show visits were missed by the same patient. Two patients missed 4 appointments each while another 2 patients did not attend three sessions each. These 4 patients comprised 27% of the absences.

Of the 30 randomly selected patients attempted to be called, 17 could not be reached despite numerous attempts. Five patients reported they had forgotten their appointment times and 2 stated that they were not aware of their appointments. Two were admitted to the hospital at the time of their missed appointment. The remaining 4 patients stated various reasons for missing their appointments including personal emergencies.

### Thursday

Thirty-one patients participated in the diabetes questionnaire. Less than half of the patients knew their medications. Seventy-seven percent of patients recognized symptoms of

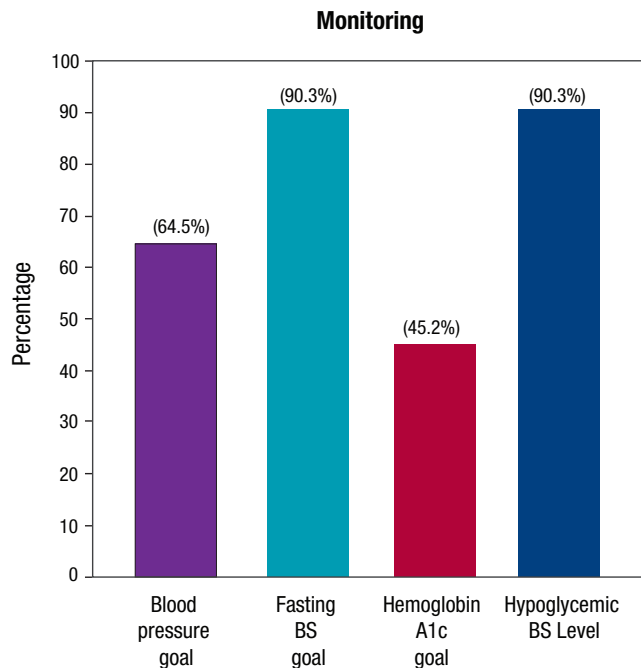


Figure 1. Percent of patients who recognized clinical goals

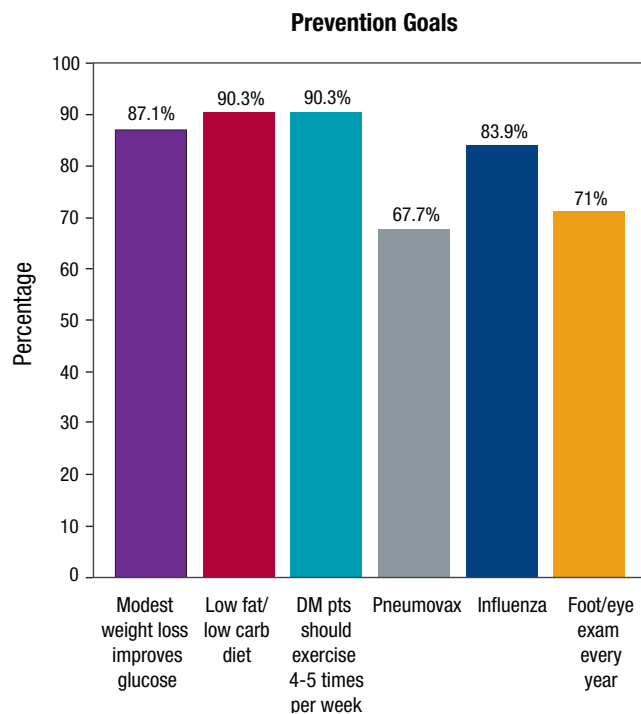


Figure 2. Percent of patients who recognized lifestyle

hypoglycemia and 74.2% recognized hyperglycemic symptoms. Almost all of the patients identified fasting blood sugar goals,

Variables	Mean	Median	% Meeting Goal
HgbA1C (mg/dl)	8.6	8.1	34.70%
LDL (mg/dl)	101	103	46.80%
SBP (mm Hg)	132.3	130	60.40%

Variables	Intervention	No Intervention	Total
HgbA1C >7	30 (73.1%)	11 (26.9%)	41
LDL > 100	16 (42.1%)	22 (67.9%)	38
SBP > 140	16 (59.3%)	7 (40.7%)	23

Variables	Intervention	No Intervention	Average
HgbA1C >7	-0.32	0.65	-0.02
LDL > 100	-50.1	-17.8	-31.4
SBP > 140	4.7	-18.4	-4.9

but only about half were able to identify blood pressure and hgbA1c targets (Figure 1). One third of patients were unaware of the importance of the pneumonia vaccine but 80% of patients acknowledged the importance of the influenza vaccine. Almost all of the patients acknowledged the importance of lifestyle changes. Seventy percent were aware of the need for regular eye and foot care (Figure 2).

Friday

Most of the 30 charts reviewed included a plan for foot and eye exams as well as testing for urine microalbumin. Eighty-three percent of the charts included a plan for a foot exam; 93% included a plan for an eye exam; and 90% included a plan for urine microalbumin testing. A slightly smaller percentage of the charts included documentation of the exam results: 77% included documentation of a foot exam; 67% included an eye exam; 70% included results of a urine microalbumin documented within the past year. Therefore, 92% of patients with a planned foot exam received it, 71% of patients referred for an eye exam had one done, and 78% of patients with a urine microalbumin ordered had the test done.

Discussion

In our QI project, we found that our diabetic patients had poor continuity of care and no show rates, generally failed to meet LDL and hgbA1c targets, and had inadequate knowledge of their disease and management, but had adequate screening for foot, eye, and renal complications.

Patient knowledge about their diabetes management was inconsistent. Most patients were unable to identify their diabetic medication or their clinical target goals. The inadequate patient understanding is likely a factor in their failure to meet clinical targets. There are multiple reasons to explain the patients' lack of understanding. Given the demographics of our patient population, literacy and level of education may limit the amount of information that the patient understands.

Perhaps the most alarming finding in the data was the numerous missed appointments and poor continuity of care. Although most JHAP patients are assigned a primary care provider, our patients were seen by a different provider approximately every two visits and missed, on average, a quarter of their visits. Although no causal inferences can be made with our data, an association between lack of visits with a PCP and failure to meet clinical targets is likely. Continuity of care has been shown to be associated with improvement in glucose control.<sup>2,20</sup> Missed appointments have similarly been associated with poorer glycemic control, medical adherence, and adverse outcomes.<sup>21</sup> However the causal relationship is unclear. Does lack of appointments with a regular provider lead to inadequate diabetic management or is noncompliance reflected in both missed appointments and poor diabetic management? Poor social and financial support in our patient population likely also contributes to the inadequate diabetic care.

The reason for our clinic's poor continuity of care and no show rates are multiple. Continuity of care is difficult in any resident clinic given the variable schedule of residents and the demographics of our patient population who may have limited ability to attend doctor visits. Our clinic's absenteeism is similarly multifactorial. With many unsuccessful attempts to contact a subgroup of patients, we extrapolated that our patient population is difficult to reach. The incorrect contact information reflects other barriers to their access to diabetes management.

There are several limitations to the project. First, the number of the patients included in each project was small and the population includes primarily urban, underserved patients. Although about 30% of JHAP patients have diabetes, some of the QI groups had difficulty finding patients to add to their database. Some of the projects required each resident who had a diabetic patient to add their patient to the database. Given the time restraint in our ambulatory clinic, some residents may have missed the opportunity to add the patients' data. Another issue with the individual projects was the variety of the projects. Some clinic days' projects were more manageable than other projects.

Each individual project had limitations as well. Tuesday clinic only considered systolic not diastolic blood pressure. Additionally, the project did not define "intervention" which may have allowed subjectivity amongst the various residents who reviewed the charts for an intervention. The questionnaire used in the Thursday project is limited by including multiple choice questions which enabled guessing and is not a validated

survey. Finally, both the Tuesday and Friday project data depended primarily on documentation and may have included incorrect information.

Overall these QI projects were a successful way to incorporate practice based learning and improvement and systems-based practice into an internal medicine curriculum. Creating a QI team enabled several residents to take leadership positions and create individual projects. The project was easily incorporated into the ambulatory clinic curriculum and nearly all residents were able to participate

Given our data, we have implemented a number of changes to the JHAP clinic to improve the care provided to our diabetic patients. To improve our no-show rate, the medical assistants call patients a day prior to their appointment. To improve continuity of care and decrease the number of providers each patient sees, we assigned residents into blocks of 4 each clinic day and assigned patients to both a PCP and block. We have instituted a "diabetes mentor," a resident designated on a daily basis whose primary role is to provide diabetic education to each scheduled diabetic. This change is based partially on the results found previously in other resident clinics, which found that working in small teams combined with targeted patient education reduced no-show rates.<sup>22</sup> After one year of these interventions, we plan to review the same data to evaluate if our changes improved our diabetic care.

## Conclusion

In conclusion, incorporating a QI project into the ambulatory clinic practice and creating individual projects with one disease process such as diabetes is an efficient way to include practice based learning into an internal medicine residency program's curriculum. We found that our JHAP clinic needs to continue to improve diabetes education, screening, and reaching clinical targets as well as improve our continuity of care and no show rates. These types of intervention strategies provide residents essential skills as they move into practice and work to improve the care of all of their patients.

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## References

- Centers for Disease Control and Prevention (CDC). National Diabetes Fact Sheet, 2007: General Information, <http://www.cdc.gov/diabetes/pubs/estimates07.htm#2>, Accessed September 27, 2011.
- Parchman ML, Pugh JA, Noeh PH, et al. Continuity of care, self-management behaviors, and glucose controls in patients with type 2 diabetes. *Med Care* 2002;40(2):137-144.
- Holmboe ES, Prince L, Green M. Teaching and improving quality of care in a primary care internal medicine residency clinic. *Acad Med* 2005;80(6):571-577.



4. Sutherland JE, Hoehns JD, O'Donnell B, et al. Diabetes management quality improvement in a family practice residency program. *J Am Board Fam Pract* 2001;14(4):243-251.
5. Adler AI, Stratton IM, Neil HA, et al. Association of systolic blood pressure with macrovascular and microvascular complications of type 2 diabetes (UKPDS 36): prospective observational study. *Brit Med J* 2000;321:412-419.
6. Hansson L, Zanchetti A, Carruthers SG, et al. Effects of intensive blood-pressure lowering and low-dose aspirin in patients with hypertension: principal results of the Hypertension Optimal Treatment (HOT) randomized trial. *Lancet* 1998;351:1755-1762.
7. Patel A, MacMahon S, Chalmers J, et al. Effects of a fixed combination of perindopril and indapamide on macrovascular and microvascular outcomes in patients with type 2 diabetes mellitus (the ADVANCE trial): a randomised controlled trial. *Lancet* 2007;370(9590):829-840.
8. JNC 7. National High Blood Pressure Education Program. Seventh Report of the Joint National Committee (JNC) on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *JAMA* 2003;289(19):2560-2571. <http://www.nhlbi.nih.gov/guidelines/hypertension/jnc7full.pdf>
9. American Diabetes Association. Standards of Medical Care in Diabetes - 2010. *Diabetes Care* 2010;33:s11-s61.
10. Reichard P, Nilsson B. The effect of long-term intensified insulin treatment on the development of microvascular complications of diabetes mellitus. *N Engl J Med* 1993;329(5):304-309.
11. Barr C. Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications Research Group. Retinopathy and Nephropathy in patients with type 1 diabetes four years after a trial of intensive therapy. *N Engl J Med* 2000;342:381-389.
12. The Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications (DCCT/EDIC) Study Research Group. *N Engl J Med* 2005; 353:2643-2653.
13. Li R, Zhang P, Barker LE, et al. Cost-effectiveness of interventions to prevent and control diabetes mellitus: a systematic review. *Diabetes Care* 2010;33(8):1872-1894.
14. Apelqvist J, Larsson J. What is the most effective way to reduce incidence amputation in diabetic foot? *f* 2000;16 (Suppl. 1):S75-S83.
15. Bragge P, Gruen RL, Chau M, et al. Screening for presence or absence of diabetic retinopathy: a meta-analysis. *Arch Ophthalmol* 2010;129(4):435-444.
16. Kahn HA, Leibowitz HM, Ganley JP, et al. The Framingham Eye Study. I. Outline and major prevalence findings. *Am J Epidemiol* 1977;106(1):17-32.
17. Mogensen CE. Microalbuminuria as a predictor of clinical diabetic nephropathy. *Kidney Int* 1987;31:673-689.
18. Mogensen CE, Keane WF, Bennett PH, et al. Prevention of diabetic renal disease with special reference to microalbuminuria. *Lancet* 1995;346(8982):1080-1084.
19. Qaseem A, Vijan S, Snow V, et al. Glycemic control and type 2 diabetes mellitus: the optimal HgA1c targets. A guidance statement from the American College of Physicians. *Ann Intern Med* 2007;147:417-422.
20. Mainous AG, Koopman RJ, Gill JM, et al. Relationship between continuity of care and diabetes control: evidence from the Third National Health and Nutrition Examination Survey. *Am J Public Health* 2004;94(1):66-70.
21. Karter AJ, Parker MM, Moffet HH, et al. Missed appointments and poor glycemic control: an opportunity to identify high-risk diabetic patients. *Med Care* 2004;42(2):110-105.
22. Johnson BJ, Mold JW, Pontius JM, et al. Reduction and management of no-shows by family medicine residency practice exemplars. *Ann Fam Med* 2007;5:534-539.

*"Simian Portrait"*

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