

# Interdisciplinary Diabetes Care: A New Model for Inpatient Diabetes Education

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## ■ ABSTRACT

A patient-centered interdisciplinary diabetes care model was implemented at Vidant Medical Center in Greenville, N.C., a 909-bed tertiary care teaching hospital, for the purpose of providing all patients with diabetes clear and concise instructions on diabetes survival skills. Survival skills education during hospitalization is needed for safe transition to community resources for continued and expanded diabetes self-management education. This article describes the process used to develop, implement, and evaluate the model. This initiative achieved substantial cost savings, with no significant changes in length of stay (LOS) or diabetes readmission rates. This patient-centered model demonstrates how a team of interdisciplinary health care professionals can integrate services in providing care for a large population of patients with chronic disease.

Acknowledging the challenges of teaching diabetes self-management in the hospital setting, the American Diabetes Association suggests that teaching diabetes “survival skills” is a reasonable approach to provide sufficient information and training to enable a safe transition to home (1). Outpatient diabetes programs are the preferred venue for teaching lifestyle modifications required for optimal diabetes self-management. Connecting patients with an outpatient diabetes education program in the community is an important part of discharge planning for patients with diabetes. This article describes the process used to evaluate and redesign an interdisciplinary inpatient diabetes education program to match patient and institutional needs and link patients to outpatient community resources.

Vidant Medical Center (VMC) (formerly Pitt County Memorial Hospital) is a 909-bed tertiary care academic medical center located in

eastern North Carolina. The institution serves a 29-county area, in which the population with diabetes is ~25% higher than the national average (2). Twenty-seven percent of patients discharged from VMC have diabetes, accounting for >12,000 discharges annually. On an average day, one of three patients at the facility has an order for insulin. In the majority of these patients, type 2 diabetes is listed as a secondary diagnosis.

The VMC Diabetes Program has been in place for >10 years. It was originally staffed with a program director, medical director, diabetes clinical nurse specialist, and five nurse case-managers. In its early years, Newton and Young (3) reported that the program reduced morbidity and length of stay (LOS) while producing cost savings, primarily by team efforts to improve glycemic control. In subsequent years, the team experienced a change in leadership and attrition of staff but continued to have a presence in the institution.

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An interdisciplinary Diabetes Best Practice Steering Committee was organized in September 2011 to advance the diabetes program beyond the efforts of a centralized team and to specifically address diabetes care, including patient education. A comprehensive assessment of the program in 2013 provided the data that led to a decision to develop a new system of care for hospitalized patients with diabetes.

### Program Assessment

Historically, the program had always used a small team of nurses providing in-hospital patient education, while the institution over the 10-year period had nearly doubled its inpatient bed complement. Operational leaders at the direction of the nurse executive completed an assessment of the needs of the organization that included a review of the literature to identify industry best practices, a gap analysis with existing institutional practices, and an examination of patient outcomes associated with the program. This assessment was unable to discover evidence in the literature that in-hospital diabetes education improves outcomes or is cost-effective (4–7). However, outpatient diabetes self-management education has been clearly shown to improve long-term outcomes (8). Although there is extensive literature concerning safe transition within and from the hospital, little of it is specific to patients with diabetes (9). Although it is clear that diabetes discharge planning is a crucial part of an overall discharge plan (10), no single best practice for inpatient diabetes education could be identified through telephone interviews with leaders of other hospital diabetes programs.

Before June 2013, the VMC diabetes team consisted of five full-time employees (a program manager who was a pharmacist and certified diabetes educator [CDE], two registered nurse CDEs, and two specially trained registered nurses) in addition to an endocrinologist from the affil-

**TABLE 1. Key Assumptions**

1. Hospitalized patients are ill, under increased stress related to their hospitalization and diagnosis, and in an environment not conducive to learning.
2. For hospitalized patients, diabetes “survival-skills” education is a feasible approach to provide sufficient information and training to enable safe care at home.
3. A patient who is hospitalized needs brief, targeted diabetes education and take-home materials to reinforce instruction.
4. Patient education is the foundation of good nursing practice.
5. Preparation for discharge needs to begin on the day of admission.
6. Hospitalization is a time to help patients access comprehensive diabetes education resources in their communities.
7. Patients should be encouraged to become more activated and confident in diabetes self-care.
8. All current resources should be used efficiently and appropriately, making best use of staff skills.

iated medical school who served as medical director, with support from a half-time administrative assistant. Patients needing diabetes education were identified by consultation requests from providers and nurses and from a daily report from the laboratory of patients with A1C levels >8.5%. The team made contact with an average of 221 patients per month, which was ~20% of the diabetes patients discharged monthly. These patients and their families were offered extensive one-on-one diabetes education, usually in a single session. Each was given a 45-page illustrated handbook produced internally. Although there were anecdotal reports from patients and staff of the positive benefits of these teaching sessions, no impact on patient outcomes (i.e., patient satisfaction, LOS, or readmission rates) were identified.

### Building the Model

The review and internal assessment was used to set a vision for a new inpatient model to provide for the needs of patients with diabetes. A vision statement “to deliver coordinated care to meet the needs of patients and their families, to provide the right care and education at the right time, and to position the program for long-term sustainability” was adopted. The diabetes program was given the charge

to achieve this patient-centered vision without specialized nurse educators. At a minimum, the goal of the change was to realize a cost savings for the organization while not adversely affecting outcomes in the inpatient diabetes population.

Input was sought from stakeholders to generate and develop a model consistent with VMC key strategic initiatives and diabetes management best practices (1,11). Information was gathered over a 2-month period in which one-on-one interviews were conducted with leaders in nursing, patient education, nutrition, pharmacy, and case management, as well as with hospitalists and endocrinologists. The leaders agreed on key assumptions (Table 1) based on evidence and consensus opinion.

A patient education focus group composed of front-line staff nurses, case management staff, registered dietitian nutritionists (RDNs), pharmacists, advance practice nurses, and a patient/family advisor was convened to review and provide feedback on the model. Consistent with VMC’s long history of involving patient/family advisors in planning programs and initiatives, we invited two advisors (one a patient with diabetes and the other the parent of a child with diabetes) to help ensure that our



# Interdisciplinary Diabetes Care



For Non-Pregnant Adults



Final 3-13-14

FIGURE 1. The Interdisciplinary Diabetes Care model.

plans would be patient-centered and practical.

This group, guided by the health system’s director of patient education, identified a need to clarify the roles of all members of the team and enhance the electronic health record (EHR) to support the new model. The focus group also identified a need for standardized tools for the team to use. Among these tools were a readily accessible community resource list on the hospital intranet page, a diabetes education box for each unit, and simple patient instructional materials.

Patient advisors felt strongly that it was important to limit patient education and instruction to what was most important for safe discharge. Therefore, keeping in mind the mantra, “less is more,” four

diabetes survival skills were chosen as the focus for patient teaching: 1) medications, 2) glucose monitoring, 3) hypoglycemia recognition and treatment, and 4) post-discharge contact information. Although nutrition education is not included as a survival skill, the group recognized that patients often have questions about “diabetic diets,” especially when newly diagnosed. Nutrition referrals are recommended for all patients with new-onset diabetes and are available to others on request.

By standardizing the processes, we envisioned providing consistent, high-quality transitional care for all patients with diabetes. Keeping patients and families involved and informed throughout the process, we

also projected high levels of patient satisfaction (12).

Working through several iterations, with input from the VMC Diabetes Best Practice Steering Committee, a model was finalized (Figure 1). Medical and surgical providers, bedside nurses, case managers, RDNs, and pharmacists were assigned specific responsibilities for ensuring patients’ safe transition to the next level of care, with patients’ nurses accepting a central coordinating role. The result was the patient-centered Interdisciplinary Diabetes Care model designed to provide patients with clear and concise instructions on survival skills needed for safe transition from the hospital to home and a formal process that linked community resources for

expanded diabetes self-management education to the discharge process.

### Operationalizing the Model

The following steps were taken to operationalize the new model:

- “The Basics of Diabetes,” a simple 1-page handout, was developed to be given to every patient with diabetes. The Vidant Health patient/family advisors team helped simplify this handout to focus on survival skills.
- To assist bedside nurses, badge tags were created listing the four survival skills and how to access diabetes patient education resources at VMC.
- A diabetes curriculum was created on VMC’s patient education in-room video system to make selection of essential videos easier for patients and staff to locate. Staff members were encouraged to assign videos to patients through the intranet software.
- Each unit was supplied with a diabetes patient education box containing insulin practice pens and pen needles, practice insulin syringes, a practice pillow, a demonstration blood glucose meter, and additional 1-page handouts to copy for patients as needed (covering various topics, including insulin pen use, insulin injection sites, hypoglycemia recognition and management, and blood glucose monitoring).
- The Patient Education section of the EHR was modified to direct the documentation of survival-skills teaching; “The Basics of Diabetes” handout was also embedded in the EHR.
- Algorithms were created and education was provided to assist pharmacists in the management of complex diabetes-related issues. Patient education consultations for complex patients would be provided by a pharmacist CDE. A consultation for “pharmacist counseling—diabetes” was added to EHR orders.
- RDNs were given the ability to access written nutrition education handouts from the Academy of Nutrition and Dietetics’ *Nutrition Care Manual*, which is posted on the VMC intranet. Access to these handouts facilitated individualization of nutrition education with standardized tools.
- A revised nutrition screening and consultation process was developed and implemented to identify patients with newly diagnosed diabetes. During implementation of the model, there was a 2% increase in volume of RDN consultations, which was manageable with existing resources.
- Case managers began to work closely with providers and pharmacists to ensure that patients were given discharge orders for medications and supplies that were affordable based on their insurance coverage and financial status. One of the barriers to successful transition of care is a lack of knowledge of community resources. Resource documents placed on the VMC intranet included, “Local Pharmacy Resources for Diabetes Medications,” “VMC Adult Discharge Supplies Process,” flyers about glucose meters, and a newly developed “Diabetes Education Resources in Eastern N.C.” document. This new document is a comprehensive list of diabetes education resources in the region. For each resource, information is cataloged by county and includes requirements for referrals and type of payment accepted. Referral forms, websites, and telephone numbers are provided when available. More than 50 resources in the 29-county region are included. Given this rich source of information, case managers can more easily share with patients and families the resources available in their own communities.
- Standardized order sets for intravenous and subcutaneous insulin

were developed and promoted to providers. An inpatient order set that generates prescriptions for diabetes discharge supplies helps facilitate the process for ordering needed diabetes supplies.

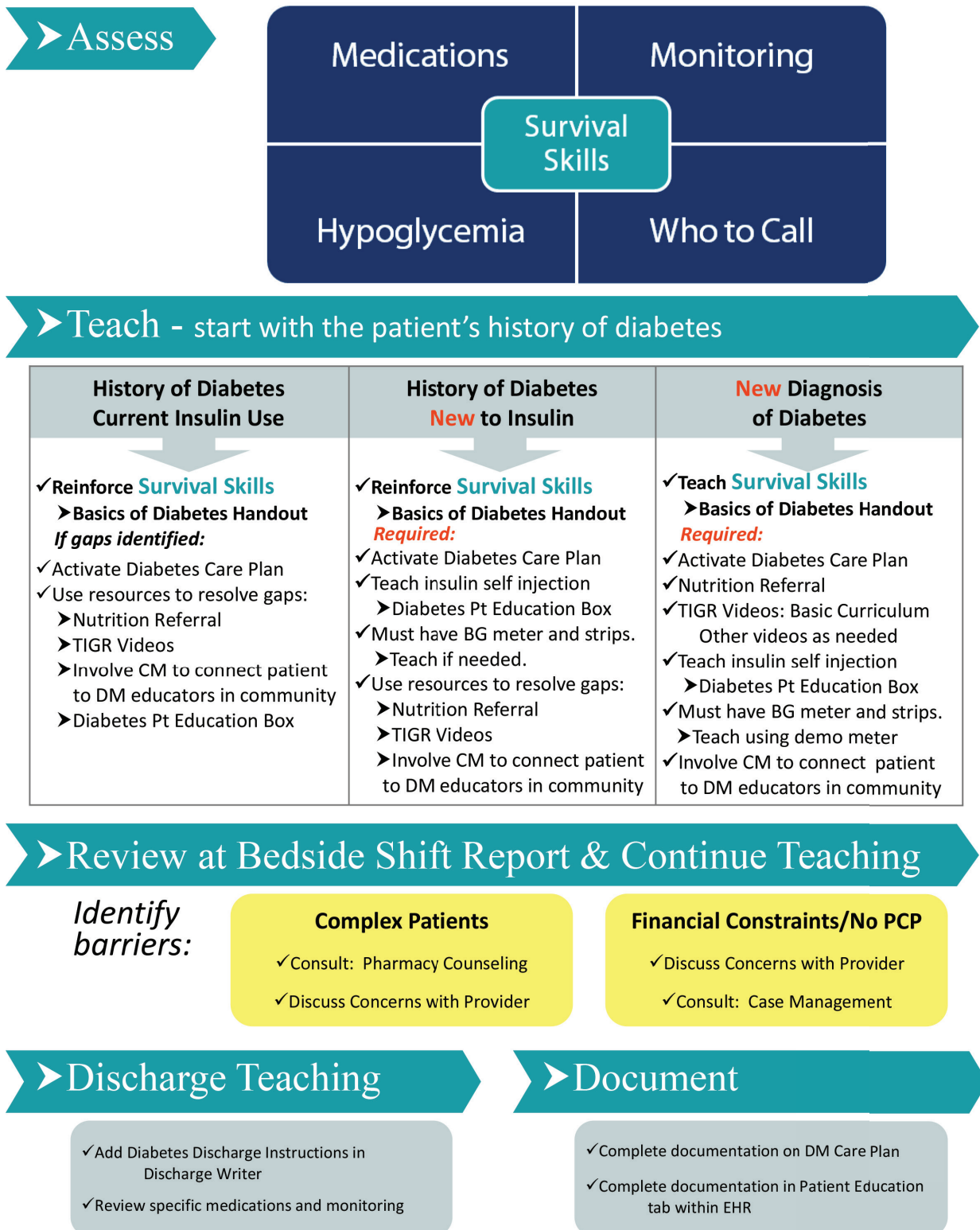
- *Practical Inpatient Management of Adults with Diabetes and Hyperglycemia*, an internally published handbook for providers, was posted prominently on the hospital’s intranet. The handbook includes recommendations for transition from hospital to discharge.

### Change Management

The first step in the implementation process was to present the change to the new care model to the current diabetes care team. The nursing staff and part-time administrative assistant were given options to transfer to other positions within the subsequent 4 months. The program manager (a pharmacist CDE) and medical director would remain in place to marshal the transition and steer the institution in delivering best-practice diabetes care.

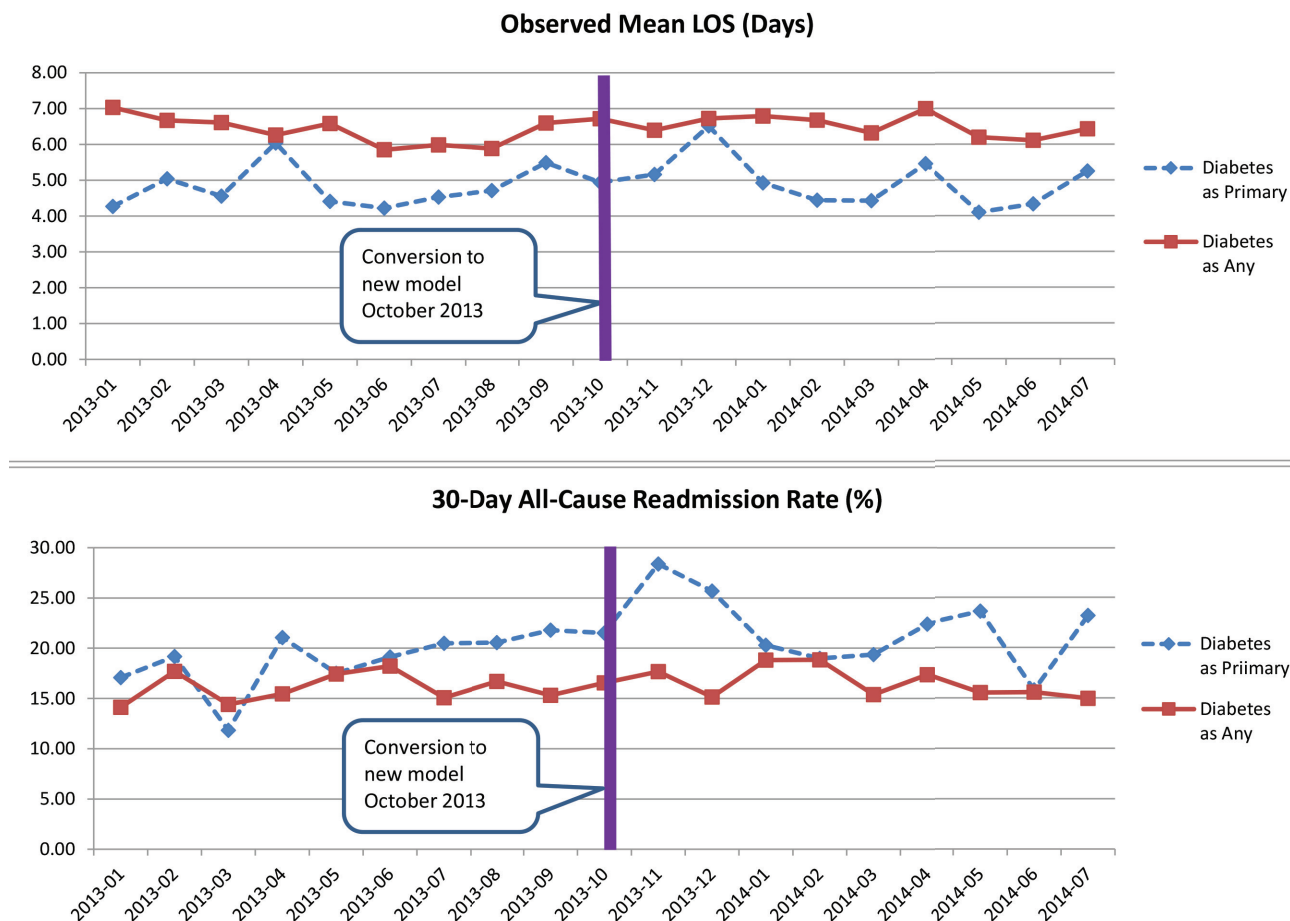
In the 3 months before the transition from a centralized program to the new interdisciplinary model, communication about the new model was provided in numerous forums throughout the hospital to inform all involved disciplines. The graphic representation shown in Figure 1 was a helpful tool in explaining the interactions and roles of each team member. After implementation of the model, department leaders continued to reinforce and model care delivery. Refinements of the tools, such as making the diabetes resource list on the intranet more user-friendly, were incorporated. A staff teaching aid (Figure 2) was created to further describe the process used for bedside patient education and encourage educational assessments early in a patient’s admission. The teaching aid was publicized throughout the hospital in huddles, staff meetings, and e-mail communications.

STAFF JOB AID — Diabetes Patient Education (Non-pregnant adults)



June 18, 2014

■ **FIGURE 2.** A staff teaching aid describes the process used for bedside patient education and encourages educational assessments early in a patient's admission.



**FIGURE 3.** Mean LOS and 30-day all-cause readmission rates before and after conversion to the Interdisciplinary Diabetes Care model. University HealthSystem Consortium data as of 5 November 2014 are shown. Diabetes as primary diagnosis: pre-intervention  $n = 706$ , post-intervention  $n = 673$ ; diabetes as any diagnosis: pre-intervention  $n = 9,049$ , post-intervention  $n = 9,043$ .

### Outcome Measures

LOS and 30-day readmission rates for diabetes patients were selected as important metrics for outcomes associated with the change to the new model. University HealthSystem Consortium (UHC) data were used to track these measures. UHC is a collaboration of >200 academic medical centers that share clinical, safety, operational, and financial data, which is then analyzed and reported for the purposes of improving performance in quality, safety, and cost-effectiveness. The first month after transition to the new model was not included in the analysis to allow for an expected staff learning curve. Statistical analysis of LOS and 30-day all-cause readmission be-

fore and after implementation of the model was performed with Minitab Statistical Software (Minitab Inc., State College, Pa.).

LOS data were analyzed using the Mann-Whitney (Wilcoxon ranked sums) test on the median after the Anderson-Darling test illustrated that these data were nonparametric, with a  $P < 0.005$ . The median LOS for diabetes as the primary diagnosis was 3.0 days both before and after the intervention ( $P = 0.3385$ ). Median LOS for diabetes as a secondary diagnosis was 4.0 days both before and after the intervention ( $P = 0.9353$ ), indicating that the change in the diabetes model did not statistically change the mean LOS.

The percentage of patients readmitted within 30 days was tested using a two-proportion test on both diabetes as the primary diagnosis and diabetes as the secondary diagnosis. When diabetes was the primary diagnosis, the pre-intervention readmission rate was 18.6% of a total 706 admissions, whereas the post-intervention readmission rate was 21.7% of a total 673 admissions; these results indicated no statistically significant difference in the populations ( $P = 0.141$ ). Readmissions for diabetes as a secondary diagnosis were 15.5% of a total 9,049 admissions and 15.9% of a total 9,043 admissions for the pre- and post-intervention populations, respectively. Again, results

indicated no statistically significant change ( $P = 0.422$ ) in readmissions due to the model change (Figure 3). These data indicate that the model is working at least as well as the previous model.

The new model also yielded substantial annual cost savings to the institution. Cost savings were determined by comparing the program's total operating expenses for the 2013 fiscal year to those of the 2014 fiscal year. The difference represented the reduction in workforce since no other program changes had taken place. Changing to the new model yielded cost savings of ~\$425,000 annually, representing a 53% budget reduction for the diabetes program. In 2013, VMC discharged an average of 1,030 patients with diabetes monthly. Transition to the new model translated to average per-patient cost savings of \$34.38 per year.

### Conclusion

In the current health care environment, leaders are called on to evaluate systems and processes of care. The inpatient diabetes patient population is a high-risk group of patients who may be admitted for other acute illnesses but continue to have diabetes care needs. It is crucial for staff members to have easy access to systems and processes to meet the needs of patients who may be discharged with

new diabetes care plans. This article described the experience of a large academic teaching hospital in evaluating an inpatient system and process for providing diabetes care and the use of data to redesign an interdisciplinary approach to inpatient diabetes patient education.

Coordinating care involving primary care physicians and community diabetes education providers is essential to the ongoing success of this program and, more importantly, to providing adequate diabetes care for the region. Future initiatives will include measuring patient satisfaction and following up on patient utilization of community diabetes resources.

### Duality of Interest

No potential conflicts of interest relevant to this article were reported.

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