



The Diabetes Prevention Care Program

Diabetes is a common and costly chronic health condition, being responsible for increased rates of myocardial infarction, stroke, kidney disease, limb amputation, and other problems. Starting in 1995, a multidisciplinary team approach to adult diabetes care was launched with the mission of decreasing variation in practice patterns and improving quality of care. The approach included 1) a primary-care vs. specialty-care-based approach; 2) use of care managers; 3) a team approach; 4) inclusion of psychosocial assessment and behavioral strategies; 5) ongoing staff training; and 6) comprehensive information technology.

Since the program's inception, statistically significant (all with p<0.05) improvements have been seen in every clinical measure evaluated, including glycemic control, blood lipid control, renal screening, retinal screening, aspirin use, smoking counseling, and patient/provider satisfaction. Additionally, cost effectiveness is expected to be demonstrable within two years of implementation. We conclude that this easily transferable primary-care-based team approach to diabetes can improve both the rates of screening and the management of both lipids and glycemia.

The North Carolina Diabetes Prevention Care Program was begun in the North Carolina Region Local Markets in July 1996. Team Member names/titles appear in Table 1.

Background

Diabetes is a common and costly chronic health condition. Afflicting slightly more than 3% of Kaiser Permanente North Carolina (KPNC) members, this condition is responsible for increased rates of myocardial infarction, stroke, kidney disease, and limb amputation. The medical management of these patients leads to dramatically higher health care costs than for nondiabetic patients. In 1995, the estimated PMPM cost per KPNC diabetic member was \$315, nearly three times that of nondiabetic members.

Diabetes care became a quality priority for KPNC in 1993. Over a two-year period despite several efforts to improve care, costs continued to increase. We lacked regionally accepted clinical practice

guidelines for diabetes care, and HEDIS diabetes eye exam rates reflected little improvement. In 1995, senior management chartered a multidisciplinary design team to develop a new approach to the primary care management of adult members with diabetes. The mission of the team was to decrease variation in practice patterns and to improve quality and process of care. The new model incorporated six key design features which our patients, practitioners, and staff told us they wanted: 1) a primary-care vs specialty-care-based approach; 2) use of diabetes care managers; 3) an explicit team approach; 4) inclusion of psychosocial assessment and behavioral strategies; 5) ongoing staff training; and 6) comprehensive information technology.

The program was implemented throughout KPNC over an eight-month period from July, 1996 through February, 1997. Called the North Carolina Diabetes Preventive Care Program, it has a proactive, population approach to diabetes

management. The program is built around evidence-based clinical practice guidelines and protocols (available upon request). A diabetes registry identifies patients with diabetes risk, stratifies them, and captures relevant laboratory, pharmacy, utilization, and information regarding comorbid conditions (also available upon request). The registry is updated weekly. A primary-care-based Diabetes Care Team (DCT) works with the primary care provider, pharmacists, nutritionists, and diabetes patients to deliver coordinated, comprehensive care. A DCT consists of an RN 'Diabetes Personal Care Coordinator' and an LPN 'Diabetes Self-Care Specialist.' Since the program's inception, statistically significant improvements have occurred in every clinical measure evaluated. KPNC now has KP Program-leading performance in retinal screening and aspirin use among patients with diabetes. We are among the top performers in smoking counseling and patient satisfaction for patients with diabetes, and provider satisfaction with the program has been exceptional.

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Table 1. Diabetes Care Program Team Members

Sam Weir, MD, Associate Medical Director Quality & Prevention; Betsy LaForge, RD, MPH; Administrator, Quality & Prevention, Cara Thompson, RN, MSN, CDE, Diabetes Program Coordinator; Sally Morton, PharmD, Clinical Pharmacist; Michael Thomas, MD, Family Practitioner; JoAnne Ferguson, RN, Manager Health Education; Shawnee Weir, MD, Endocrinologist; Alan Baldwin, Analyst; our Diabetes Care Team Nurses, Primary Care Providers, Pharmacists, and patients with diabetes.

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“The program has a population management approach and addresses not only the diabetes-specific risk of the population but also the risk of developing cardiovascular disease through management of additional cardiovascular risk factors frequently seen in these patients—smoking, hypertension, hyperlipidemia, and microalbuminuria.”

Objectives

The objectives of the Diabetes Prevention Care Program are to:

- Decrease practice variation;
- Increase patient satisfaction;
- Increase clinician satisfaction;
- Enable the patient to better care for him/herself;
- Reduce costs of care (achieved by 10% reduction in costs of outside referrals and hospital utilization);
- Improve HEDIS diabetes eye exam rates; demonstrate successful quality improvement activities targeted at chronically ill populations for NCQA.

Scope and Significance

Scope of Quality Issues/Member Impact and Magnitude

The program is targeted at all patients with diabetes 18 years or older, representing approximately 5000 patients across the state of North Carolina. The program has a population management approach and addresses not only the diabetes-specific risk of the population but also the risk of developing cardiovascular disease through management of additional cardiovascular risk factors frequently seen in these patients—smoking, hypertension, hyperlipidemia, and microalbuminuria.

In addition, patient preferences strongly influenced the scope of the program. Through telephone surveys and focus groups, patients identified the following “desirable” features for their care: 1) easy access, a convenient system; 2) “one-stop shopping” (as much care as possible occurring in one location vs multiple referrals to other specialties); 3) gentle, responsive, and consistent reminders; 4) affordability; 5) consistent, coordinated teamwork; 6) personal care and help in coping; 7) “supporting my own self-care.”

Relevance of the Project to Direct Patient Care

A Diabetes Care Team (DCT) is based in the primary care modules. Each team works with multiple primary care providers and is responsible for coordinating the care of 800 to 1200 patients. Using a risk-stratified registry of patients and approximately 40 standing orders and clinical protocols, the goal of each DCT is to see at least 85% of their patient panel annually for a diabetes preventive screening visit. Patients are then “triaged” to more extensive follow-up by the DCT on the basis of current risk factors and the patient’s readiness to change health behaviors.

The preventive screening visit consists of: 1) a history focusing on current health care habits, including smoking status and readiness to change health habits; 2) physical assessment focusing on blood pressure measurement, retinal photography with a nonmydriatic camera, and screening foot assessment with a monofilament; and 3) laboratory testing (HbA1C, fasting lipid panel and renal screening with a spot albumin/creatinine ratio). After data collected from this visit are complete, the LPN and RN use a protocol to determine appropriate follow-up plans for each patient. Follow-up visits with the DCT include glycemic management, lipid, microalbuminuria, and hypertension management, routine foot care (corn and callus removal, toenail trimming, foot care education), lifestyle counseling, and goal setting. There is no copayment required for DCT visits. The DCT communicates regularly with the primary care provider to ensure coordinated care for patients.

Pharmacists in each medical office initiate, reinforce, and document prophylactic aspirin therapy using the pharmacy database when any prescription for diabetes-related medication is filled or refilled. Aspirin has reduced mortality and CVD morbidity in patients with diabetes. Nutritionists work closely with the DCT. They offer group and individual nutrition and lifestyle counseling to support self-care of diabetes and other cardiovascular risk factors.

Practice Innovation/Leadership; Member/Community Impact

Several aspects of the program are innovative. Most important is the improvement in quality of care in this population. The KPNC Local Markets are among the leaders for the national program in HEDIS retinal screening rates.

Second, the program’s integrated patient care brings together at the primary care module many previously fragmented services, such as foot care, retinal screening, and behavioral counseling to support self-care. One reviewer described the program not as a carve-out of diabetes care but as a carve-in of comprehensive, team-based care for this population. Placing the DCT in primary care allows immediate access to the primary care provider when needed. If the diabetes nurses see a patient requiring care beyond the scope of the diabetes protocols, a primary care provider is readily available. Conversely, the primary care provider has immediate access to the diabetes nurses when dealing with a newly diagnosed patient or a patient needing services.

Third, this program has led to an immediate reduction of expensive subspecialty costs of care for this popula-



tion in the KPNC Local Markets. Before initiation of this program, annual retinal screening required referral to ophthalmology. The use of retinal photos taken by trained LPNs has led to greatly increased screening rates with significant cost savings and patient convenience. Retinal photos are read by a board-certified ophthalmologist from The Permanente Medical Group in Northern California. Training the diabetes nurses to deliver routine diabetes foot care has reduced podiatry referrals dramatically. Within one year of implementation, we have experienced 10% reduction in the percentage of patients with diabetes who were hospitalized in the last 12 months.

Finally, this program emphasizes KP's competitive advantage as an integrated health care system. In this program, primary care providers, call center nurses, pharmacists, laboratory technicians, nurses, nutritionists, patient educators, even data analysts each have an important role to play in the team approach. Involvement of the pharmacy in recommending and reinforcing the consistent use of aspirin to diabetes patients serves as a continuous reminder of this simple, effective preventive therapy (this innovation was recently identified as a "certified" successful practice by the KP programwide Care Management Institute).

Methodology

We present data from six different versions of the Diabetes Registry to observe our cohort of patients with diabetes during the previous six quarters since the program was fully implemented. Our data are observational and prospective. All diabetes patients are included with no control group identified. Program results come from three data sources:

- The 1997 Kaiser Permanente Survey of Adults with Diabetes was used for reporting patient satisfaction data, aspirin use by patients with diabetes and CAD, smoking status and the percentage of current smokers who report receiving smoking cessation counseling. This mail-based survey was sent to 575 randomly selected diabetic members enrolled in KPNC. The survey was conducted from June through July 1997. The data are comparable with similarly collected data from other KP markets nationwide;
- HEDIS 1994-1998 for retinal screening rates and HEDIS 1997-1998 for advising smokers to quit. Again, the data are comparable with similarly collected data from other KP Local Markets;
- The KPNC Diabetes Registry for HbA_{1c}

screening rates, percentage of patients in fair to good glycemic control, LDL screening rates, percentage of patients with LDL <130 mg/dL, renal screening rates and foot exam rates. The data were collected prospectively from March 1997 through July 1998.

Although specific inclusion criteria vary slightly depending upon the nature of the variable being measured, the foundation of all data sources is as follows: 1) currently enrolled member during reporting period; 2) at least 20 years of age during the reporting period; 3) presence of diabetes determined by one of the following factors:

- Dispensed medication for treatment of diabetes
- Inpatient stay with discharge diagnosis indicating diabetes outpatient
- Lab test with HbA1C result $\geq 7.0\%$.

Quality Measures

We obtained data for the following Quality Measures. *HbA_{1c} Testing and Glycemic Control*

For each of the last six quarters, we present data on the percentage of our members of the Diabetes Registry who had an HbA_{1c} assay in the past 12 months. A second analysis stratified the population with an HbA_{1c} test in the last year into good (HbA_{1c} < 8%), fair (HbA_{1c} of 8% to 10%), and poor (HbA_{1c} >10%) on the basis of thresholds developed by the American Diabetes Association (ADA) and other organizations. All adult diabetes members are included in this measure.

Lipid Screening and Management

We present data on the percentage of our diabetes population of ages 40 to 70 years who had a full lipid panel of tests (fasting total cholesterol, triglycerides, HDL cholesterol, and calculated or measured LDL cholesterol) within the prior 12 months. For those tested within this interval, we present data on the percentage of the population with LDL < 100, between 100 and 130, and >130 mg/dL.

Retinal Screening

Diabetes patients can benefit from early detection of retinopathy. The annual rate of retinal screening has been a HEDIS measure for several years. We present our HEDIS results.

Renal Screening

Diabetes patients are at risk for kidney damage. ACE inhibitors lower subsequent risk of end-stage renal failure. Most groups, including the ADA, recommend annual screening. We present the percentage of our diabetes population who have been screened in the prior 12 months.

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Administration of Aspirin

Among patients with cardiovascular disease or cerebrovascular disease (25% to 30% of the diabetes population), regular administration of aspirin yields statistically significant and clinically meaningful reduction in risk of heart attack. We present from the Care Management Institute's national survey of diabetes members done during the summer of 1997 the percentage of our

population with both diabetes and heart disease who self-reported use of aspirin as preventive therapy.

Satisfaction with Care

We present the satisfaction data reported in the CMI national survey of diabetes members.

We performed Quantitative Analysis in the following way. Data from the Diabetes Registry were

Table 2. KPNC Diabetes Registry data - 1Q1997 - 2Q1998

	1Q1997	2Q1997	3Q1997	4Q1997	1Q1998	2Q1998
Size of population	N=4754	N=4880	N=4944	N=4892	N=4683	N=4769
Percentage with Nba _{1c} in prior 12 months	78.8%	78.5%	78.4%	81.1% ^a	80.2%	80.1%
Percentage with HbA _{1c} <8.0%	43.5%	45.6%	45.9% ^a	46.2% ^a	47.2% ^a	48.0% ^a
Percentage with HbA _{1c} 8.0-9.9%	34.6%	33.2%	34.2%	33.6%	33.5%	32.6%
Percentage with HbA _{1c} >10.0%	21.9%	21.1%	19.9% ^a	21.2%	19.3% ^a	19.4% ^a
Size of population aged 40-70	N=3662	N=3700	N=3758	N=3740	N=3575	N=3588
Percentage with LDL in prior 12 months	52.3%	58.3% ^a	62.1% ^a	66.8% ^a	67.2% ^a	67.5% ^a
Percentage with LDL <100 mg/dL	21.7%	22.1%	23.7% ^a	26.0% ^a	30.5% ^a	32.2% ^a
Percentage with LDL 100-129 mg/dL	30.3%	32.7%	33.3% ^a	33.3% ^a	34.2% ^a	35.3% ^a
Percentage with LDL >129 mg/dL	48.0%	45.2%	43.1% ^a	40.7% ^a	35.3% ^a	32.6% ^a
Percentage with Alb/Cr ratio in prior 12 months	33.2%	41.3% ^a	48.5% ^a	53.2% ^a	54.7% ^a	54.4% ^a
Percentage with foot exam in prior 12 months	13.0%	22.8% ^a	35.1% ^a	43.3% ^a	41.5% ^a	40.7% ^a
Percentage with hospital stay in prior 12 months	11.5%	Not available	10.1% ^a	11.1%	9.7% ^a	9.3% ^a

^ap < .05 for comparison with 1st Quarter 1997.



analyzed using the EpiInfo statistical package. The entire registry was analyzed, so sampling is not an issue. The comparisons are between different

points in time for the entire population of patients with diabetes enrolled in KPNC. Alpha was set at .05.

Table 3. 1997 Kaiser Permanente survey of adults with diabetes, Care Management Institute

Region/Local Market	Percentage of patients with diabetes and CAD reporting aspirin use	Percentage of diabetes patients who are current smokers	Percentage of current smokers with diabetes who report receiving cessation advice or referral
ADA - Provider recognition standard	NA	NA	76.0
Northern California:	69.0	11.4	76.5
NCR - Golden Gate	72.0	9.4	71.4
NCR - East Bay	65.0	12.8	86.0
NCR - Fresno	73.0	13.5	65.1
NCR - South Bay	70.0	9.6	73.3
NCR - Valley	67.0	13.9	78.6
NCR - NE Bay	71.0	10.3	70.3
Colorado	72.0	15.5	81.6
Georgia	56.0	15.9	76.0
Hawaii	69.0	12.8	81.6
Ohio	66.0	13.0	79.5
Texas	66.0	18.5	61.4
Kansas City	74.0	15.1	72.0
North Carolina	78.0	19.9	84.8
Southern California:	65.0	12.6	76.5
SCR - Valley	61.0	12.0	66.7
SCR - Tri Central	61.0	11.8	91.9
SCR - Inland Empire	68.0	12.5	66.7
SCR - Metro	63.0	14.2	76.1
SCR - Orange County	66.0	11.1	71.4
SCR - San Diego	72.0	12.9	78.0
Northwest	70.0	11.3	71.8
Mid-Atlantic	59.0	16.6	78.8

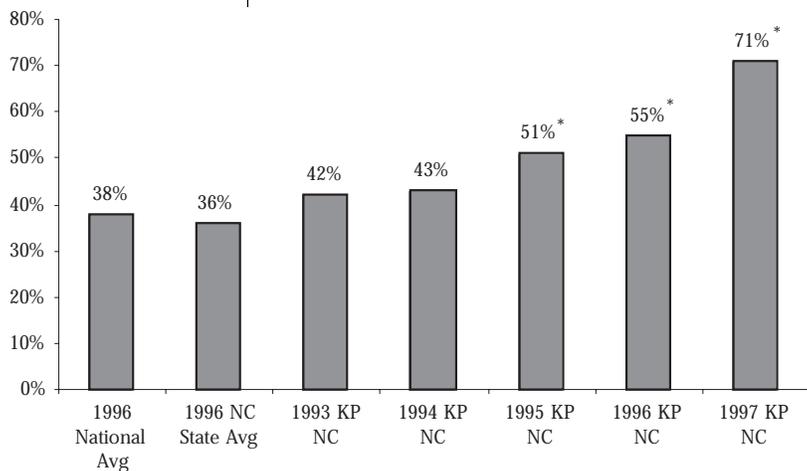


Figure 1. Eye exams for people with diabetes (commercial HMO population).

* Represents statistically significant change from the previous year at the .05 level. Source: National Committee for Quality Assurance, Quality Compass (HEDIS database). Accessed May 18, 1999.

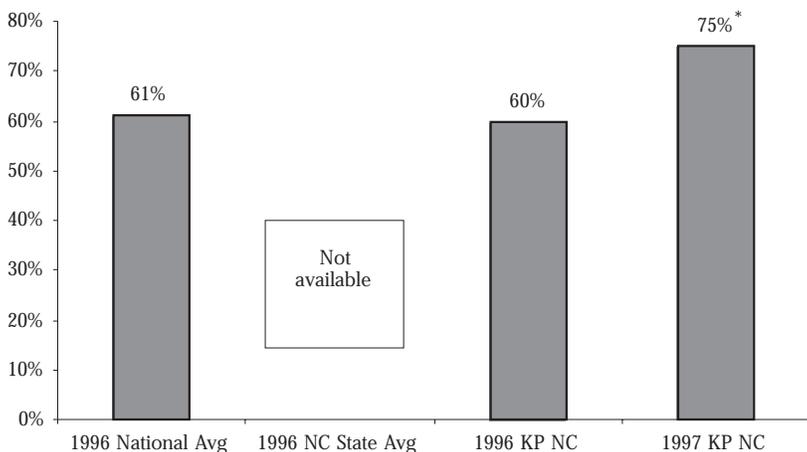


Figure 2. Smokers advised to quit (commercial HMO population).

* Represents statistically significant change from the previous year at the .05 level. Source: National Committee for Quality Assurance, Quality Compass (HEDIS database). Accessed May 18, 1999.

Results

Statistically significant improvements are seen in every clinical measure since implementation of the program (Tables 2,3; Figures 1,2). Within one year of implementation, hospitalization rates decreased by more than 10%. Provider satisfaction, though not formally measured, can be best summarized by the fact that 100% of TCPMG providers have wholeheartedly endorsed the program by signing the nursing standing orders allowing the DCTs and pharmacists to initiate the program with their diabetes patients. An initial cost-benefit study in 1995 predicted cost-effec-

tiveness would be achieved within two years of program implementation. While a cost-benefit analysis is underway, the data are as yet unavailable.

Conclusions

A primary-care-based team approach to diabetes can improve both rates of screening and management of both lipids and glycemia. The department of Quality and Prevention, with physician champion, Sam Weir, MD, led and supported the project with strong input from operations, primary care and specialty physicians, health education, office staff, and pharmacy. Multidisciplinary involvement was critical in the success of this program. All "stakeholders" were invited into the process, allowing for a highly accepted, fully integrated program. The pharmacy database flagging system for aspirin could readily be transferred. (We have already expanded this program to all patients with prescriptions for nitrates or cholesterol-lowering drugs). All or portions of this program can be easily transferred to other Local Markets. The way in which we used the quality planning process and methods for making the program operational has served as the framework for several other successful program roll-outs within the North Carolina Local Markets. KP in Texas adopted our model as a pilot in 1997; the pilot was successfully implemented, and plans for expansion were underway when that health plan was sold. For regions without internal ophthalmology or optometry, nonmydriatic cameras and training of primary-care-based nurses to take retinal photographs are readily transferable. Finally, use of care managers is common within the KP system, and our clinical protocols can be adopted or adapted by others. We hope that our local contribution to a quality improvement process will be adapted elsewhere in other group-model health care management systems nationally. ❖

Publications

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