

## A Multicomponent Intervention to Improve Diabetes Care

Nyman MA, Murphy ME, Schryver PG, et al. *Improving performance in diabetes care: a multicomponent intervention. Eff Clin Pract 2000;3:205-12.*

### Study Overview

**Objective.** To determine if a multicomponent intervention can increase the annual rate of microalbumin/urine protein testing, dilated eye examinations, and foot examinations and reduce overall levels of glycosylated hemoglobin (HbA<sub>1c</sub>) in patients with type 2 diabetes.

**Design.** Before-after study. This was not a randomized trial.

**Setting and participants.** Adult patients seen at 1 practice of 18 general internists. The practice delivers primary and specialist care to patients in southeastern Minnesota, excluding Olmsted County.

**Intervention.** From April 1996 to June 1998, a guideline on type 2 diabetes was implemented with multicomponent interventions. The guideline, which was peer-reviewed and updated annually, consisted of an algorithm outlining an evidence-based approach to diabetes diagnosis and management. Physicians could access the guideline as a print document and on computer workstations. Endocrinologists, who were designated as opinion leaders in diabetes, conducted small-group educational sessions at the local practice site. Held annually, these sessions provided a 1-hour overview of type 2 diabetes; 1 session devoted specifically to the use of microalbumin testing was given during the first year of guideline implementation. Data representing activities of the entire group were displayed quarterly at practice meetings. In addition, provider-specific data on the performance of urine protein testing were distributed to the practice once during the study period. As part of an effort to develop electronic medical records, practice physicians had access to an electronic ordering system, which allowed providers to order a cluster of diabetes-specific tests (eg, lipid panel, glucose testing, HbA<sub>1c</sub> testing, urinalysis) by pressing a computer "hot button."

**Main outcome measures.** Outcome measures included HbA<sub>1c</sub> values and annual performance rates of urine protein testing, foot examination, and dilated eye examination. Data were collected monthly on a random sample of 20 patients. Each patient could be selected only once per quarter. The population from which patients were chosen for sampling was

defined as any adult patient who (1) had a visit during a sample month at which diabetes was indicated using ICD-9 codes (codes 250.00 to 250.93) and (2) had had an additional visit in the past 11 to 24 months. A paired analysis of HbA<sub>1c</sub> levels was also performed on 82 baseline patients whose levels were measured before and after guideline implementation; this was done to reduce any potential bias caused by disenrollment of patients with poorly controlled disease.

**Main results.** During the entire period, a gradual improvement was observed in all measures. Annually, urine protein testing increased from 24% to 66% ( $P = 0.001$ ), dilated eye examinations from 63% to 84% ( $P = 0.001$ ), and foot examinations from 86% to 97% ( $P = 0.001$ ). In the entire diabetes population, mean HbA<sub>1c</sub> levels decreased from 7.8% to 7.1% ( $P < 0.001$ ) when values before and after guideline implementation were compared. Results from the paired analysis, which included only those patients ( $n = 82$ ) who had available HbA<sub>1c</sub> measures from baseline and after 1 July 1997, showed a reduction in HbA<sub>1c</sub> levels from baseline assessment to the most recent postimplementation assessment in 69 patients (84%). Among the 82 patients with values from both time periods, mean HbA<sub>1c</sub> levels decreased from 8.02% in the intervention period to 6.97% in the postintervention period (absolute decrease, 1.05% [95% confidence interval, 0.82% to 1.27%]).

### Conclusion

After a multicomponent diabetes management intervention was implemented in a small group practice, improvements were observed in the rates of foot examinations, eye examinations, and urine protein measurements performed by providers. A significant reduction in HbA<sub>1c</sub> levels also occurred among patients with diabetes.

### Commentary

Although not a randomized controlled trial, this study is interesting in that it demonstrates that improvements in the delivery of diabetes care can be made through a relatively inexpensive program. At least 2 large trials, the United Kingdom Prospective Diabetes Study (UKPDS) [1] and the Diabetes Control and Complications Trial (DCCT) [2], have indicated that outcomes in diabetic patients improve with

appropriate management. A study by Peters and colleagues [3] in 1996 showed that in a large health management organization in California, foot examinations were not documented in 94% of diabetic patients, urine specimens for proteinuria were collected in only 48%, and HbA<sub>1c</sub> levels were measured in only 44%. One can argue that these data were published in 1996, before the results of the UKPDS study could influence management practices. However, a more recent but smaller study confirmed that compliance with diabetes guidelines is poor [4].

This study by Nyman et al has its shortcomings. Its biggest weakness is the fact that it is not a randomized study and has no comparison group. Independent variables that were not measured (eg, media, newspaper, medical journals) could explain the practice changes noted by the authors. Participating physicians also may have been improving their knowledge of diabetes treatment independently from the intervention. Furthermore, the study was conducted in relatively small group practice and may not be reproducible on a large scale. The computer program that practice members used to order clusters of diabetes-related laboratory tests is not available everywhere. Despite these problems, such results are promising. One study by Peters and Davidson [5] showed that the quality of diabetes management could be improved through the use of a program combining computer technology and nurses following protocols. Further large-scale studies should be conducted to determine the best approach to improving care delivery for patients with diabetes, as the magnitude of effect of such interventions may not be as large as we would like. In Nyman and colleagues' study, for example, HbA<sub>1c</sub> levels were reduced only by 0.7%—a rather small gain in the pre-

vention of microvascular and macrovascular complications. Cost-effectiveness analyses will also be needed in future research.

### Applications for Clinical Practice

A multicomponent provider-based intervention may improve the quality of care for diabetic patients. However, such a program cannot be recommended until larger randomized controlled trials are undertaken.

### References

1. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33) [published erratum appears in *Lancet* 1999;354:602]. *Lancet* 1998;352:837-53.
2. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. The Diabetes Control and Complications Trial Research Group. *N Engl J Med* 1993;329:977-86.
3. Peters AL, Legorreta AP, Ossorio RC, Davidson MB. Quality of outpatient care provided to diabetic patients. A health maintenance organization experience. *Diabetes Care* 1996; 19:601-6.
4. Cook CB, Penman A, Cobb AB, et al. Outpatient diabetes management of Medicare beneficiaries in four Mississippi fee-for-service primary care clinics. *J Miss State Med Assoc* 1999;40:8-13.
5. Peters AL, Davidson MB. Application of a diabetes managed care program. The feasibility of using nurses and a computer system to provide effective care. *Diabetes Care* 1998;21: 1037-43.

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