

Evaluation of a Teaching and Treatment Program in Over 4,000 Type 2 Diabetic Patients After Introduction of Reimbursement Policy for Physicians

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Patient education in diabetes has become an integral part of diabetes management (1–3). Systematic reviews report the best results in terms of improved metabolic control, weight loss, and diabetes-related knowledge in cases where mainly nurses provide patient education combined with structured and regular patient review. Therefore, patient education is recommended as a necessary component in promoting good diabetes control (4,5).

In 2000, the Styrian Diabetes Type 2 Education Project was implemented across the Austrian province of Styria. Until then, no formal implementation or reimbursement of educational efforts had been provided in the Austrian health care system. The primary objective of the project was to provide free access to a structured diabetes teaching and treatment program (DTTP) at the primary health care level throughout the province to patients with type 2 diabetes who are not using insulin for glycemic control. Here, we report its overall acceptance and effectiveness 4 years after its systematic implementation.

RESEARCH DESIGN AND METHODS

— The Styrian Diabetes Type 2 Education Project is a combined intervention consisting of a structured DTTP and a special training for the educating staff. The DTTP is a 16-h course, conducted at the primary health care level. It is well evaluated and transferable (6–10). The program covers nine education areas: basic diabetes information, self-monitoring, medication and hypoglycemia, diet, foot care, physical activity, sick day rules, and late complications. Training of the educators (physicians and diabetes educators) focuses on the discussion of evidence-based therapy and therapy goals. Role-playing techniques are used to improve patient education skills. One year after the initial teaching program, a 2-h refresher course including a follow-up assessment is held. The remuneration for one training course (6–12 participants) is \$870 and \$183 for the follow-up.

The project is supported by a quality management concept using a documentation form that includes most of the data proposed by the European Di-

abetes Indicator Project (EUDIP) (11). This form must be completed for each patient at baseline and at follow-up. Every 3 months, a benchmarking report is compiled and sent to each participating physician. An annual report analyzes the effects of the program that suggests adaptations to the steering committee, which reviews current data biannually. A postgraduate meeting is offered twice a year.

RESULTS

— During 4 project years, 120 physicians and 52 diabetes educators taught the DTTP course to 4,396 patients with type 2 diabetes (55% female, aged 63.8 ± 10.7 years, diabetes duration 5.0 ± 6.2 years, BMI 29.7 ± 5.1 kg/m², baseline A1C $7.6 \pm 1.6\%$; all mean \pm SD). A total of 2,122 (48%) individuals attended the follow-up assessment. All target parameters significantly ($P < 0.001$) improved after 1 year (A1C $-0.4 \pm 1.3\%$, BMI -0.4 ± 2.4 kg/m², body weight -1.1 ± 6.2 kg, systolic blood pressure -1.8 ± 19.3 mmHg, diastolic blood pressure -1.1 ± 10.8 mmHg, cholesterol -0.1 ± 1.1 mmol/l, LDL cholesterol -0.2 ± 0.9 mmol/l, and triglycerides -0.1 ± 1.8 mmol/l). Changes in glucose-lowering treatments are illustrated in Fig. 1. Although insulin therapy was not an inclusion criterion, 1.1% of the patients were already on insulin at baseline and 6% at follow-up. Sixty-six percent of the patients had eye examinations within 1 year before the course and 69% ($P = 0.04$) at follow-up. The rate of foot examinations did not change significantly (86–85% at follow-up, $P = 0.28$).

More information on the project, the documentation form, statistical analysis, baseline characteristics, change in A1C, and treatment for arterial hypertension and blood lipids are available in an online-only appendix (available at <http://dx.doi.org/10.2337/dc06-2095>).

CONCLUSIONS — Our evaluation demonstrates that a teaching and treatment program for patients with type 2 diabetes can successfully be implemented throughout the area at the primary health

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Abbreviations: DTTP, diabetes teaching and treatment program.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

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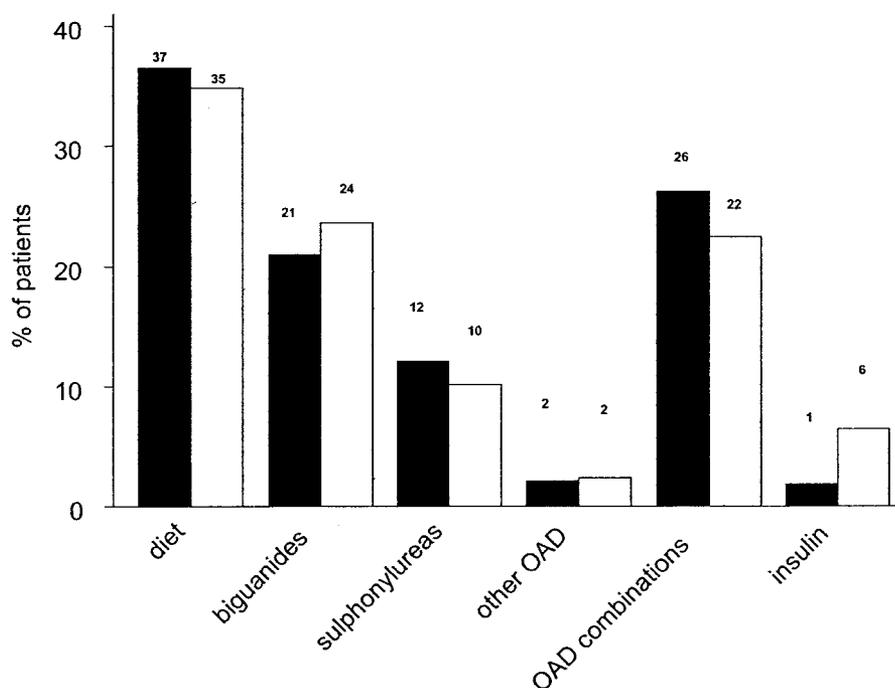


Figure 1—Change in hypoglycemic treatment before training and at follow-up. Insulin denotes insulin use, either as single therapy or in combination with other oral antidiabetes agents (OAD). Among combinations of OAD, the combination of metformin and sulphonylureas was the most frequent and was prescribed in 55 and 58% of patients receiving >1 OAD at baseline and follow-up, respectively. ■, before education; □, follow-up.

care level. Our large-scale cohort showed an improvement of all target parameters with an A1C reduction comparable to previous randomized studies (12,13). The relative increase of patients treated with biguanides at follow-up may account partly for the decrease of A1C and for the observed weight reduction. Apart from the effects of the training program, including improved drug intake compliance, increase of physical activity patterns, and changes in nutritional habits (9,10), the metabolic improvement could be further explained either by an increase in medication dosage or by initiation of insulin therapy.

The low follow-up rate is a limitation of the project. Randomized controlled trials on similar topics obtain follow-up rates of at least ~80% (2), while in interrupted time series and before-and-after studies, which are more comparable to our study, these rates are seldom achieved. However, sustained implementation of education programs within the health system has rarely been subject to evaluation in the literature. Through a standardized questionnaire sent to participating physicians, reasons for the low follow-up rate were determined. The most common response was that operating ex-

penses for documentation are too high and that remuneration for the follow-up examination is not attractive. Otherwise, based on physicians' opinions, patients do not show up at follow-up because of loss of motivation, a guilty conscience because they did not modify their behavior after the training course, or they do not see the sense of a follow-up, having already heard everything in the initial course. It is possible that the patients lost to follow-up were less successful in reaching their treatment targets than the others. One can speculate whether a personal reminder for patients, as installed for physicians, would have further increased the follow-up rate.

The introduction of a structured documentation led to a more accurate and comprehensive monitoring of the patient. Eye examination rate (69%) was clearly higher compared with a survey (57.6%) by Saaddine et al. (14). The early educational intervention and intensified screening and treatment for secondary complications in our program will likely postpone the outbreak of diabetes-related comorbidity as previously shown in disease management programs (15,16).

In conclusion, our investigation dem-

onstrates, by means of improved intermediate outcome parameters, that a teaching and treatment program for patients with type 2 diabetes who are not using insulin for glycemic control was successfully implemented province wide at the primary health care level.

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References

1. Deakin T, McShane CE, Cade JE, Williams RDRR: Group based training for self-management strategies in people with type 2 diabetes mellitus. The Cochrane Database of Systematic Reviews Issue 2. Art. No.: CD003417.pub2. DOI:10.1002/14651858. CD003417.pub2, 2005
2. Renders CM, Valk GD, Griffin SJ, Wagner EH, Eijk Van JT, Assendelft WJ: Interventions to improve the management of diabetes in primary care, outpatient and community settings: a systematic review (Review). *Diabetes Care* 24:1821–1833, 2001
3. Norris SL, Lau J, Smith SJ, Schmid CH, Engelgau MM: Self-management education for adults with type 2 diabetes: a meta-analysis of the effect on glycemic control. *Diabetes Care* 25:1159–1171, 2002
4. Burgers JS, Bailey JV, Klazinga NS, Van Der Bij AK, Grol R, Feder G, AGREE Collaboration: Comparative analysis of recommendations and evidence in diabetes guidelines from 13 countries. *Diabetes Care* 25:1933–1939, 2002
5. International Diabetes Federation: Global Guideline for Type 2 Diabetes [Internet], 2005. Available from http://www.idf.org/webdata/docs/idf_GGT2D.pdf. Accessed 20 April 2006
6. Pieber TR, Holler A, Siebenhofer A, Brunner GA, Semlitsch B, Schattenberg S, Zapotoczky H, Rainer W, Krejs GJ: Evaluation of a structured teaching and treatment programme for type 2 diabetes in general practice in a rural area of Austria. *Diabet Med* 12:349–354, 1995
7. Gagliardino JJ, Etchegoyen G, PENDID-LA Research Group: A model educational program for people with type 2 diabetes: a cooperative Latin American implementation study (PEDNID-LA). *Diabetes Care* 24:1001–1007, 2001
8. Mühlhauser I, Berger M: Patient education: evaluation of a complex intervention. *Diabetologia* 45:1723–1733, 2002
9. Kronsbein P, Jörgens V, Mühlhauser I,

- Scholz V, Venhaus A, Berger M: Evaluation of a structured treatment and teaching programme on non-insulin-dependent diabetes. *Lancet* 2:1407–1411, 1998
10. Grüsser M, Bott U, Ellermann P, Kronsbein P, Jörgens V: Evaluation of a structured treatment and teaching program for non-insulin-treated type 2 diabetic outpatients in Germany after the nationwide introduction of reimbursement policy for physicians. *Diabetes Care* 16:1268–1275, 1993
 11. Beaufort CE, Reunanen A, Raleigh V, Storms F, Kleinbreil L, Gallego R, Giorda C, Midthjell K, Jecht M, de Leeuw I, Schober E, Boran G, Tolis G: European Union diabetes indicators: fact or fiction? *Eur J of Public Health* 13 (Suppl.):51–54, 2003
 12. Lozano ML, Armale MJ, Tena DI, Sanchez NC: The education of type-2 diabetics. *Aten Primaria* 23:485–492, 1999
 13. Brown SA, Garcia AA, Kouzekanani K, Hanis CL: Culturally competent diabetes self-management education for Mexican Americans. *Diabetes Care* 25:159–168, 2002
 14. Saaddine JB, Engelgau MM, Beckles GL, Gregg EW, Thompson TJ, Narayan KM: A diabetes report card for the United States: quality of care in the 1990's. *Ann Intern Med* 136:565–574, 2002
 15. Trento M, Passera P, Bajardi M, Tomalino M, Grassi G, Borgo E, Donnola C, Cavallo F, Bondonio P, Porta M: Lifestyle intervention by group care prevents deterioration of type II diabetes: a 4-year randomized controlled clinical trial. *Diabetologia* 45:1231–1239, 2002
 16. Lavery LA, Wunderlich RP, Tredwell JL: Disease management for the diabetic foot: effectiveness of a diabetic foot prevention program to reduce amputations and hospitalizations. *Diabetes Res Clin Pract* 70: 31–37, 2005