

Evaluation of Comprehensive Program for Diabetes Care at Primary Health-Care Level

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The Swedish National Board of Health and Welfare published its first diabetes health-care program in 1977. The impact of the program was evaluated in the Stockholm County after 4 yr. The results showed that the educational program had reached ≥ 1 staff member in 86% of the 104 primary health-care centers (PHCCs). Several organizational changes had taken place as a result of the program. The 10 "best" PHCCs were compared with a random sample of the centers with regard to patient outcomes. Patients from the 10 best centers had gotten a more comprehensive education, were more knowledgeable about foot care, tested glucose more often, and used less medication. The metabolic control was the same for both groups of patients. The PHCC staffs reported the following roadblocks to change: lack of knowledge of diabetes care, insufficient cooperation between staff members, poor contact with specialists, and absence of guidelines for diabetes care. The staffs in the best centers spent twice as much time in staff meetings and continuing education as those from the random sample of centers. The findings led us to formulate a new strategy for the program. The main objective of the new approach is to create organizational changes within the centers. Thus, local knowledge and creativity can be utilized. Preliminary data demonstrate that 84% of the locally developed plans for reorganization of diabetes care had been accomplished within 1 yr. *Diabetes Care* 11:269-74, 1988

tives of expanding the primary health-care sector and reducing hospital-based services. As a result, several new primary health-care centers were organized, and more physicians and nurses were employed within the primary health-care sector. The expanding primary health-care services then also became a potential resource for treatment of most diabetic patients with non-insulin-dependent diabetes mellitus.

To provide quality diabetes care to all patients, the following prerequisites would have to be fulfilled. 1) The patients must have better knowledge about the disease to be motivated for an active role in its treatment. 2) Medical care should be available close to where patients live. 3) A more knowledgeable staff should spend more time with the patients. 4) Training of the staff and reallocation of some of the work performed by physicians to specially trained nurses should be accomplished. The Swedish National Board of Health and Welfare published a diabetes health-care program in 1977 that formed the basis for the development of diabetes care in many parts of Sweden (1). At the time, there was no consensus on how to organize diabetes care at the community level. However, it was evident that good care was not available to all diabetic patients. Because the disease could be well controlled in some diabetic individuals, the problem was now to translate the knowledge obtained from the care of a limited number of patients into care for the whole population of diabetic subjects. It was soon realized that new approaches to

In the 1970s, the structure of the public health-care sector was under debate in our country. Sweden had a well-developed hospital-based health-care system. The number of beds per capita was high compared with countries such as the United States. Gradually, new norms were developed with the objec-

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diabetes care had to be formulated and that available services had to be reorganized to handle this problem. New resources would probably also have to be produced.

The first survey of the effect of the program was performed 4 yr later. It showed that the program had been adopted by seven county councils in Sweden and partly adopted by another six (2). Thirty-seven percent of the primary health-care centers in Sweden had used the program to reform diabetes care. The program had also stimulated numerous organized discussions and workshops on the organization and content of diabetes care. Thus, the diabetes-care program had increased the awareness of a need for quality care and had initiated an organizational change of diabetes care in many parts of Sweden. This article is a discussion of the development of the diabetes-care program in the county of Stockholm (population 1.6 million).

STOCKHOLM PROGRAM

Based on the medical-care program for diabetes mentioned above, a training course was started in 1980 in Stockholm County to implement the program at the primary health-care level. The responsibility for the training course was transferred to the Diabetes Education Center that was organized at the Karolinska Hospital, one of the university hospitals in Stockholm. The center was to teach diabetes care to physicians and registered nurses at the primary health-care centers within the entire county. The teaching staff at the center consisted of a senior diabetologist, a nurse-instructor, a dietitian-instructor, a podiatrist-instructor, and a secretary. Other specialists in the field of diabetes assisted in the teaching.

Four 2-wk training courses have been given annually since 1980, each with 20–30 participants. Usually, physician-nurse pairs at the primary health-care centers were selected for the course. Instructions were provided for the following subjects: norms and “rules of thumb” for practical care, the use of testing material, self-monitoring of glucose, nutrition, foot care, management of acute complications, and socioeconomic and psychological problems. It was also considered essential to instruct the participants on how to organize diabetes care at the primary health-care centers and how to utilize support routines effectively (e.g., checklists of examinations and tests).

The physicians and nurses spent the 2nd wk of training in a hospital outpatient unit, where they participated in the teaching and treatment of diabetic patients. After these 2 wk of training, the physicians and nurses had to implement the program at their primary health-care centers. The teaching staff provided support by site visits to support the reorganization of the diabetes care. In addition, a follow-up discussion was organized 6 mo after the course.

Evaluation of program. In 1983, health-care authorities in Stockholm County decided to evaluate the program for diabetes care and the training course. The objectives of the evaluation were to study the impact of the training courses on implementation of the program in the primary health-care centers; to identify factors, other than training, of importance for the implementation; and to evaluate the impact of the program, where in use, on diabetes control.

METHODS

The evaluation was performed in three steps. First, the degree of implementation was measured. The comprehensive program was analyzed, and teaching staff and former participants in the courses were interviewed to find criteria by which the degree of implementation could be measured. Six criteria were selected: at least one nurse at the primary health-care center takes special care of diabetic patients, a register of the diabetic patients treated at the center is used, there are written guidelines for diabetes care at the center, the nurse(s) who are working with diabetic patients at the center also advise patients about medication, special office hours are reserved for diabetic patients, and checklists for notes about examinations and tests are used.

Questionnaires measuring these criteria were sent in 1983 and 1984 (to 94 and 104 centers, respectively) to the physicians in charge of the primary health-care centers in Stockholm County. In the 1983 survey, 10 of 94 centers fulfilled the first four criteria, which by that time were seen as the most important ones. These centers were defined as having “the program in use.” A random sample of 10 centers was also drawn from the remaining centers, forming a control group of centers. In each of these 20 centers, a questionnaire measuring the six criteria was validated by personal interviews with staff responsible for diabetes care at the center. These two groups of centers fulfilled 5.0 ± 0.3 and 1.6 ± 0.4 (mean \pm SD) of the six criteria, respectively. The impact of the program was then measured by comparisons between these two groups.

Second, the physicians and nurses at the centers were presented with a questionnaire to identify environmental and attitudinal factors that could be significant for implementation of the program. Third, the impact of the program on the patients’ health and well-being was evaluated by comparisons between two groups of centers regarding the patients’ conditions. A 10% random sample of the diabetic patients who had visited the primary health-care centers during the preceding year was examined by the physician from the Diabetes Education Center. In addition to the physical examination, the following laboratory tests were performed: HbA_{1c} (normal value 5.2–6.7%; 3), serum creatinine, and albumin in urine. The patients were also presented with a questionnaire to estimate their well-being, attitudes toward and knowledge about the disease, and behavior relevant

TABLE 1
Fulfillment of six criteria used to measure implementation of diabetes program

	Centers (%)	
	1983	1984
At least 1 nurse is taking special care of diabetic patients	66	70
There is a register of diabetic patients	37	64
There are written guidelines for diabetes care	31	37
The nurse modifies the patients' treatment	15	21
Special office hours are reserved for diabetic patients	21	25
Checklist is used	14	54
Number of centers	94	104

to self-care. Photos were taken of the patients' feet, and each patient's need of foot care was estimated by a podiatrist by analyzing the photos and results of the foot examination. This estimation was done for 63 of the 193 patients.

The information was computerized and stored according to the rules of the Swedish Data Laws with the permission of the Swedish Data Inspection Board. Statistical analysis was carried out with the Statistical Analysis System (4).

RESULTS

Program implementation. In 1983, 80% of all the centers in Stockholm County had sent at least one staff member to the training program; in 1984 the figure was 86%. In 1984, a nurse had special responsibility for the care of diabetic patients in 70% of the centers (Table 1). Sixty-four percent of the centers had a special register of all their diabetic patients, and 54% used a checklist. The organizational change that had taken place between 1983 and 1984 was the increased use of patient registers and checklists. In 1984, only one additional center fulfilled the first four of the six criteria. The percentage of

TABLE 2
Percentage of respondents who reported hindrances to implementation of diabetes program in centers using program and in control centers

	Centers using program (n = 55)	Control centers (n = 136)
Lack of knowledge in diabetology	4	21*
Lack of internal cooperation	2	14*
Lack of guidelines for diabetes care	2	13*
Lack of contact with specialists	0	11

* $P < .01$ by χ^2 -analysis.

TABLE 3
Percentage of requests for more cooperation with different categories of subjects in primary health-care centers using diabetes program and in control centers

	Centers using program (n = 95)	Control centers (n = 136)
Staff (%) expressing dissatisfaction with cooperation with:		
One another	13	32*
Dietitian	27	53*
Podiatrist	21	40†
Patients	6	16
Patients' relatives	18	34

* $P < .01$ and † $P < .05$ by χ^2 -analysis.

staff trained at the Diabetes Education Center did not differ significantly between the two groups of centers: 36 versus 24% in centers with the program in use and in control centers, respectively.

Other factors of importance for program implementation. There was no systematic relationship between successful implementation of the program and certain background factors, including number of inhabitants per physician, age distribution, or socioeconomic status in the catchment area (5).

Answers by staff to an open-ended question in the questionnaire revealed the following hindrances to implementation of the program: lack of knowledge of diabetes care, insufficient cooperation between staff members, poor contact with specialists, and absence of guidelines for diabetes care. Differences between the two groups of centers are shown in Table 2. These observations were corroborated by the finding that only half as much time was spent for staff meetings and continuing education in control centers compared with those with the program in use (3.9 vs. 7.0 h/mo, $P < .01$). Furthermore, a larger percentage of the staff in control centers expressed a need for more cooperation with those involved in diabetes care (Table 3).

Impact of program on treatment of patients and their health and well-being. The 10% random sample of patients comprised 196 subjects, 120 from control centers and 76 from 10 centers with the diabetes program in use. The two groups of patients were comparable with regard to sex and the following social indicators: education, economy, degree of employment, housing, and whether they lived alone.

Centers with the program in use had attracted a significantly younger patient population than the control centers (64.0 ± 0.4 and 67.5 ± 0.3 yr, respectively, $P < .001$). The mean age at onset of diabetes was 58 and 60 yr, respectively. The percentage of patients with insulin-dependent diabetes at the primary health-care centers was 11% in centers with the program in use and 13% in control centers.

As seen in Table 4, a larger percentage of patients in

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TABLE 4
Percentage of patients who answered questions about which topics they had been informed

	Centers using program	Control centers
Diet	79	58*
Exercise	67	44†
Alcohol use	61	45
Foot care	57	24‡
How to test for glucose	54	26‡
Medication		
Tablets	51	39
Insulin	14	10
Injection methods	9	13*
Late complications	6	3
Can point out unsuitable food	68	49*
Patients that made self-tests more than twice a month	62	43†
Patient treatment		
Diet only	43	23
Tablets	47	57
Insulin	10	18
Number of patients	76	120

* $P < .05$, † $P < .01$, ‡ $P < .001$ by χ^2 -analysis.

centers with the program in use reported that they had been instructed about diet, exercise, foot care, and how to test for glucose in blood and/or urine. Only a few patients (6% in centers with the program in use and 3% in control centers) said that they had received information about late complications.

Patients at primary health-care centers with the program in use had better knowledge concerning selection of food and also tested for glucose more often (Table 4). A larger percentage of these patients were treated with diet only: 43 compared to 27% in control centers (Table 4). In centers with the program in use, the nurse, physician, and dietitian were equally important as sources of information for the patient, whereas the physician was the major source of information in control centers (Table 5).

There were no differences between the two groups of patients regarding reported diabetes-related symptoms or clinical findings after standardizing for age and duration of diabetes. HbA_{1c} of the two groups of patients was 9.2 ± 0.2 and $9.7 \pm 0.2\%$ (mean \pm SE), serum creatinine was 87.1 ± 2.1 and $94.7 \pm 2.5 \mu\text{M}$ ($P < .05$), and urine albumin was 0.10 ± 0.02 and 0.14 ± 0.02 g/L in the group of centers with the program in use and in control centers, respectively.

Of the 196 patients, 26.1% reported symptoms of angina pectoris, 12.2% had myocardial infarction, 13.2% reported proteinuria, and 7.1% reported reduced perception of touch to the feet. The physical examination did not reveal any significant differences between the two groups of center patients. In the total sample of 196 patients, mean blood pressure and weight-height indices

were within the normal range. Twenty-three percent had reduced perception of vibration (toes), 49.9% showed loss of hair on feet, and 39.6% had signs of pressure on the feet.

A sample of patients (first 63 of 196 examined) was also examined by a podiatrist who classified the patient's need of foot care. Thirty-six percent were found to be in need of podiatric treatment, 27% in need of orthopedic treatment, and 6% in need of hospitalization due to different foot problems.

DISCUSSION

Implementation and roadblocks to change. The program for diabetes care and the training course included lectures on diabetes mellitus and its treatment and instructions on how to organize diabetes services by means of certain support routines. The six criteria for measuring program implementation mainly addressed organization of care including support routines. The staff of the educational unit and physicians and nurses in the primary health-care centers had agreed on the importance of these routines for qualitative diabetes care. We found great variance in the degree to which the routines had been implemented in different centers. As was shown, only 10 of 94 centers had implemented four or more of the routines by January 1983. The routines most often added between 1983 and 1984 were a register of diabetic patients and use of checklists. This would imply that these routines were more easy to implement or more accepted by the staff than the other four. One reason for this could be that these two routines do not threaten the distribution of tasks and responsibilities or other characteristics of the existing work organization, nor do they demand any extensive cooperation among staff but can easily be organized by one person. To reserve special office hours, to let a nurse or nurses take special care of diabetic patients, or to let nurses modify a patient's treatment (which in Sweden is usually done by physicians) are, on the other hand, routines demanding

TABLE 5
Percentage of patients reporting staff who supplied the most information in centers using the diabetes program and control centers

	Centers using program	Control centers
Nurse	22	7*
Physician	21	51*
Dietitian plus physician	15	18
Nurse plus physician	15	4
Dietitian	13	11
Nurse plus dietitian	6	2
Number of patients	76	120

* $P < .001$ by χ^2 -analysis.

that priorities, work roles, and responsibilities be thoroughly discussed in the primary health-care center.

Internal cooperation among staff was seen as an important factor for establishing good diabetes care by many respondents from both groups of centers, 33 and 25%. Furthermore, cooperation, involvement in decision-making processes, and time for discussions were found to be the factors most effectively differentiating between centers. From these results, we conclude that to give advice about organizational changes in a traditional lecture format is not sufficient.

Different models can be used to understand the resistance to change. In laboratory experiments on attitudinal change, McGuire et al. (6) have isolated a series of four mediators between factors such as persuasive communication and action: attention, comprehension, yielding, and retention. There is no reason to believe that the two groups of centers differed initially on these variables, because personnel from both groups of centers took part in the same course to the same extent. However, participants and others from centers with the program in use had more opportunities to discuss the routines among themselves (they participated in meetings on objectives and organization of diabetes care), which probably strengthened retention and yielding.

Kelman (7,8) differentiated three processes by which influence could be accepted and lead to action: compliance, identification, and internalization. The first process, compliance, is dependent on rewards and/or punishments and results in acceptance that is purely instrumental. In the identification process the person subjected to influence accepts the message communicated to maintain an important relationship with the communicator. This kind of change is never fully integrated and requires that the relationship to the communicator stays active and important to the person. Internalization occurs when a person changes personal attitudes or behavior because the content of the influence is congruent with his/her own value system.

The teaching program did not promote internalization due to its traditional curriculum. The criteria/routines most seldom implemented were, as discussed above, those demanding a change in priorities, work roles, and responsibility distribution—all things that can be valued in different ways. Again, acceptance of a change requires that the matter be thoroughly discussed among those concerned. Therefore, staff from centers with more frequent communication and better cooperation would have an advantage.

Patient's health and well-being. This study demonstrated that systematic implementation of a comprehensive program for diabetes care through teaching of physicians and nurses can benefit the patients. The main impact of the program seemed to be on the instructions received by the patients. Patients in centers with the program received more instruction on diet, and this group of patients also showed more knowledge of unsuitable foods. Instructions on testing for blood and urine glu-

cose also differed between the two groups of centers as did the patients' reported behavior in this area. Taken together, these findings probably explain why a greater percentage of patients could be treated with diet only, without loss in metabolic control, in centers employing the program. This effect has been analyzed elsewhere and shown to lead to considerable savings in the costs of treatment (9).

Although a larger percentage of patients in the centers with the program reported that they had received instructions on foot care, two-thirds of the patients in both groups demonstrated foot problems. One reason for this finding might be that self-care for foot problems may not come as naturally to the diabetic patient as dietary changes and self-testing of blood glucose. In addition, the elderly patient may be more dependent on professional help for this type of medical problem (10). This finding certainly does not mean that foot-care instructions are of no value but that they must be accompanied by increased availability of outside services.

No effect of the program on the development of late complications was found in this evaluation. A reason for this negative finding could be that the study was made too early after the program was started.

A new strategy. The findings reported herein prompted us to formulate a new strategy. The main objective of the new approach is to create organizational changes from within the centers. With this approach, local knowledge and creativity can be utilized. Before any formal teaching course is started, we now have the staff examine their diabetes service and formulate a local plan for development. Thereafter, key staff members are admitted to the teaching course, which is followed by on-site training over an 18-mo period. Each "student" receives ~10 h of tutoring. In addition, we promote the use of a continuing evaluation process at the local level as a tool for staff learning and internalization of the knowledge.

The new strategy is being evaluated by a randomized clinical trial involving 34 primary health-care centers and 3800 diabetic patients. The study will be completed in spring 1988.

In a pilot study the implementation process was followed at six centers. Before the start of the program the six centers fulfilled on average 62% of the six criteria shown in Table 1. After 1 yr, 84% of the local plans had been fulfilled. When the six original criteria were used, the centers had only improved by 5%. Apparently, the two sets of criteria measured different aspects of development.

Examination of the local plans showed that the centers, to a great extent, had addressed the same organizational issues as the original criteria. However, the plans were more detailed, tailored for each center, and integrated existing services. Furthermore, a third of the plans were aimed at refining existing routines. In fact, the local programs were more ambitious and richer in content than called for by the original six criteria.

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