Nationwide Program for Improving the Care of Diabetic Patients in Israeli Primary Care Centers

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OBJECTIVE — To improve the effectiveness of primary care providers in Israel to monitor and control glycemic levels of diabetic patients.

RESEARCH DESIGN AND METHODS — We designed a 2-year program to improve the effectiveness of primary care providers to administer diabetes care. The program was conducted by the largest Israeli health maintenance organization, which insures 60% of the population. Interventions included continuing medical education and establishing guidelines and diabetes registers in every clinic. A retrospective cohort study was conducted from 1995 to 1997 to evaluate the project's effect on the care of diabetic patients. One patient was randomly chosen for review from each of the physicians' updated diabetes registers. The same indicators and variables were collected for each year.

RESULTS — The response rate was 72.7%. Nationwide, 876 physicians participated in the review. From 1995 to 1997, there was a statistically significant improvement in the prevalence of performing all of the parameters for monitoring the primary care of diabetic patients. The process parameters showed a considerable improvement: the prevalence of recording weight increased from 35% of the diabetic patients in 1995 to 60% in 1997; the prevalence of conducting foot inspections increased from 40 to 63%; the prevalence of conducting fundus examinations increased from 38.5 to 68.3%; and the prevalence of measuring HbA_{1c} values increased from 30.6 to 69.9%. As a result, metabolic control significantly improved: the percentage of diabetic patients with HbA_{1c} concentration >9% decreased from 33.2% in 1995 to 22.5% in 1997; the percentage of diabetic patients with HbA_{1c} concentration <7.4% increased from 45.1 to 50.5%.

CONCLUSIONS — A major intervention plan based on quality assurance principles can improve physicians' performance on a national scale without the use of punitive administrative measures.

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Diabetes is a major health problem that seriously affects morbidity and mortality (1). As a chronic disease, diabetes has a major impact on one's quality of life. In the Western world, it is the main cause of blindness (2), end-stage renal failure (3), and amputation of lower extremities (4). According to the recent results of the U.K. Prospective Diabetes Study, good glycemic control may prevent or postpone complications and improve patients' quality of life (5). Monitoring, glycemic control, prevention, and early detection of complications are the mainstays of diabetes care (5,6).

Primary care physicians play crucial roles in managing diabetic care in the community. As compared with consultants, they are more accessible, have a more thorough knowledge of the patients and their families, and generally display a more "holistic" attitude toward treatment and care.

According to previous surveys (7), the prevalence of diagnosed diabetes in Israel is between 3 and 6%. Prevalence increases with age, reaching 10% by the age of 65 years. Thus far, there are no data available on the quality of diabetes care on a nationwide scale in Israel.

Since the enactment of the 1995 National Health Care Bill, every Israeli citizen is insured in one of the country's health maintenance organizations (HMOs), which, as defined by law, are responsible for providing all aspects of health care.

In 1995, Kupat Holim Clalit (KHC) decided to implement nationwide the St. Vincent Declaration, a joint effort of the World Health Organization–Europe and the International Diabetes Federation to improve care for diabetes patients, in its primary care centers. KHC insures 60% of the Israeli population and provides 3.6 million people with health care services.

Community care is provided mainly by the staff, including physicians, nurses, pharmacists, and office staff, in primary care centers. Approximately 15% of insured patients prefer independent physicians.

KHC employs 3,545 primary care providers: 1,495 primary care physicians (not including pediatricians) and 2,050 nurses.

This study aims *1*) to describe the state of diabetic care in KHC and in primary care centers before the intervention in 1995, and *2*) to estimate the influence of the planned interventions on the quality of care of diabetic patients in the field of primary care by evaluating the changes in monitoring and glycemic control.

The main interventions used to achieve these goals were administrative and quality assurance interventions. Administrative measures included the establishment of a multidisciplinary team that consisted of a primary

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Abbreviations: CME, continuing medical education; HMO, health maintenance organization; KHC, Kupat Holim Clalit.

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

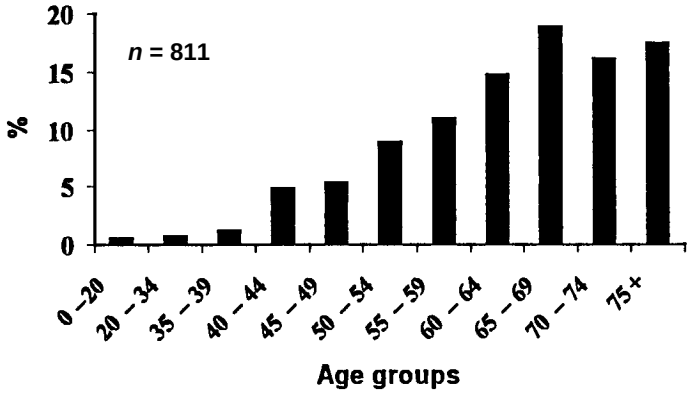

Figure 1—*The age demographics (years) of the study population.*

care physician (the chairman), a diabetologist, a dietitian, a nurse, and a health educator in every district of KHC nationwide. Diabetes coordinators, 80% of whom were nurses, were appointed in every primary care clinic. Special diabetes flowsheets were used as part of the medical records. To establish guidelines for quality assurance interventions, KHC published the Hebrew version of the *Desktop Guide to the Management of NIDDM* and distributed issues by mail to all practicing physicians of the HMO (8).

Barrier identification was performed at each separate intervention. Among the members of the leading team at the headquarters and according to feedback from the members of the program's district leading teams, consensus about the interventions was obtained among the diabetologists, primary care physicians, nurses, dietitians, and health educators.

Every primary care clinic established a register of diabetic patients for each physician.

Data were collected on the performance of primary care physicians before, during, and after the interventions, as reported in RESULTS.

Annual performance feedback was given to the districts' multidisciplinary teams. The feedback covered many areas, such as participation of the target population in continuing medical education (CME) program, satisfaction with the CME, knowledge improvement, and improvement of registers.

The contents of the CME were planned before the intervention for two years ahead. Every year was devoted to different aspects of diabetes care. A common CME program was established nationwide.The CME was conducted in small interdisciplinary learning groups, which included physicians, nurses, and dietitians. Various aspects of the CME, including participation rate, knowledge improvement, and satisfaction, were annually appraised.

RESEARCH DESIGN AND METHODS

— At the end of 1997, 2 years after the start of the Diabetes in Community project, a retrospective cohort study was conducted to evaluate the project's effect on the care of diabetic patients in the community. Data concerning the state of care in 1995, before the program was started, were designed to serve as the compare data of the study. Each patient in the cohort served as his or her own matched control subject.

Every clinic received a random number from 1 to 20 per physician; the number they were given determined which patient from the register they would review. It was the responsibility of each clinic's program coordinator to perform this task. All of the chosen patients had to be diagnosed with diabetes at least since 1995 and had to be in the care of the same primary physician during the years 1995–1997. The same indicators and variables were collected for every year.

Of all primary care physicians of KHC, 80.6% (1,205 physicians) were expected to participate in the review.

A data collection sheet, which contained each patient's demographic data, the reviewer data, and data on the quality of the diabetes care, was prepared for each individual review. The demographic data included the patient's identification number, age, sex, year of diagnosis, and the type of diabetes treatment given. Follow-up variables were performance of the weight inspection; fundus examination; foot inspection; blood pressure examination; fasting blood glucose test; HbA_{1c} test; urine test; microalbumin in urine test; total, HDL, and LDL cholesterol tests; and triglycerides test. Glycemic control was evaluated on the basis of HbA_{1c} levels. Each of the variables should have been recorded at least once during the year before the intervention and the intervention years 1996 and 1997. The local district team was responsible for carrying out the review. Because the medical union objected to the nurses performing the reviewing processes, the reviewers consisted of the physicians, the diabetes clinic coordinators, or reviewers not employed by the clinic. The data were gathered from the medical records of the chosen patients. Data are expressed as real numbers and percentages were analyzed by use of SPSSPC for Windows; the χ^2 test was used to determine statistical significance in categorical variables. All *P* values were two-sided.

To validate the results, we independently reviewed the frequency of HbA_{1c} tests per patient per year, which were conducted through the laboratories of the KHC. Every laboratory reported the number of annual HbA_{1c} tests for the years 1995 and 1997.

RESULTS

— Of 1,205 expected data collection sheets nationwide, 876 were gathered (72.7% response rate). The data collection sheets represent a population of ~91,980 diabetic patients. Of the 876 sheets, 42.6% were gathered by the physicians, 31.9% were gathered by clinic coordinators (80% of whom were nurses), and 25.5% were gathered by reviewers outside of the clinic.

We did not find any consistent differences in reporting among the various reviewers.

Demographic population data

Of 876 patients, information was obtained for 815 patients. Of these patients, 455 (52%) were women and 360 (48%) were men. The majority (67.5%) of the patients were aged ≥60 years (Fig. 1), and 28% were diagnosed with diabetes <5 years before the beginning of the study; 47.9% were diagnosed 5–15 years before the beginning of the study, and 24.1% were known diabetic patients for >15 years before the initiation of the study.

Diabetes monitoring in the primary care clinics

There was a substantial and statistically significant improvement in diabetes monitoring ($P < 0.0001$) (Table 1). The prevalence

Table 1—*The monitoring of diabetic patients in 1995 and 1997*

Examination/inspection	1995	1997
Weight	304 (35)	529 (60)
Height	234 (27)	379 (43)
Foot	322 (40)	550 (63)
Fundus	337 (38.5)	598 (68.3)
Blood pressure	587 (67)	749 (86)
Urine	535 (61.1)	676 (77.2)
Microalbumin urine	102 (11.6)	381 (43.5)
Fasting blood glucose	691 (79)	820 (93)
HbA_{1c}	268 (30.6)	612 (69.9)
Cholesterol	546 (62.3)	729 (83.2)
HDL	282 (32.2)	500 (57.1)
Triglycerides	511 (58.3)	708 (80.8)

Data are *n* (%), where *n* is the number of patients monitored per test per year and % is the percentage of patients from the overall study population ($n = 876$) who were monitored. $P < 0.0001$.

of recording weight inspections increased from 35% of the patients in 1995 to 60% of the patients in 1997; the prevalence of conducting foot inspections increased from 40 to 63%; the prevalence of conducting fundus examinations increased from 38.5 to 68.3%; and the prevalence of conducting HbA_{1c} examinations increased from 30.6 to 69.9%. The prevalence of recording blood pressure examinations increased from 67 to 86%, cholesterol examinations (at least once a year) increased from 62.3 to 83.2%, and fasting blood glucose inspection increased from 79% in 1995 to 93% in 1997.

The independent results from the laboratories' reports show that the frequency of HbA_{1c} tests almost doubled from 0.6 tests per diabetic patient per year in 1995 to 1.14 tests per diabetic patient per year in 1997 ($P < 0.0001$).

Glycemic control

Glycemic control improved, especially within the group with highly uncontrolled diabetes. The percentage of patients with HbA_{1c} concentration >9% decreased from 33 to 22%, showing an improvement of 33% ($P < 0.008$). The proportion of patients with well-controlled diabetes (HbA_{1c} concentration <7.4%) increased from 46 to 51%, showing a 10.9% improvement ($P = 0.165$) (Fig. 2).

CONCLUSIONS

The characteristics of primary care are high availability, long-term care, continuity of care, and a holistic approach to caring for the patients and their families (9,10). All of these characteristics make primary care providers an excellent choice for the care of diabetic patients.

The chief obstacle in providing high-quality diabetes care in Israel is the variation in standards of care among the different care providers (11–14). According to Tabenkin et al. (15) and Gross et al. (16), primary care physicians in KHC consist of generalists (41.2–50%), family medicine specialists (28.6–30%), and specialists in other disciplines (mainly internists) (30.2 and 20%, respectively). Another reason for the variation in practice is the fact that Israel is a society composed of immigrants. Only ~24% of the primary care physicians completed their medical studies in Israel. All others graduated elsewhere; 48% graduated in Eastern Europe (16). These two reasons contribute to the variation of care in the primary care centers of KHC.

The demographic data in this study are not representative of the Israeli population as a whole: people aged ≥65 years and those of lower socioeconomic classes are overrepresented in the population insured by KHC (16a).

Although the study population represents the nationwide population insured by KHC, this population does not represent the entire Israeli population.

Before the intervention in 1995, the state of diabetes care in KHC in the field of primary care resembled that found by other studies on the field of primary care without previous intervention (13,17–20). For instance, Carney and Helliwell (19) reported a blood glucose recording rate in 61.9%, an HbA_{1c} recording rate in 13.4%, a cholesterol examination in 15.9%, and a blood pressure recording in 58.8% of the diabetic patients' records. Dunn and Bough (17) reported that 44% of the diabetic patients in primary care had undergone a full eye examination and that cholesterol level measurements, foot inspections, and glycemic control and blood pressure measurements were performed in 25, 57, and >75% of their patients, respectively. Weiner et al. (12) found that 16.3% of the diabetic patients in the Medicare program received an HbA_{1c} test, 45.9% underwent a fundus examination, and 55.1% had their cholesterol levels measured.

In comparison with the aforementioned studies, this study reports that, before the intervention, HbA_{1c} tests were performed on 30.6%, fundus inspections were performed on 38.5%, and foot inspections were performed on 40% of the patients. Monitoring of cholesterol (62.3%) and blood pressure (67%) were more prevalent than in studies conducted before the intervention.

Therefore, we conclude that the management of diabetes care in the primary care clinics of KHC was similar to that in other countries. During the improvement program, all indicators of care improved significantly ($P < 0.0001$), and some indicators, such as the prevalence of HbA_{1c} monitoring, increased by more than twofold. The same information was gathered from the laboratories' data, which showed doubling in the volume of HbA_{1c} tests performed. These data verify the results that were based on medical records.

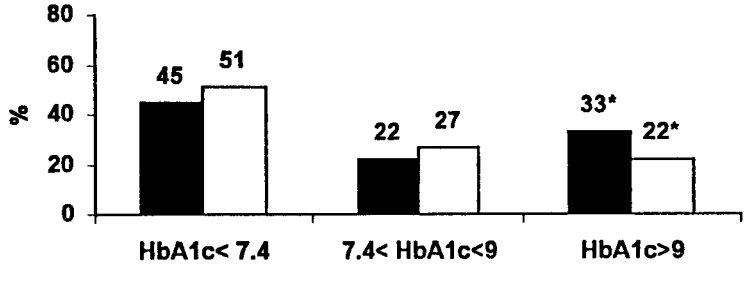

Figure 2—*The prevalence of monitoring the glycemic control of the study population in 1995 (■) and 1997 (□).* $P < 0.01$.

Other studies also reported considerable improvement after specific intervention. The Poole Study reported on intervention with diabetes registers, report charts, and audits. They reported that after intervention, fasting blood glucose levels were measured in 82%, HbA_{1c} levels were measured in 76%, cholesterol levels were measured in 25%, foot inspections were performed on 29%, blood pressure was measured in 82%, and eye examinations were performed on 44% of diabetic patients (17). These data are not different than those of our study, except for the data concerning eye examinations and foot inspections, which are two performance areas in which we reported more favorable results.

Carney and Halliwell reported on the influence of CME on improving diabetes care between 1986 and 1991. They found a substantial improvement in the prevalence of recording blood glucose levels in diabetic patients, which increased from 61.9 to 87.7%; the prevalence of recording HbA_{1c} levels increased from 13.4 to 87.4%; the prevalence of recording blood cholesterol levels increased from 15.9 to 59.7%; and the prevalence of measuring blood pressure increased from 58.8 to 72.9%. There was no improvement in the prevalence of referrals for an eye examination (18). O'Connor et al. (21) reported on the improvement in diabetes control after continuous quality improvement intervention in primary care clinics in Minnesota. The percentage of patients with HbA_{1c} values >10 was 12 vs. 27% of the patients from a control clinic (21). The Amsterdam program reported on improvement in diabetes, cholesterol, and hypertension control as well (22).

Unlike the programs in other countries, the diabetes in community program in Israel was implemented nationwide with multifaceted interventions.

The main confounder of our findings was the documentation of the results, which may be deficient. Recent patient-visit surveys from primary care reports show that some primary care physicians in Israel recorded up to 87% of patient visits, whereas others recorded only 25% of patient visits. The frequency of recording is influenced by the retrievability of medical records, the physicians' medical education, and each physician's personality traits (23). Therefore, we may conclude that the improvement in monitoring may be partly attributed to improvements in recording. The glycemic control also resembled other studies in the same circumstances (19,20,24). In this study, during 2 years, the percentage of diabetic patients with HbA_{1c} values >9% decreased from 33 to 22%, which marks a significant 33% improvement ($P < 0.001$).

Unfortunately, there are no magic solutions. What we can do is work hard to determine the aspects of care which will bring about the greatest improvements in performance (25). Of the "three Rs" (register, review, and recall) of administrative measures in quality improvement, only two were introduced, register and review; recall was not used, although it is a powerful intervention with proven results (26). Except for the establishment of simple administrative measures, such as placing diabetes monitoring sheets in medical records, diabetes care in the primary care clinics was not reorganized. The performance feedback did not reach the level of primary care providers; rather, it remained at the management level.

Despite all of this, there was a considerable improvement, without financial incentives or administrative restrictions, in the care of diabetic patients. We mainly attribute the improvement in the effectiveness of monitoring diabetic patients to the quality assurance measures, such as the development of guidelines, educational measures, and the CME.

This study represents 91,000 diabetic patients in Israel who are insured by KHC. It shows that primary care providers are important partners in improving the quality of care of diabetic patients in the community and in implementing the St. Vincent Declaration.

We conclude that simple interventions can result in major changes in primary care providers' performances and, more importantly, in patients' outcomes.

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