Evaluation of the Impact of the Kuwait Diabetes Care Program on the Quality of Diabetes Care

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Key Words

Diabetes · Primary care · Quality of care · Kuwait

Abstract

Objectives: To evaluate the impact of the Kuwait Diabetes Care Program on the quality of care provided for diabetic patients in the Primary Health Care setting. **Materials and Methods:** The Kuwait Diabetes Care Program developed, published and disseminated clinical practice guidelines, conducted training courses, standards for diabetes care, and introduced a monitoring and evaluation system. Four audits (September 1999, October 2001, 2002 and 2003) were carried out at five diabetic clinics. September 1999 referred to in this study as first (baseline) audit was prior to the introduction of the clinical practice guidelines. The three other audits were performed to assess adherence with the guidelines in the administrative management of patients' records and implementation of the standards. Two hundred and fifty patients were involved in the study. **Results:** The proportion of patients with organized, structured files increased significantly from 60.0 to 100.0% ($p < 0.001$), and recording of patients' demographic data increased from 38.6 to 95.6% ($p < 0.001$). Use of structured visit sheets, proper fixation of the laboratory and prescription sheets had also improved significantly. The prevalence of smoking assessment, fundus examination, and foot examination increased significantly

from 2.8 to 27.2% ($p < 0.001$); 2.4 to 31.6% ($p < 0.001$); 0.4 to 40.4% ($p < 0.001$), respectively. The prevalence of measuring urinary microalbumin, serum creatinine and HbA_{1c} increased significantly from 4.4 to 26.4% ($p < 0.001$); 16.0 to 78.4% ($p < 0.001$), and 10.4 to 60.8% ($p < 0.001$), respectively. The prevalence of measuring serum total cholesterol, triglycerides, HDL-C, and LDL-C levels increased significantly from 16.4 to 80.0% ($p < 0.001$); 14.4 to 80.0% ($p < 0.001$); 2.4 to 32.8% ($p < 0.001$), and 2.4 to 24.0% ($p < 0.001$), respectively. **Conclusion:** This audit shows that a national diabetes program was associated with improved processes of diabetes care. Further, support from health authorities, provision of manpower resources, a continuing monitoring and evaluation system, and conduction of structured education programs may lead to further improvements in the quality of diabetes care.

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Introduction

Diabetes mellitus is a major health problem worldwide with a great impact on patient well-being and health care resources. Diabetic complications, such as coronary artery disease, peripheral vascular disease, stroke, diabetic neuropathy, renal failure and blindness, result in significant disability, reduce life expectancy and impose enormous health costs for virtually every society [1]. Commu-

nity-based studies have shown that well organized and structured diabetes care programs can improve the process and outcome of the care of diabetic populations [2, 3]. The World Health Organization has set guidelines and initiatives for national diabetes programs to improve the quality of diabetes care worldwide [4], and national diabetes programs have become extremely important in many countries as exemplified in the United Kingdom, where the National Service Framework for diabetes initiated a 10-year program in 2001 [5].

The socioeconomic development and changes in lifestyles in Kuwait have been accompanied by the emergence of diabetes as a major health problem [6]. The prevalence of type 2 diabetes has been reported to be approximately 15.0% [7]. The incidence of type 1 diabetes has increased nearly fivefold, from approximately 4.0 to 20.0 per 100,000, within the last two decades [8, 9]. Diabetes care is largely provided at the primary care level through several mini-diabetic clinics distributed over five health regions. The Kuwait Diabetes Care Program (KDCP) (appendix) was established to improve the quality of care provided for diabetic patients in the Primary Health Care (PHC) setting throughout Kuwait. We carried out this study to evaluate the impact of KDCP on the quality of diabetes care.

Materials and Methods

Four cycles of audits were performed. The first baseline audit was conducted to evaluate the quality of diabetes care before the onset of the program (i.e. September 1999). Second, third, and fourth audits were performed in October 2001, 2002, and 2003, respectively. Five out of 21 centers with mini-diabetic clinics were selected, representing the five health regions. Centers with family medicine practice were not included in the study. The selection of the clinics was done under the sponsorship of the Central Department of Primary Health Care (CDPHC) because of other ongoing programs in these centers for other specialties. However, the selected diabetic clinics were not different from other clinics in terms of structure, patient load, availability of dieticians and nurses, availability of fundus camera or delivery of diabetes care, and they were not involved in other quality improvement programs or research that affects the findings. The working group were taught how to survey and collect data. Data collection was done simultaneously at the five diabetic clinics using designed sheets and 50 medical records were studied in each centre, thereby providing a total of 250 records for each audit. Because of organizational barriers, medical records were selected by convenience sampling for patients who attended the clinics from 1st of October to 30th of September for each audit year. Medical records were included only if the patients had had three or more visits during that year to ensure that the treating physician had enough time to implement the guidelines. The designed data collection

sheets contained the items necessary to measure the structure of the clinic and the process of diabetes care. It was decided at the outset only to use process measures to audit the program initially, this being necessary because at baseline measurements such as for HbA_{1c} were not performed frequently enough to provide data and outcomes such as amputation and laser photocoagulation were not being recorded.

Scoring of data was in the form of yes or no to indicate the implementation of the standard. There was general agreement about the interpretation of the data from the medical records. Adherence of the patient to his appointment was measured at the survey period.

Statistical Methods

Data obtained from each audit are presented as percentages. The χ^2 for linear trend was used to assess the significance of the trend in proportions between implementation of the standards in the four cycles of audits, and the data were compared between the baseline and the fourth audit. The normal Z-test was used to determine the significance of the difference between the first and fourth audits. The cut-off level for significance was <0.05 .

Results

Human Resources, Administrative Structure and Specialized Clinics for Diabetes Care

The manpower resources and access to specialized and laboratory services involved in diabetes care over the four periods in the studied clinics are summarized in table 1. Shortage of physicians and lack of dieticians, diabetes nurses, educators, social workers and secretaries were the main deficiencies.

The Impact of KDCP on the Process of Diabetes Care

The changes in the process of administrative standards in diabetes services over the four periods are given in table 2. Although almost all patients have identity booklets with appointment dates registered, the adherence to appointment was not optimal (70.0–73.4%) and did not improve. The availability of an appointment registry in the clinics improved, but there was no policy for defaulters. The filing system improved significantly from the baseline (150/250, 60%) to fourth audit (250/250, 100%; $p < 0.001$) and recording patients' identification data increased from 96/249 (38.6%) to 239/250 (95.6%; $p < 0.001$). Use of structured visit sheets, proper fixation of the laboratory and prescription sheets had also improved significantly.

The improvements in the process of clinical diabetes care are shown in table 3. There was a significant improvement in implementation of all the clinical standards. The prevalence of smoking assessment, fundus ex-

Table 1. Manpower resources and access to specialized and laboratory services involved in diabetes care over the four periods in the studied clinics

Measure	First audit (baseline)	Second audit Oct. 2001	Third audit Oct. 2002	Fourth audit Oct. 2003
Total physicians	15	14	14	14
Total registered nurses	9	8	6	6
Availability of				
Diabetes nurse	0	0	0	0
Diabetes educator	0	0	0	0
Dietician	0	0	0	1
Social worker	0	0	0	0
Secretary	0	1	1	0
Presence of appointment registry	1/5	1/5	3/5	4/5
Presence of policy for appointment and defaulters	1/5	1/5	1/5	1/5
Access to fundus clinic	5/5	5/5	5/5	5/5
Access to foot care clinic	3/5	4/5	5/5	5/5
Availability of glycosylated hemoglobin measurement	5/5	5/5	5/5	5/5
Availability of microalbumin measurement	5/5	5/5	5/5	5/5

Table 2. Changes in the process of administrative care in diabetes services over the four periods

Measure	First audit (baseline)	Second audit Oct. 2001	Third audit Oct. 2002	Fourth audit Oct. 2003	p linear trend	p for A1 vs. A4
Appointment booklet	250/250 (100.0)	249/259 (99.6)	249/259 (99.6)	250/250 (100.0)	NS	NS
Appointment registered in the diabetes booklet	233/250 (93.2)	222/250 (88.8)	241/250 (96.4)	240/250 (96.0)	NS	NS
Adherence to appointment	171/233 (73.4)	161/222 (72.5)	177/241 (73.4)	168/240 (70.0)	NS	NS
Presence of structured and organized file	150/250 (60.0)	150/250 (60.0)	218/250 (87.2)	250/250 (100.0)	<0.001	<0.001
Patient's identification data	96/249 (38.6)	194/250 (77.6)	238/250 (95.2)	239/250 (95.6)	<0.001	<0.001
Visit sheets						
Initial visit sheet	–	–	7/250 (2.8)	15/250 (6.0)		
Regular visit sheet	–	4/250 (1.6)	45/250 (18.0)	104/250 (41.6)	<0.001	<0.001
Annual visit sheet	–	1/250 (0.4)	80/250 (32.0)	50/250 (20.0)		
Laboratory sheets in the proper place	72/249 (28.9)	67/250 (26.8)	126/250 (50.4)	228/250 (91.2)	<0.001	<0.001
Prescription sheet in the proper place	102/249 (41.0)	125/250 (50.0)	245/250 (98.0)	250/250 (100.0)	<0.001	<0.001

A1 = First audit; A4 = fourth audit. Figures in parentheses indicate percentages.

amination, and foot examination increased significantly from 7/250 (2.8%) to 68/250 (27.2%; $p < 0.001$); 6/250 (2.4%) to 79/250 (31.6%; $p < 0.001$), and 1/250 (0.4%) to 101/250 (40.4%; $p < 0.001$), respectively. The prevalence of measuring urinary microalbumin, serum creatinine, and HbA_{1c} increased significantly from 11/250 (4.4%) to 66/250 (26.4%; $p < 0.001$); 40/250 (16%) to 196/250 (78.4%; $p < 0.001$), and 26/250 (10.4%) to 152/250 (60.8%; $p < 0.001$), respectively. The prevalence of measuring serum total cholesterol, triglycerides, HDL-C, and LDL-C levels increased significantly from 16.4 to 80.0% ($p < 0.001$); 14.4 to 80.0% ($p < 0.001$); 2.4 to 32.8% ($p < 0.001$), and 2.4 to 24.0% ($p < 0.001$), respectively.

The Impact of the KDCP on the Process of Continuing Medical Education and Patients' Education Programs

Clinical practice guidelines for diabetes care were not available before the onset of the program and therefore the program has provided it in all the clinics. Continuing Medical Education (CME) activities for the medical staff were available in three of the five surveyed clinics at the first audit and they were available in the five clinics at the fourth audit. Educational activities for nursing staff were available in only one clinic at the first audit and improved to be available in three clinics at the fourth audit. Patients' education activities were available in one or two of the surveyed clinics, but the activities were single and not

Table 3. Changes in the process of clinical care in diabetes services over the four periods

Measure	First audit (baseline)	Second audit Oct. 2001	Third audit Oct. 2002	Fourth audit Oct. 2003	p linear trend	p A1 vs. A4
Assessment of smoking status	7/250 (2.8)	29/250 (11.6)	5/250 (2.0)	68/250 (27.2)	<0.001	<0.001
Fundus examination	6/250 (2.4)	17/250 (6.8)	25/250 (10.0)	79/250 (31.6)	<0.001	<0.001
Foot examination	1/250 (0.4)	35/250 (14)	43/250 (17.2)	101/250 (40.4)	<0.001	<0.001
Measurement of						
Microalbumin	11/250 (4.4)	40/250 (16.0)	50/250 (20.0)	66/250 (26.4)	<0.001	<0.001
Serum creatinine	40/250 (16.0)	105/250 (42.0)	127/250 (50.8)	196/250 (78.4)	<0.001	<0.001
Glycosylated hemoglobin	26/250 (10.4)	76/250 (30.4)	89/250 (35.6)	152/250 (60.8)	<0.001	<0.001
Triglycerides	36/250 (14.4)	112/250 (44.8)	144/249 (57.8)	200/250 (80.0)	<0.001	<0.001
Total cholesterol	41/250 (16.4)	110/250 (44.0)	145/249 (58.2)	200/250 (80.0)	<0.001	<0.001
HDL cholesterol	6/250 (2.4)	25/250 (10.0)	43/249 (17.3)	82/250 (32.8)	<0.001	<0.001
LDL cholesterol	6/250 (2.4)	25/250 (10.0)	41/249 (16.5)	60/250 (24.0)	<0.001	<0.001

Figures in parentheses indicate percentages.

structured or coupled with treatment programs. However, there were some educational leaflets and educational posters in all the clinics.

Discussion

The main finding of this study, based on several interventional strategies and continuing audits of diabetes care services, is the improvement in the process of diabetes care as reported previously [2, 3, 10, 11]. Programs which used multiple intervention strategies consisting of provision of clinical guidelines, workshops and training, clear management structure, audit and feedback were more successful in effecting change [2, 3] than programs which used only consultation models and chart audits [11, 12]. Our study demonstrated that the majority of the standards were not optimally achieved. Auditing for implementation of the standards done by others showed that although it was successful in changing the general process of care in the practice, it was unsuccessful in achieving the standards set for diabetes care [13], and that standard of care of diabetics by general practitioners was generally not optimal [14].

The importance of continuing audit of diabetes services to ensure the implementation of standards of care has already been recognized [14, 15]. Reauditing in this study showed that KDCP was successful in changing all the items that constitute the process of clinical care similar to other studies [2, 3, 11, 12], but it was only partly successful in changing the structure of diabetes care and

educational efforts consistent with other findings [3, 12]. Drake and Baumer [11] reported that there was difficulty in improving manpower resources and suggested that clinical governance might have a positive effect on rectifying service deficiencies. Our study revealed that there was no improvement in patients' adherence to appointments. Griffin [16] has suggested a number of strategies (including patient reminders and induction videos, logistical and administrative changes in the clinic, training in consultation skills for health professionals) that have the potential to decrease the number of defaulters.

The improvement in implementation of the clinical standards reported in our study could be partly attributed to the improvements in the filing system, the medical records, as well as the feedback to the physicians regarding the importance of documentation in the records. In addition, the recent introduction and use of fundus cameras in the PHC setting has contributed to the improvement of fundus examination.

The recent introduction of the CME system in the Ministry of Health has contributed largely to the improvement in conducting CME programs for the medical staff as well as for patients. Studies have shown that changing knowledge was not enough for improving care, but changing beliefs and attitudes is equally important in improving implementation of guidelines [17] and, therefore, resulting in improvement of the clinical management and education of diabetic patients. Structured education/treatment programs carried out by physicians, dieticians, and diabetes nurse educators have been shown to be effective in improving the knowledge and metabol-

ic control, as well as in reducing hospitalization and amputation rates [18–20]. Therefore, the educational program must provide encouragement, use behavioral strategies, and be coupled with expert adjustment of medication to obtain the desired outcome.

There are several limitations to our study. It lacked proper control group, electronic filing system and structured visit sheets, which resulted in convenience sampling. In addition, laboratory measurements for lipid profile, HbA_{1c} and microalbuminuria were done only in hospital laboratories during the study period. This might have contributed to the shortfall in implementation of these standards. Several interventions were used in the KDCP and, therefore, it is difficult to know the effect of each one in isolation. Most importantly, we did not study the impact of the program on the outcome that would have necessitated the use of structured self-educational/treatment programs using specific behavior change strategies provided by nurses and other health professionals [18].

Conclusion

Our study has shown that a national diabetes program was associated with improved processes of diabetes care. However, it was only partly associated with changes in the structure and conducting educational programs. Support from health authorities, provision of manpower resources, continuous monitoring and evaluation system, and conduction of structured education programs may lead to further improvements in the quality of diabetes care.

Acknowledgements

Dr. Afaf Al-Adsani, chairperson of the KDCP, would like to thank all members of the working group for their cooperation. We would thank Dr. Yousif Al-Nissef, Dr. Laila Al-Dosari, Directors of PHC areas for their support, WHO experts Dr. Assaf Al-Assaf and Dr. Imad El-Kebbi for their contribution, Prof. Philip Home for his valuable comments on the manuscript. Prof. Mohamed Moussa for assistance in statistical analysis; all physicians in PHC for their cooperation to improve diabetes care and the secretarial staff in the CDPHC for assistance with the administrative work.

Appendix

Establishment of the KDCP

The KDCP was established in September 1999 by a ministerial decree under the auspices of the CDPHC. A working group

was formed, which included a chairperson and five members, each representing a health region. The main goal of the program was to improve the quality of care provided for diabetic patients in the PHC setting throughout Kuwait. Subsequently, the general plan was developed [21]. The main strategies which were set to achieve this goal were (a) development, publication, and dissemination of clinical practice guidelines for diabetes care, (b) development and dissemination of standards for diabetes care, (c) conducting training courses, and (d) establishing a monitoring system to ensure implementation of these standards.

Intervention Strategies

The clinical practice guidelines for diabetes care were developed and distributed through the CDPHC to all clinics of the PHC regions. The developed guidelines included standards of care to enhance the practice of ordering HbA_{1c}, urine microalbumin, serum creatinine and lipid profiles, in addition to the performance of fundus and foot examinations, and education about the health risks of smoking.

Twelve standards and several indicators of diabetes care were developed to be implemented in the diabetic clinics. The working group developed the following standards: proper appointment system, proper filing system, availability of diabetes care team, assessment of smoking status, fundus and foot examination, measurement of HbA_{1c}, serum creatinine, lipid profile, and urinary microalbumin, conducting CME activities for physicians and nurses, and participation in patients' education. The standards were developed based on international recommendations [22–24], and main deficiencies observed in practice. The standards are mainly set to improve the structure and process of diabetes care. The standards and indicators are available from the authors on request.

Training courses for physicians working in PHC were conducted. Currently, primary care physicians (n = 806) in Kuwait consists of 573 general practitioners (GPs), 70 family medicine specialists, 73 generalists working in mini-diabetics clinics, and 90 in mini-gynecology and obstetrics clinics. The first training course was conducted from 31 March to 4 April 2001 for 59 physicians working in diabetic mini-clinics at PHC centers. The course was conducted over 5 days (3 h per day). The clinical practice guidelines, formats of visit sheets and the standards to be implemented were distributed during the course. The course covered the following subjects: standards of care for diabetic patients and indicators for measurement, definition of diabetes mellitus, status of diabetes in Kuwait, screening and classification of diabetes, type 1 and type 2 diabetes: etiology, pathogenesis, and treatment. The course also covered acute and chronic complications of diabetes such as hypoglycemia and hyperglycemic emergencies, diabetic retinopathy, nephropathy, neuropathy and diabetic foot, hypertension and macrovascular complications. Emphasis on glucose monitoring and guidelines for glycemic and lipid control were also discussed. The role of education, exercise, and medical nutritional therapy in diabetes was emphasized. The course also covered an update on oral antihyperglycemic agents, insulin therapy, and combination therapy.

Subsequent courses were conducted in cycles periodically for GPs working at the PHC. Each cycle accommodated about 80 GPs.

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