

An audit of diabetes care at 3 centres in Alexandria

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تدقيق على رعاية السكري في ثلاثة مراكز في الإسكندرية
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الخلاصة: للتدقيق على الخدمات المقدمة للسكريين في ثلاثة مراكز في الإسكندرية تم اختيار ثلاثة مؤشرات هي البنية والإجراءات والحصائل. وقد كانت البنية سيئة، ومن مشاكلها الرئيسية عدم وجود نظام للمواعيد والاتصال بالمرضى، وقصور في موارد المختبرات [المعامل] وعدم وجود المواد التشخيصية. أما الإجراءات فقد كانت سيئة أيضاً في 69.2% من المرضى، ومن أوجه القصور فيها: غياب المعلومات الأساسية في السجلات، وضياع الفحوصات السريرية الأساسية، كما كانت درجة التحكم في المرض سيئة من وجهة نظر 49.2% من المرضى، ولم ينجو من الإصابة بأية مضاعفات سوى 30.6% من المرضى. وقد كان الامتثال للمواعيد جيداً في رأي 80% من المرضى. أما الحصائل الأفضل (مضاعفات أقل وامتثال أكثر) فقد ترافقت ترافقاً يُعتدُّ به إحصائياً. مع سوء إجراءات الرعاية. ولا يمكن أن نعتبر ذلك من المنبئات ذات المصدقية للحصائل لأن الرعاية الجيدة قد يُشرع بها مع وجود المضاعفات.

ABSTRACT Selected indicators for structure, process and outcome of care were used to audit diabetes care in 3 centres in Alexandria. Structure was poor: main problems included absence of appointment and recall system, deficiencies in laboratory resources and lack of educational material. Process of care was poor for 69.2% of patients: deficiencies included absence of essential information in records and missing some essential clinical examinations. Degree of control was poor for 49.2% of patients and only 30.6% had no complications. Compliance to appointment was good for about 80% of patients. Better outcome (fewer complications and higher compliance) was significantly associated with poor process of care. This cannot, however, be considered a valid predictor of outcome as good care might be initiated by the presence of complications.

Audit des soins aux diabétiques dans trois centres d'Alexandrie

RÉSUMÉ Un certain nombre d'indicateurs de structure, de processus et de résultats des soins ont été utilisés pour réaliser un audit des soins aux diabétiques dans trois centres d'Alexandrie. La structure s'est avérée médiocre : les principaux problèmes étaient l'absence de système de rendez-vous et de rappel, des insuffisances en termes de ressources de laboratoire et le manque de matériel pédagogique. Le processus de soins était déficient pour 69,2 % des patients : les points faibles étaient l'absence d'informations essentielles dans les dossiers et l'omission de certains examens cliniques essentiels. Le degré de contrôle était mauvais pour 49,2 % des patients, et seuls 30,6 % n'avaient pas de complications. Le respect des rendez-vous médicaux était bon pour environ 80 % des patients. On a observé une association significative entre de meilleurs résultats (moins de complications et meilleur respect des rendez-vous médicaux) et un mauvais processus de soins. Toutefois, cette association ne peut pas être considérée comme un facteur prédictif de résultats valable, dans la mesure où la mise en place de soins de qualité peut être motivée par la présence de complications.

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Introduction

Diabetes is one of the major world health problems: prevalence for all age groups worldwide was estimated to be 2.8% in 2000 and projected to be 4.4% in 2030 [1]. The 10 countries estimated to have the highest numbers of people with diabetes in 2000 and 2030 are listed by The International Diabetes Federation *Diabetes atlas 2000* [2]. The top 3 countries are the same as those identified for 1995 (China, India and the United States of America) [3]. Bangladesh, Brazil, Indonesia, Japan, and Pakistan also appear in the lists for both 2000 and 2030. Italy and the Russian Federation appear in the list for 2000 but are replaced by Egypt and the Philippines for 2030, reflecting anticipated changes in population and structure in these countries.

The total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030. The urban population in developing countries is projected to double between 2000 and 2030. For Egypt, the total projected number of people with diabetes is 6.7 million [1].

Treatment and preventive care in persons with diabetes can slow the progression of end-stage complications and reduce the risk of cardiovascular and other diabetes-related disease [4–6]. On the basis of these findings, there has been substantial recent interest in diabetes disease management interventions, guidelines and care practice [7,8]. As the vast majority of diabetes care occurs in primary care settings, to promote proper management, standards for care and clinical practice guidelines targeting primary care providers (among others) have been published by professional organizations such as the Canadian Diabetes Association [9], the American Diabetes Association [10] and the World Health Organization (WHO) [11].

Quality of medical practice and record registration are related. A medical audit is “a detailed review and evaluation of selected clinical records by qualified professional personnel for evaluating quality of medical care” and it is one of the most important functions of the medical staff. The audit committee reviews medical records to determine whether the appropriate action was taken and examine the processes, and to determine whether if the process had been different, i.e. investigation, diagnosis, etc., the outcome would have been different [12]. Audit of diabetes care is now becoming common in general practice [13].

The aim of this study was to assess the care provided at 3 diabetes centres in Alexandria in terms of structure, process and outcome in accordance with documentation and adherence to WHO guidelines [14] for primary diabetes care.

Methods

The study was conducted from March 2003 to end of May 2003. Out of the total of 6 diabetes centres affiliated to Ministry of Health and Population in Alexandria city, 3 centres having higher attendance rate were selected: Abu-Qir Hospital (El Montaza region), Farouk Hospital (middle region) and Ras El-Ten Hospital (El Gomerk region). Returning patients who had been diabetic for ≥ 1 year and who visited the centre during the period of the study (3 months) were the target of the study. During the pilot study, it was noted that the usual number of patients at each centre was 40–50/month. Therefore, using an equal allocation method of sampling, the study included 360 patients registered at and regularly attending the 3 centres. The first 120 consecutive patients attending each centre during the study pe-

riod were selected. There were no refusals to participate.

All patients were interviewed using structured questionnaires for collection of information about patient characteristics (age, sex, education, employment), disease characteristics (duration of diabetes, presence of complications) and treatment characteristics (type of treatment). Interviews were carried out by the first author in the clinic immediately after clinical examination.

Selected indicators for structure, process and outcome of care were based on the quality assurance protocol and the WHO manual on diabetes mellitus [14,15]

Assessment of structure

Structure of diabetes care was assessed using 2 checklists: one for the essential items of care (13 items) and the second for the less-essential items (10 items). The checklist on essential items was scored on a 3-point scale: item available all the time scored 2; item available sometimes scored 1; item not available scored 0. The checklist of less-essential items of care was scored on a 2-point scale: item available scored 1 and item not available scored 0.

The total score of all items for structure of diabetes care ranged from 0 to 36. If the total score was > 28 , i.e. $> 80\%$ of the total score, structure of care was considered good; if score was 21–28, i.e. 60%–80%, it was considered fair; if total score was < 21 , i.e. $< 60\%$, it was considered poor.

Assessment of process

Process of care was assessed by a modified scoring system [16]. This depended on the fulfilment of 10 items for good diabetes care by physicians in the previous year by reviewing the medical records. Score ranged from 0 to 10 points. Process was categorized as good (8–10 points), moderate (5–7 points) or poor (< 4 points).

Assessment of outcome

Outcome indicators included degree of diabetes control, degree of compliance with appointment and presence of complications. Control of diabetes was defined as good if the previous 2 readings for fasting blood sugar were 70–120 mg/dL and poor if they were > 120 mg/dL.

Degree of compliance with appointment was based on the number of visits of diabetes patients during a 6-month period. Good compliance (2 points) was recorded for attending the centre on > 2 occasions, fair compliance (1 point) when they attended for 1 occasion and poor compliance (0 points) when they had never attended the centre during the previous 6 months. The total score for outcome of diabetes care ranged from 0 to 6 points, categorized as good (4–6 points), fair (2–3 points) or poor (< 2 points) outcome.

Analysis

Data analysis was done using *SPSS* statistical package, version 10. Statistical significance for difference between rates was tested by chi-squared test and independent sample means by the Student *t*-test. The *F*-test was also used to compare between the 3 groups for some variables, e.g. age, duration of illness and compliance. Significance was denoted at the ≤ 0.05 level.

Results

Males constituted 52.2% of the sample and females 41.8%; mean age was 53.36 [standard deviation (SD) 10.83] years. Type I diabetes patients constituted 22.9% and type II diabetes patients 77.1%. Mean duration of diabetes was 1.48 (SD 0.50) years. There was no significant difference between the 3 centres for patient characteristics except for age ($F = 10.897$; $P < 0.01$): mean age was highest among Ras El Ten Hospital

patients, 55.35 (SD 11.45) years and lowest among those at Abu-Qir Hospital, 49.70 (SD 8.45) years (Table 1).

The average total score for structure of diabetes care in the 3 centres was 15, 16 and 16 points of a total possible 36 points (Table 2), i.e. < 60% of total score, reflecting poor care in all 3 centres. The essential items that were available all the time were: effective referral system, coordination with the district hospital diabetes clinic, direct access to an eye specialist, 1 doctor in the practice who had a special interest in diabetes and a diabetes register. Essential items that were never available included: internal

quality assurance system in the practice, appointment system and system for recall of defaulters (Table 2).

Most of the less-essential items were never available apart from direct access to a hospital laboratory, cholesterol measurements, carrying out electrocardiography and funduscopy in the practice and direct access to a dietitian (Table 2).

Audit of process of care recorded in patients' files for the previous year showed that over 60% of patients had not had their feet examined, nor had they been clinically examined for weight, peripheral sensation and pulse (Table 3). Also, they had not been

Table 1 Distribution of characteristics for return diabetes patients attending 3 diabetes centres in Alexandria

Characteristic	Abu-Qir Hospital (n = 120)		Farouk Hospital (n = 120)		Ras El-Ten Hospital (n = 120)		Total (n = 360)		Statistical test	
	No.	%	No.	%	No.	%	No.	%	χ^2	P
<i>Age (years)</i>										
≤ 40	19	15.8	12	10.0	8	6.7	39	10.8	220.9	< 0.001
> 40	101	84.2	108	90.0	112	93.3	321	89.2		
Mean (SD)	49.70	(8.45)	50.03	(11.43)	55.35	(11.45)	53.36	(10.83)		
<i>Sex</i>										
Male	66	35.1	64	34.0	58	48.3	188	52.2	1.157	0.056
Female	54	31.4	56	32.6	62	51.7	172	41.8		
<i>Employment</i>										
Unemployed	93	77.5	93	77.5	85	70.8	271	75.3	1.910	0.384
Employed	27	22.5	27	22.5	35	29.2	89	24.7		
<i>Education</i>										
Illiterate	84	70.0	80	66.7	73	60.8	237	65.8	2.297	0.317
Literate	36	30.0	40	33.3	47	39.2	123	34.2		
<i>Type of diabetes</i>										
Type I	35	29.2	26	21.7	26	21.7	87	22.9	2.455	0.292
Type II	85	70.8	94	78.3	94	78.3	273	77.1		
<i>Duration (years)</i>										
≤ 5	62	32.6	66	34.7	62	32.6	190	52.8	0.357	0.837
> 5	58	34.1	54	31.8	58	34.1	170	47.2		
Mean (SD)	1.48	(0.50)	1.45	(0.50)	1.48	(0.50)	1.48	(0.50)		

Treatment type for all patients was diet plus drugs.

^aF-test value.

SD = standard deviation.

Table 2 Score of essential and less essential items of structure of diabetes care in 3 diabetes centres in Alexandria

Item	Score		
	Abu-Qir Hospital	Farouk Hospital	Ras El-Ten Hospital
<i>Essential^a</i>			
Effective referral system	2	2	2
Coordination with district hospital diabetes clinic	2	2	2
Health education materials	0	0	0
Direct access to eye specialist	2	2	2
Internal quality assurance system in the practice	0	0	0
Blood sugar measurement	0	0	0
Urine protein measurement	0	0	0
Essential drugs for diabetes	1	1	1
≥ 1 doctor in practice has special interest in diabetes	2	2	2
Diabetes follow up cards	0	0	0
Diabetes register	2	2	2
Appointment system	0	0	0
System for recall of defaulters	0	0	0
Total (26 points)	11	11	11
<i>Less-essential^a</i>			
Mini diabetes clinic	0	0	0
Specialist diabetes nurse	0	0	0
Direct access to chiropodist	0	0	0
Direct access to dietitian	0	1	1
Direct access to hospital laboratory	1	1	1
Funduscopy in the practice	1	1	1
Glycosylated haemoglobin measurement	0	0	0
Cholesterol measurements	1	1	1
ECG in the practice	1	1	1
Diabetes identity cards	0	0	0
Total (10 points)	4	5	5

^a2 = available all the time; 1 = available sometimes; 0 = not available.

^b1 = available; 0 = not available.

referred for annual ophthalmic examination, urea and electrolytes. The glycosylated haemoglobin test had not been performed for anyone. This situation was similar in all 3 centres with no statistically significant differences. Regarding overall degree of care, 69.2% of patients received poor care,

26.4% fair care and 4.4% good care. Mean score was lowest at Ras El Ten Hospital and highest at Farouk Hospital ($P = 0.004$).

Outcome of diabetes care is shown in Table 4. Degree of control was poor for 49.2% of patients; only 30.6% had no complications. Compliance to appointment was good

Table 3 Audit of recorded items of process of care in diabetes patient files in the previous year in 3 diabetes centres in Alexandria

Process item	Abu-Qir Hospital (n = 120)		Farouk Hospital (n = 120)		Ras El-Ten Hospital (n = 120)		Total (n = 360)		Statistical test	
	No.	%	No.	%	No.	%	No.	%	χ^2	P
Blood pressure	60	50.0	61	50.8	59	49.2	180	50.0	0.066	0.967
Weight	120	100.0	–	–	–	–	120	33.3	360.0	< 0.001
Blood glucose	120	100.0	120	100	120	100	360	100	–	–
Test for proteinuria	32	26.7	36	30.3	38	31.7	106	29.4	0.748	0.687
Peripheral sensation	40	33.3	24	20.0	21	17.5	85	23.6	9.46	< 0.001
Peripheral pluses	40	33.3	21	17.5	24	20.0	85	23.6	9.64	< 0.001
Foot examination	29	24.2	22	18.3	18	15.0	69	19.2	3.33	0.188
Ophthalmic examination	38	31.7	44	36.7	47	39.2	129	35.8	1.522	0.467
Urea & electrolytes	32	26.7	36	30.0	38	31.7	106	29.4	0.748	0.687
Glycosylated haemoglobin	120	100.0	120	100.0	120	100.0	360	100.0	–	–
Degree of care										
Good (8–10)	7	5.8	4	3.3	5	4.2	16	4.4	17.81	0.001
Fair (5–7)	28	23.3	20	16.7	47	39.2	95	26.4	–	–
Poor (0–4)	85	70.8	96	80.0	68	56.7	249	69.2	–	–
Mean score (SD)	2.65 (0.59)		2.77 (0.50)		2.53 (0.58)		3.44 (2.01)		7.891 ^a	0.004

SD = standard deviation.

^aF-test value.

for about 80%. There was no statistically significant difference between the 3 centres as regards outcome items ($P > 0.05$).

Regarding the relationship between process of care and outcome, with worse degree of care compliance was better than with good care (87.3% vs 50.0%) and there were fewer complications (Figure 1).

Discussion

Diabetes is a chronic illness that requires continuing medical care and patient self-management education to prevent acute complications and to reduce the risk of long-term complications [17,18]. Monitoring and careful recording of important clinical data

are considered to be a vital part of diabetes care [19], making it possible to compare past and present status, to review the course of the disease and to justify continuing or changing treatment [20]. However, there is evidence that “usual care” for individuals with diabetes falls short of these ideals [21–24]. Despite the broadly distributed diabetes care guidelines, in the present study, the majority of patients did not have proper documentation of adequate management to optimize control or prevent target organ damage: degree of care was poor for 69.2% of patients. Our findings are comparable with those of other studies in Saudi Arabia [25], Lebanon [26], the United States of America [27,28] and England [29].

Table 4 Outcome of diabetes care in 3 diabetes centres in Alexandria

Outcome	Abu-Qir Hospital (n = 120)		Farouk Hospital (n = 120)		Ras El-Ten Hospital (n = 120)		Total (n = 360)		Statistical test	
	No.	%	No.	%	No.	%	No.	%	χ^2	P
<i>Degree of control</i>										
Good (2)	64	53.3	63	52.5	56	46.7	183	50.8	1.27	NS
Poor (0)	56	46.7	57	47.5	64	53.3	177	49.2		
Mean (SD)	1.07 (1.00)		1.05 (1.00)		0.93 (1.00)		1.02 (1.00)		1.064 ^a	0.303
<i>Degree of compliance to appointment</i>										
Good (2)	88	73.3	96	80.0	103	85.8	287	79.9	6.203	NS
Fair (1)	21	17.5	15	12.5	9	7.5	45	12.5		
Poor (0)	11	9.2	9	7.5	8	6.7	27	7.5		
Mean (SD)	1.34 (0.63)		1.28 (0.59)		1.21 (0.55)		1.28 (0.59)		1.527 ^a	0.219
<i>Presence of complications</i>										
Yes (0)	80	66.7	83	69.2	87	72.5	250	69.4	8.738	NS
No (2)	40	33.3	37	30.8	33	27.5	110	30.6		
Mean (SD)	1.40 (1.34)		1.49 (1.38)		1.38 (1.21)		1.43 (1.31)		0.237 ^a	0.789
<i>Total outcome</i>										
Good (4–6)	65	54.2	65	54.2	58	48.4	188	52.2	2.848	NS
Fair (2–3)	39	32.5	38	31.7	49	40.8	126	35.0		
Poor (0–1)	16	13.3	17	14.2	13	10.8	46	12.8		
Mean (SD)	3.39 (1.78)		3.38 (1.84)		3.28 (1.82)		3.34 (1.81)		1.836 ^a	0.091

^aF-test value.

NS = no statistically significant difference.

SD = standard deviation.

The structural criteria are considered antecedents of quality, and outcome criteria are considered consequences of quality [30]. There should be a direct relationship between processes and outcomes of care; less than optimal outcomes have their roots in inappropriate or poorly implemented processes [31]. In the present study, degree of control was poor for more than half the patients. It was interesting, however, to note that better outcome—in terms of fewer complications and higher compliance—was associated with poor process of care, contradictory to what would be expected. This finding could be explained by the fact that many of the elements of process of care were not being carried out except when

there were signs of poor outcome in terms of complications, etc. The physician was possibly initiated to provide care only in case of complaint regarding complications, and this may be why there are fewer complications with poor care. Thus poor outcome in terms of more complications and lower rate of compliance acted in the present study as a cause rather than an effect, leading to upgrading the process of care.

Poor outcome in the present study may have been a result of factors such as lack of some essential structural items for care. The shortage of laboratory strips was compensated by cooperation between the clinic and the hospital central laboratory. Actually, the patient is referred for urine analysis

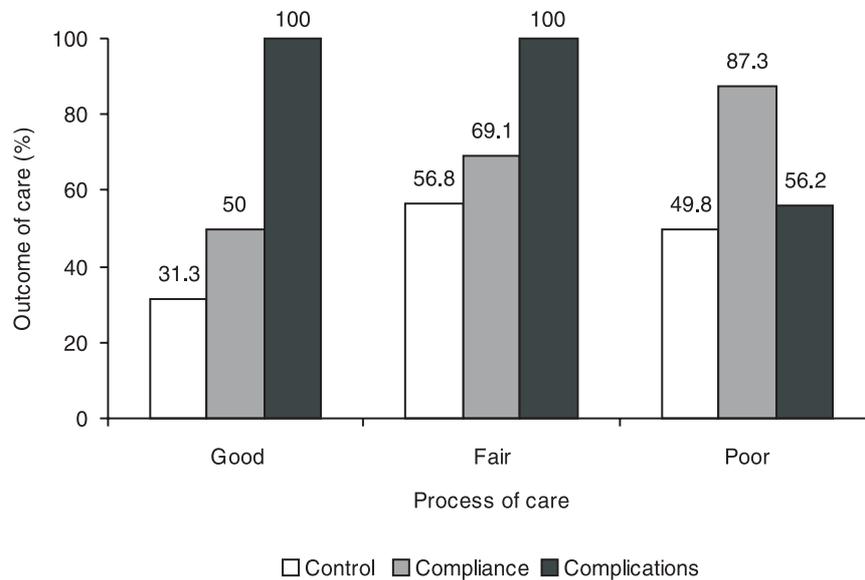


Figure 1 Relation between process of care and outcome in 3 diabetes centres in Alexandria

for glucose every visit to the clinic (every 10–20 days) and referred for fasting and postprandial blood glucose only every 3rd visit.

Access to a coordinated, interdisciplinary, diabetes care team to offer appropriate care, whether the need is self-management, education, medical advice, or psychosocial support, has been identified as an important factor for improving treatment outcomes in diabetes [37]. The team should include, but not be limited to, physicians, nurses, dietitians and mental health professionals with a special interest in diabetes [32]. In the present study there was lack of some essential items in the structure of care such as a diabetes nurse, and this could influence the process and outcome of care. Nurses can play an important role in patient-oriented interventions, through patient education or facilitating adherence to treatment [33,34]. A dietitian was available in only 2 of the

3 centres in this study, even though it is known that a registered dietitian, knowledgeable and skilled in implementing nutrition therapy into diabetes management and education, is the team member who evaluates the patient's food intake, metabolic status, lifestyle, readiness to make changes, goal-setting, dietary instruction and evaluation [35].

Compliance to appointment in the present study was rated good for most of the patients. Fair or poor compliance by the others may be a consequence of the absence of an appointment system for diabetes patients or a system for identifying and recalling defaulters. Our results are comparable to those of similar studies in Saudi Arabia [25] and Lebanon [26]. Some studies have shown that organizational interventions that improve regular prompted recall and review of patients (central computerized tracking systems or nurses who regularly contact the

patient) can improve diabetes management [33,36].

Glycaemic control is fundamental to the management of diabetes. In some developed countries, at least half of those diagnosed with diabetes do not achieve satisfactory glycaemic control, despite the availability of effective treatments [37]. In the present study the degree of control was poor for about half the patients. Prospective randomized clinical trials have shown that achieving glycaemic control is associated with decreased rates of retinopathy [30,38], nephropathy and neuropathy, and epidemiological studies support the potential of intensive glycaemic control in the reduction of cardiovascular disease [30].

The most important issues in diabetes care, besides good metabolic control, are to reduce the high risk of macrovascular complications by adequate treatment of high blood pressure and to convince diabetes patients to stop smoking [39]. In the present study, 69.4% were suffering from complications. In spite of this, only 35.8% of patients were referred for ophthalmic examination and only 29.4% were referred for protein urea testing, even though direct access to an ophthalmologist and laboratory services

were available. Moreover, blood pressure measurements, ECG and lipid profile were only requested in case of complaint. This applied for foot examination also, although all individuals with diabetes should receive an annual foot examination to identify high-risk conditions [32].

Conclusion and recommendations

It is recommended that a special clinic protocol for diabetes care should be developed, based on the standards guidelines and intensive training of physicians. There is a need for the introduction of a diabetes flow-sheet in the patient records to facilitate documentation, there is also a need for a diabetes nurse, educational materials and other essential structure care in each diabetes centre.

The level of process of care cannot be considered a valid predictor of outcome as good care might be initiated by the presence of complications, as seen in the present study. The diabetes care team must be trained not to wait till there is poor outcome to provide quality care.

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