

ASSESSMENT OF CARE FOR TYPE 2 DIABETIC PATIENTS AT THE PRIMARY CARE CLINICS OF A REFERRAL HOSPITAL

Assim Alfadda, FRCP(C), MSc,* Khalid A. Bin Abdulrahman, ABFM, MHSc(MEd)[†]
Department of *Medical Biochemistry and [†]Family Medicine, College of Medicine, King Saud University, Riyadh, Saudi Arabia

مقدمة: إن مرض السكري يتنامى بشكل سريع في المملكة العربية السعودية كما هو الحال في باقي دول العالم الأخرى. والرعاية المثالية لمرضى السكري تعتمد على مهارة مقدمي الخدمة الصحية ومكان تقديم الخدمة الصحية للمرضى. ونظراً لشدة المضاعفات النهائية الناتجة عن سوء التحكم في النوع الثاني من مرض السكري فإنه من الضروري تقويم ممارسات مقدمي الخدمة ونتائج رعاية المرضى في أي موقع من مواقع الممارسة الطبية.

هدف الدراسة: تهدف الدراسة إلى تقويم الممارسة الطبية المقدمة لرعاية مرضى السكري في عيادات الرعاية الصحية الأولية التابعة لمستشفى الملك خالد الجامعي بجامعة الملك سعود بالرياض ومقارنتها مع الدليل الحالي لرعاية مرضى السكري الذي أوصت به الجمعية الأمريكية لمرضى السكري.

طريقة الدراسة: تم مراجعة 103 ملفات من ملفات المرضى التي حققت شروط الدراسة خلال الثلاث سنوات الماضية من بداية عام 2001م إلى نهاية 2003م. وتم تصميم نموذج خاص بتقويم ممارسة الأطباء في رعاية مرضى السكري تشمل فحص ضابط التحكم بمستوى السكر في الدم (HbA1c)، وضغط الدم، ومستوى الدهون في الدم وفحص العين والقدم وغيرها من الممارسات الطبية التي تم مقارنتها بتوصيات الجمعية الأمريكية للسكري.

نتائج الدراسة: متوسط أعمار عينة الدراسة من المصابين بالنوع الثاني من مرض السكري هو 57 سنة. ومعدل كتلة الجسم 30.8 كجم/م² ومتوسط مدة إصابتهم بالمرض هو 11.8 سنة، وتبين من خلال الدراسة أن كثيراً من المرضى مصابين بأمراض أخرى أو بمضاعفات السكري (25% لديهم اعتلال في الشبكية و 17% اعتلال في الكلى و 12% اعتلال في الأعصاب). ولقد أوضحت الدراسة أن حوالي 24% من المرضى فقط تم التحكم بمستوى السكر في الدم ($HbA1c \leq 7.0$) وأن 85% من المرضى تم إجراء فحص الدهون لهم خلال فترة المتابعة. وخلال السنة الثانية والثالثة من المتابعة تبين أن فقط 30% من المرضى تم إجراء فحص ضابط التحكم بمستوى السكر في الدم (HbA1c) لهم. ومن ناحية أخرى تبين أن فقط 26% من المرضى تم فحص أقدامهم خلال السنة الثانية من المتابعة و 22% خلال السنة الثالثة من المتابعة. كما تبين أن نسبة المرضى الذين خضعوا لفحص العين تقل مع طول مدة المتابعة. وخلاصة القول فإن الدراسة أوضحت أن الممارسة الطبية المقدمة لرعاية مرضى السكر هي بعيدة جداً عن توصيات الجمعية الأمريكية لمرضى السكري.

الخلاصة: إن الرعاية الطبية المقدمة لمرضى السكري من النوع الثاني في عيادات الرعاية الأولية لا تتفق مع توصيات دليل رعاية مرضى السكري التابع للجمعية الأمريكية لمرضى السكري. ولهذا نوصي بإجراء دراسات أخرى لمعرفة أسباب تدني الخدمة وكذلك لتحسين الخدمة المقدمة لمرضى السكري.

الكلمات المرجعية: مرضى السكري، الرعاية الصحية الأولية، المملكة العربية السعودية.

Background: There is rapid increase in the incidence of Diabetes Mellitus (DM) in the Kingdom of Saudi Arabia (KSA), as in other countries. An optimal care of diabetic patients depends on the health care providers as well as the type of health care setting. Due to the severity of chronic complications in Type 2 diabetic patients, it is essential to assess both the practices of the providers and the patient outcomes at any clinical setting.

Objectives: To assess the screening patterns of diabetes associated health care problems in primary care clinics of King Khalid University Hospital (KKUH) and while compare them to the current diabetes clinical practice recommendations of American Diabetes Association (ADA).

Correspondence to:

Dr. Khalid B. Abdulrahman, Associate Professor of Family Medicine, Vice Dean, Postgraduate and CME, College of Medicine, King Saud University, P.O. Box 2925, Riyadh 11461, Saudi Arabia - E-mail: khalidab@ksu.edu.sa

Methods: The retrospective review of charts of 103 eligible patients who attended the primary care clinics of KKHU over a 3 year-period (1/12001-31/12/2003) had provided 99 type 2 diabetic patients. The study variables included demographic data, complications, treatment, the provider screening practices (measurements of HbA1c, BP, Lipid profile, number of eye and foot examination). From these data, the frequency of provider screening tests, normalized by patient-year could be compared with the ADA guidelines.

Results: The mean age of 99 type 2 diabetic patients was 57 years, with a mean BMI of 30.8 kg/m² and with a mean duration of diabetes of 11.8 years. Many had comorbidities or complications: 25% had retinopathy, 17.2% had nephropathy, and 12.1% had neuropathy. The HbA1c level of ≤ 7.0 was maintained by only 24.7% of patients. About 85% of patients had ≥ 1 lipid profile, during their follow-up period. During 2nd and 3rd year follow up only 30% had ≥ 1 HbA1c measurement and 26.5% (at 2nd year), 22% (at 3rd year) had ≥ 1 foot examination. The proportion of patients, who had ≥ 1 eye examination was also reduced during their follow up. The provider practice screening results per patient-year was well below the specified guidelines of ADA.

Conclusion: Type 2 diabetic patients care at our primary care clinics did not adhere to the guidelines of ADA. The reasons for the deficiencies were not evident from this study. More detailed studies are needed to find out the relevant causes for the lack of adequate diabetic care at primary care clinics.

Key Words: Diabetes, Primary health care, Saudi Arabia

INTRODUCTION

Diabetes Mellitus (DM) is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart and blood vessels. Several pathogenic processes are involved in the development of diabetes. Long term complications of diabetes include retinopathy with potential loss of vision; nephropathy leading to renal failure; autonomic neuropathy causing gastrointestinal, genitourinary and cardiovascular symptoms and sexual dysfunction. Patients with diabetes have an increased incidence of atherosclerotic cardiovascular, peripheral arterial and cerebrovascular disease. The prevalence of diabetes varies throughout the world, but increasing because of changes in lifestyle. According to the estimates of World Health Organization (WHO), around 100 million people suffer from diabetes.^{1,2} The Kingdom of Saudi Arabia (KSA), a country of over 16 million people, is a rapidly developing country. During the past three decades the potential surge in socioeconomic growth has considerably influenced the lifestyle of the people. A recent community-based national epidemiological health survey in KSA has found the overall prevalence of

DM as 23.7%³ which is alarming for health care providers.

People with diabetes should receive medical care from a physician-coordinated team. These teams may include physicians, nurse practitioners, physician's assistants, nurses, dietitians, pharmacists, and mental health professionals with the expertise and a special interest in diabetes. It is essential in this collaborative and integrated team approach that individuals with diabetes assume an active role in their care. There is strong evidence to suggest that a close correlation exists between good glucose control and improved clinical outcomes in hospitalized diabetic patients and in the outpatient setting.⁴⁻⁶ Also, the target levels of good glucose could not be achieved in the diabetic outpatients who attend both at private and government hospitals.⁷ Patients cared for by physicians in the diabetes clinic receive better quality of diabetes care than patients cared for by physicians in the general medical clinic.⁸ However, another component of care is a community care. A meta-analysis of randomized controlled trials found that the unstructured care in the community is associated with poorer follow up, worse glycaemic control, and greater mortality than in hospital care.⁹ In fact, most of the diabetic patients are not optimally managed despite the availability and efficacy of interventions for the control of glycemia, blood pressure, and hyperlipidemia.^{10,11} The gap between optimal and

actual care constitutes a wide “quality chasm”, and underscores the need for innovative approaches to change the current practice of diabetes care. There are barriers to effective care in the medical system, physician, and patient levels.¹² All three elements of medical care, viz, the medical system, the actions (or inactions) of physicians and other providers, as well as the behavior of patients (and their families and communities), play a critical role in achieving the overall goal of optimal diabetes control.¹³ Treatment and preventive care in persons with diabetes, particularly towards the care of vascular complications of Type 2 diabetes which causes high morbidity, hospitalization and mortality, is the cornerstone of management of these patients. To monitor these patients, American Diabetes Association (ADA) has suggested the guidelines for classification, diagnosis and screening of diabetes.¹⁴ Even though the ADA guidelines for desired HbA1c values, lipid and BP values, and screening procedures have been widely distributed, these goals often are not met in the primary care setting where most diabetic patients receive their diabetes care.^{15,16} This study was carried out to assess the screening patterns of diabetes associated health care problems in primary care clinics (PCC's) of King Khalid University Hospital (KKUH) and compare them to current diabetes clinical practice recommendations of ADA. The specific objectives of this study were to quantify (1) the provider practice measures for the care of both macro and microvascular level complications of type 2 diabetic patients (2) the patient outcome measures and (3) to compare these results with ADA guidelines.

METHODS

A retrospective review of charts of the last three years (from 1/1/2001 to 31/12/2003) was performed in 2004, for all patients with Type 2 DM who attended the outpatient clinics of KKUH, Riyadh, KSA. The inclusion criterion for this study was that the patient should have done HbA1c at least once during the period from 1/1/2001 to 1/7/2001 and been followed subsequently for at least one year at the PCC. Patients who were subsequently seen at the endocrine clinic and those without regular follow-up at PCC were excluded for assessment. Out of 407 patients, a sample 99 eligible patients constituted the study subjects. This study was approved by the ethical committee of KKUH. Its

outcome after reviewing each chart was to assess the quality of management of diabetes in terms of controlling blood glucose, blood pressure, serum lipids, and check for other complications, and compare them to standards of medical care in diabetes published by ADA. The indicators assessed in this study were as follows: percentage of patients with a blood pressure measurement recorded at each visit, percentage of patients receiving ≥ 1 glycohemoglobin (HbA1c) test/year, distribution of mean HbA1c values, assessment for nephropathy in the last year, at least one lipid profile in the last year, percentage of patients receiving a dilated eye examination or retinal imaging at least once per year, percentage of patients with foot examination per year. The HbA1c tests which were ordered by PCC physicians were only included in the assessment. A 24-hour urine collection is the only method available for the detection of microalbuminuria and quantification of proteinuria at this institution.

Statistical Analysis

The data were entered in MS Excel and analyzed using the SPSS version 12.0 statistical software. Descriptive statistics (mean, standard deviation, proportions, and patient years), was used to summarize the outcome variables. And student's t-test for independent samples with 95% confidence intervals for difference of means, and a one-way analysis of variance was used to compare the mean values of quantitative variables. Age (in years) was categorized into 2 groups (<65 & ≥ 65 years), so as to facilitate the comparison of two age strata (non geriatric and geriatric).

RESULTS

The study sample of 99 type 2 diabetic patients, and their characteristics are given in Table 1. The total number of patient-year follow-up of these 99 patients was 256. About 69% of these type 2 diabetic patients were using Oral hypoglycemic agents (OHA) only, 5% were on diet only, 5% were on insulin only and 21% were on OHA and Insulin.

The distribution of macro and micro vascular complications of these patients are shown in Table 2. Retinopathy and Nephropathy were in higher proportion, followed by Neuropathy and Coronary artery disease. The distribution of the number of patients (n=93) for different levels of HbA1c is shown in Figure 1. These 93 HbA1c values were the most recent or last values of patients during

Table 1: Characteristics of Type 2 DM patients (n=99)

Variables	Mean ± SD
Age in years (range:17-87)	56.6 ± 12.0
Duration of diabetes (years) (n=86)	11.8 ± 7.7
Weight (kg)	77.4 ± 14.4
Height (mts)	1.6 ± 0.2
BMI (kg/m ²)	30.8 ± 5.8
Male (%)	53 (55.4)

Table 2: Distribution of MACRO and MICRO vascular complications of Type 2 DM patients (N=74)

Complications	No. (%)
Coronary artery disease	11 (11.1)
Vascular disease	3 (3.0)
Stroke	4 (4.0)
Amputation	2 (2.0)
Retinopathy	25 (25.3)
Neuropathy	12 (12.1)
Nephropathy	17 (17.2)

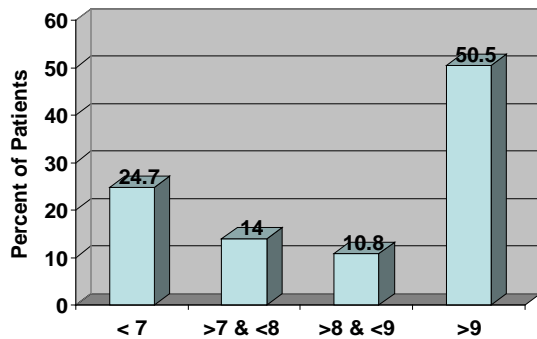


Figure 1: Distribution of HbA1c values for Type 2 diabetic patients (n=93)

the follow-up period. Only 24.7% of the patients had HbA1c values less ≤ 7.0 , while the remaining 75.3% had HbA1c values which were more than the standard guideline value. The mean \pm standard deviation of HbA1c of these patients was 8.97 ± 2.2 . There was a statistically significant difference in the mean values of HbA1c of male (8.5 ± 2.13) and female (9.5 ± 0.2) patients [$p = 0.027$, 95% confidence intervals (CI's): -1.92, -0.12]. There was no significant difference in the mean values of HbA1c of patients in relation to their age groups (< 65 years: 8.9 ± 2.2 ; ≥ 65 years: 9.1 ± 2.4 ; $p = 0.80$; 95% CI's: -1.24, 0.96). The mean values of HbA1c were not statistically different across the three levels of duration of diabetes (< 5 years: 8.6 ± 2.2 ; 5-10 years: 8.2 ± 2.1 ; ≥ 10 years: 9.4 ± 2.2 ; $F = 0.08$ $p > 0.1$). The proportion of patients receiving the provider practice measures for HbA1c, BP, Lipid profile, detailed

eye examination and detailed foot examination in each of three-year period and at all three years of follow-up is shown in Table 3. The total number of patient-year i.e., 256 was arrived by quantifying the number of patients seen ≥ 2 times during each year of the 3-year follow-up period. The number of each of the screening tests carried out on the patients, in terms of per patient-year and its relative values to the total number of patient-year was calculated. These values were then compared with current clinical practice guidelines (Table 4). From these two tables (3 & 4) it can be observed that the proportion of patients receiving the provider practice measures towards eye and foot examination was lower and the number of screening procedures for these patients were well below the ADA recommended clinical practice guidelines. For example, the screening for diabetic nephropathy, and a detailed foot examination done per patient-year were less than half (0.11 & 0.09 per patient year) of the one per year recommended by the ADA.

DISCUSSION

The retrospective study of records of Type 2 diabetic patients has brought out the provider screening practices in primary care clinics at KKUH, where most of the patients studied did not meet the current clinical practice guidelines as recommended by ADA. About 68.7% of our patients were on OHA and 21.2% were on OHA and insulin, which shows that complex treatment regimens were essential. In spite of the high prevalence of micro vascular level complications in our cohort, only about 25% of study subjects did achieve the recommended glycemic control. These findings agree with previous studies based mostly on patients in primary care settings which have often shown poor glycemic control. Martin et al¹⁵ studied 378 ethnically different patients with Type 2 diabetes in 1992-1993 and found that mean HbA1c values ranged from 8.6% in whites to 9.4% in blacks and 9.8% in Hispanics. In 1994, Weatherspoon et al. (17) reported that nearly 40% of patients with type 2 diabetes had HbA1c values of $\geq 8\%$. In contrast to these findings, Christopher D. Miller and Sandy D. Rossman,¹⁸ who studied the Type 2 diabetic patients at an Endocrinologist practice reported only 13% of their patients had HbA1c levels $\geq 8\%$. They attributed the glycemic control to the use of complex therapeutic regimens by their patients. Hellman et al¹⁹ achieved a median HbA1c level of 7.3% in patients who had received long-term care

Table 3: Number of patients receiving provider process parameters during their three-year follow-up period

Provider parameters	No. of patients during follow-up period (%)			
	1 st year (n=97)	2 nd year (n=98)	3 rd year (n=90)	All 3 years (n=99)
BP measurement at each visit	40 (41.2)	51 (52.0)	50 (55.6)	12 (12.1)
≥ 1 HbA1c	89 (91.7)	29 (29.6)	28 (31.1)	7 (7.1)
≥ 1 Lipid profile	83 (85.6)	79 (80.6)	77 (85.6)	58 (58.6)
≥ 1 Detailed eye examination	78 (80.4)	67 (68.4)	65 (72.2)	56 (56.6)
≥ 1 Well documented foot examination	33 (34.0)	26 (26.5)	20 (22.2)	10 (10.1)
Assessment for nephropathy	11 (11.3)	1 (1)	15 (16.7)	0 (0)

Table 4: Comparison of number of times screening tests of Type 2 DM patients done by primary care physicians per patient-year with current diabetes clinical practice guidelines

Variables	No.	Per patient-year	Current clinical practice guidelines per year
Patient – year	256	1.0	-
HbA1c	174	0.68	2 times
Retinopathy	192	0.75	1 time
Foot exam	77	0.30	4 times
Detailed foot exam [†]	24	0.09	1 time
Lipid profile	222	0.87	1 time
Blood pressure	250	0.98	4 times
Nephropathy	27	0.11	1 time

*means visual inspection of patients' feet.

[†]includes the assessment of protective sensation, foot structure, vascular status, and skin integrity

in their specialty practice. Hence the care of Type 2 diabetes patients is better at the specialized clinics than at the primary care clinics in relation to the control of HbA1c values.

Along with the metabolic outcomes, screening process measures for micro vascular complications are also important for treating Type 2 diabetic patients. Our data reveals that a low proportion of patients received provider process parameters each year for all three years (Table 3). These findings are close to those of two studies of Medicare patients, 40-46% of whom had ophthalmologic examinations, and 55-56% of whom had lipid measurements during a one-year period.^{16,21} Martin et al found that 53-66% of patients had annual ophthalmological examinations, 52-62% had at least one total cholesterol and one HDL cholesterol measurement during a two-year period, and 56-63% had at least two urine dipstick tests during a two- year period.¹⁵ Another study reported that 48% of 353 patients with diabetes had urine protein screenings, but 94% had no documented foot examinations during a one-year period.²² Reported studies of the care of Type 2 diabetic patients^{15,16,21,22} were at non-specialty clinics which are similar to our primary care setting. However, some studies have reported that specialists may be able to meet ADA guidelines for both macro and micro vascular level complications, better than primary care practice

physicians. Ho et al⁸ showed that process measures are addressed better by specialists. The reason behind the difference in addressing the issues of care, between the primary care setting and a specialty clinic may be due to the type of treating physician and the attitude of coordinate team. A questionnaire survey of primary care physicians to assess their attitudes and behavior toward keeping tight control of blood glucose in patients with type 1 diabetes found that HbA1c testing was severely underused.²⁰ Attention should be focused on the attitudes and practice behavior of primary care physicians in their provision of care to diabetic patients. Jacques et al noted that a physician-reported rate of obtaining HbA1c levels as 1.8 per year for patients with type 1 diabetes and 1.4 per year for patients with Type 2 diabetes.²³ Our results shows low per patient-year figures for all screening variables (Table 4), which clearly demonstrates a deficiency in the screening of the development of diabetes related micro and macro vascular complications. From the available data, it is difficult to address reasons for the existence of this deficiency. It may be the result of a lack of awareness and /or education of primary care physicians of the standards of medical care in diabetic care as given in the ADA guidelines. Secondly, it could be the result of the lack of patient's adherence to medical advice during their follow-up.

In conclusion, the results of this study indicate that suitable measures must be introduced in order to improve and provide adequate care of our diabetic patients. This could be done through (i) better physician education about standards of care, (ii) acquisition of patient's full support for regular visits, and (iii) the maintenance of consistent quality care from the other staff members of primary care setting, by continuous monitoring.

ACKNOWLEDGMENT

The authors would like to thank Dr. Shaik Shaffi Ahmed for his kind statistical assistance. This work was supported in part by College of Medicine Research Centre, King Saud University, Riyadh, Saudi Arabia. Grant: 04-480.

REFERENCES

1. Sarah W, Gojka R, Anders G, Richard S, Hilary K: Global Prevalence of Diabetes. *Diabetes Care* 2004; 27:1047-53.
2. The world health report 1997. Conquering suffering, enriching humanity. Geneva, World Health Organization, 1997.
3. Al-Nozha MM, AL-Maatouq MA, Al-Mazrou YY, Al-Harhi SS, et al. Diabetes mellitus in Saudi Arabia. *Saudi Med Journal* 2004; 25(11):1603-10.
4. The Diabetes Control and Complications Trial Research Group. The Effect of Intensive Treatment of Diabetes on the Development and Progression of Long-term complications in Insulin-Dependent Diabetes Mellitus. *NEJM* 1993;329:977-86.
5. UK Prospective Diabetes Study Group. Tight blood pressure control and risk of macro vascular and micro vascular complications in type 2 diabetes: UKPDS 38. *BMJ* 1998; 317(160):703-13.
6. Moghissi E. Hospital management of diabetes beyond the sliding scale. *Cleveland Clinic Journal of Medicine* 2004;71(10):801-8.
7. Qari FA. Glycemic Control among diabetics at a university and Erfan private hospital. *Pak J Med Sci* 2005;21(4): 408-12.
8. Ho M, Marger M, Breat J, et al. Is the quality of diabetes care better in a diabetes clinic or in a general medicine clinic? *Diabetes Care* 1997; 20(4): 472-5.
9. Griffin S. Diabetes care in general practice: meta-analysis of randomized control trials. *BMJ* 1998; 317:390-6.
10. Grant RW, Cagliero E, Murphy-Sheehy P, Singer DE, Nathan DM, Meigs JB. Comparison of hyperglycemia, hypertension, and hypercholesterolemia management in patients with type 2 diabetes. *Am J Med*, 2002, 112: 603-609.
11. Saaddine JB, Engelgau MM, Beckles GL, Gregg EW, Thompson TJ, Venkat Narayan KM. A diabetes report card for the United States: quality of care in the 1990's. *Ann Intern Med* 2002, 136: 565-74.
12. Committee on Quality of Health Care in America, Institute of Medicine: *Crossing the Quality Chasm: A New Health System for the 21st Century Health Care Services*. Washington, DC, National Academy Press, 2001.
13. Pringle M, Stewart-Evans C, Coupland C, Williams I, Allison S, Sterland J. Influences on control in diabetes mellitus: patient, doctor, practice, or delivery of care? *BMJ* 1993; 306:630-4.
14. American Diabetes Association. Standards of Medical Care in Diabetes. *Diabetes Care* 2005; 28:S4-S36.
15. Martin TL, Selby JV, Zhang D. Physician and patient prevention practices in NIDDM in a large urban managed-care organization. *Diabetes Care* 1995;18:1124-32.
16. Chin MH, Zhang JX, Merrell K. Diabetes in the African-American Medicare population: morbidity, quality of care and resource utilization. *Diabetes Care* 1998;21:1090-5.
17. Weatherspoon LJ, Kumanyika SK, Ludlow R, Schatz D. Glycemic control in a sample of black and white clinic patients with NIDDM. *Diabetes Care* 1994; 17:1148-53.
18. Miller CD, Phillips LS, Tate MK, Porwoll JM, Rossman SD, et al. Meeting American Diabetes Association Guidelines in Endocrinologist Practice. *Diabetes Care* 2000;23:444-8.
19. Hellman R, Regan J, Rosen H. Effect of intensive treatment of diabetes on the risk of death or renal failure in NIDDM and IDDM. *Diabetes Care* 1997;20:258-64.
20. Tuttleman M, Lipsett L, Harris MI. Attitudes and behaviors of primary care physicians regarding tight control of blood glucose in IDDM patients. *Diabetes Care* 1993;16:765-72.
21. Weiner JP, Parente ST, Garnick DW, Fowles J, Lawthers AG, Palmer RH. Variation in office-based quality: a claims-based profile of care provided to Medicare patients with diabetes. *JAMA* 1995; 273:1503-8.
22. Peters AL, Legorreta AP, Ossorio RC, Davidson MB. Quality of outpatient care provided to diabetic patients. A health maintenance organization experience. *Diabetes Care* 1996;19:601-6.
23. Jacques CH, Jones RJ, Houts P, Bauer LC, Dwyer KM, Lynch JC, Casale TS. Reported practice behaviors for medical care of patients with diabetes mellitus by primary-care physicians in Pennsylvania. *Diabetes Care* 1991;14:712-7.