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

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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).

Methodology: A cross-sectional survey of medical records of patients with diabetes was conducted at primary care clinics of KKUH during the period from January to June 2003. The current diabetes clinical practice recommendations of ADA were used as the reference for comparison.

Results: The study sample included 103 diabetic patients. The most common health problems were hypertension, dyslipidemia, and obesity. The results showed that the care provided was suboptimal in many aspects, such as the frequency of blood pressure and lipids measurement, and the timely adjustment of medication.

Conclusion: The results of this study highlight the need for improving the quality of care for diabetic patients in primary care clinics. Further studies are recommended to assess the impact of these improvements on patient outcomes.

Keywords: Diabetes, care, primary care, clinical practice, American Diabetes Association.
Methods: The retrospective review of charts of 103 eligible patients who attended the primary care clinics of KKUH over a 3 year-period (1/12/2001-31/12/2003) 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 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 \( \leq 7.0 \) was maintained by only 24.7% of patients. About 85% of patients had \( > 1 \) lipid profile, during their follow-up period. During the 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. 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. 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. 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. 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 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/m²)                                   | 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 ± 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 (<5years:8.6±2.2; 5-10years: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 ie., 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 al5 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 >8%. In contrasts 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 values of ≥8%. In contrasts 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 ≥ 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                          | 1st year (n=97) | 2nd year (n=98) | 3rd 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)         |
| HbA1c ≥ 1                                  | 89 (91.7)       | 29 (29.6)       | 28 (31.1)       | 7 (7.1)           |
| Lipid profile ≥ 1                          | 83 (85.6)       | 79 (80.6)       | 77 (85.6)       | 58 (58.6)         |
| Detailed eye examination ≥ 1                | 78 (80.4)       | 67 (68.4)       | 65 (72.2)       | 56 (56.6)         |
| Well documented foot examination ≥ 1       | 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. 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. 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. Reported studies of the care of Type 2 diabetic patients 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 al 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. 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. 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.

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