A Clinical Audit on Diabetes Care in Two Urban Public Primary Care Clinics in Malaysia

[1]SG Sazlina, **[2]AH Zailinawati**, **[1]A Zaiton** & **[3]I Ong**
[1]Department of Family Medicine, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Serdang, Malaysia
[2] Klinik Keluarga, Kuala Lumpur, Malaysia
[3] Klinik Ian Ong, Jalan Ampang, Kuala Lumpur, Malaysia

ABSTRACT

Introduction: The incidence of diabetes mellitus (DM) is increasing globally and it is associated with significant morbidity and mortality. The importance of a better quality of diabetes care is increasingly acknowledged. **Objective:** This clinical audit was conducted to assess the quality of care given to type 2 DM patients in public primary care clinics. **Methods:** A clinical audit was conducted in two selected urban public primary care clinics, between April and June of 2005. The indicators and criteria of quality care were based on the current Malaysian clinical practice guidelines for type 2 DM. A structured pro forma was used to collect data. **Results:** A total of 396 medical records of patients with type 2 DM were included in this audit. Most of the patients had measurements of fasting blood glucose and blood pressure recorded in more than 90% of the visits over the previous one year. Twenty-seven percent of the patients had glycosylated haemoglobin (HbA1c) done every 6 months with a mean of 8.3%. Only 15.6% had HbA1c values less than 6.5 %. Fifty percent had blood pressure controlled at 130/80 mmHg and below; and 13.0% had low density lipoprotein cholesterol values of 2.6 mmol/L or less. The majority of the patients were overweight or obese. **Conclusions:** The quality of diabetes care in this study was found to be suboptimal. There is a gap between guidelines and clinical practice. Certain measures to improve the quality of diabetes care need to be implemented with more rigour.

Keywords: Clinical audit, primary health care, quality indicators, type 2 diabetes mellitus, Malaysia

INTRODUCTION

Diabetes mellitus (DM) is one of the common chronic illnesses worldwide. In recent years, there has been a global increase in the incidence of type 2 DM. In year 2000, 171 million people suffered from diabetes globally.[1] It is estimated that the number would double by the year 2030. The greatest increase is expected to occur in Asia and Africa. The increase in incidence of DM in developing countries follows the trend of population growth, aging, urbanisation and lifestyle changes.

Diabetes mellitus has become one of the major public health issues worldwide. [2] It is associated with significant morbidity such as coronary heart disease, stroke and nephropathy leading to increased mortality and healthcare cost to the patient and the community.[2,3,4] There is increasing evidence that good glycaemic control and control of cardiovascular risk

*Corresponding author: Dr Zaiton Ahmad; Email: *zaiton@medic.upm.edu.my*

factors prevent or delay complications of DM. [5, 6] This in turn would restore quality of life.[7]

In Malaysia, the overall prevalence of DM has increased to 14.9% in 2006 from 6.3% in 1986, and 8.3% in 1996 among adults of age 30 years old and more. [8] In the year 2000, diabetes mellitus was estimated to be the seventh leading cause of burden of disease in Malaysia, accounting for 3.7% of total disability adjusted life years. [9] In addition, admission to public hospitals due to DM has increased from 33,187 in 2002 to 39,358 in 2004. [10]

Some local studies conducted in both the tertiary and primary care level have demonstrated that glycaemic control and the management of the associated cardiovascular risk factors among patients with type 2 DM are poor.[11, 12, 13, 14, 15] Hence, there is a need to evaluate the current practice on diabetes care especially in community based primary care clinics. One of the methods to assess the management is through a clinical audit.

Clinical audit is a strategy that allows for gauging the quality of care on current practice of a particular medical condition.[16] The quality of care is assessed against a standard set of criteria recommended by clinical guidelines. It is a quality improvement process that seeks to improve patient care and outcomes through systematic review of care against explicit criteria and the review of change.

A clinical audit can be evaluated in the aspects of the structure of care (includes quantity and the types of services available), process of care (what is done to the patient) and outcome of care (the eventual results on an intervention or management).[17] These indicators of care are selected and evaluated against overt criteria. Changes are implemented when indicated and further monitoring is conducted to confirm improvement in the healthcare delivery.

Primary care doctors have an important and challenging task in providing quality management to patients with type 2 DM.[18] Therefore, a clinical audit was conducted to assess the quality of care on type 2 diabetes mellitus patients attending community-based public primary care clinics.

METHODS

A clinical audit was conducted in two selected community-based urban public primary care clinics in the Klang Valley region, Malaysia between April and June of 2005. The public primary care clinics served a minimum of 20,000 population each. [10] Patients with diabetes were seen at the outpatient clinics. These clinics did not have designated days for follow-up for patients with type 2 DM nor a diabetes care team to manage their patients. The attending doctors reviewed the patients on the day of their follow-up. The staff in the outpatient clinic comprises a family medicine specialist, approximately four medical and health officers, two nurses and three medical assistants. The clinics had basic in-house laboratory facilities required for the surveillance of glycaemic control and monitoring of diabetic complications.

The indicators of quality care were determined after a discussion with the clinics' doctors which were based on the current Malaysian clinical practice guidelines on the management of type 2 DM.[19] The target level of performance for each of the indicators was agreed at 80% as good performance, in accordance to the Primary Healthcare Quality Assurance programme's recommendation.[20]

The indicators selected, represented the process and outcome measures of diabetes care. The process measures of clinical care were defined as measuring fasting blood glucose (FBG), blood pressure (BP) and calculation of body mass index (BMI) at every visit over the previous one year. It was agreed that the glycosylated haemoglobin (HbA1c) levels should be measured every six months and screening of lipid profile, fundoscopic and foot examinations, and urine protein or microalbuminuria should be done annually. The clinical outcome of diabetes care were defined as good control if the documented values were; FBG $\leq$ 6.1 mmol/L, HbA1c < 6.5 %, low density lipoprotein cholesterol (LDL-C) $\leq$ 2.6 mmol/L, BP $\leq$ 130/80 mmHg and BMI < 23 kg/m^2.

The records of patients with type 2 DM who visited the primary care clinics over the 3-month period were reviewed using a systematic random sampling method. The records were obtained from the respective clinic's database. All patients diagnosed with type 2 DM aged 18 years and above, treated and followed up regularly for at least a year with the clinic were included in this audit. Patients with type 1 DM, newly diagnosed Type 2 DM (less than 6-month duration) and gestational DM were excluded from this audit.

A standard structured pro forma was used to document the secondary data of the patients. The pro forma comprised the socio-demographic profile, duration of diabetes, smoking status, past medical history including presence of comorbid illness (defined as the presence of medical conditions such as hypertension, hyperlipidaemia, coronary artery disease and others) and treatment history for diabetes. In addition, it also consisted of the checklist for both process measures for diabetes care and the outcome of care.

Both verbal and written informed consents were obtained from the participating clinic doctors and relevant authorities. Ethical approval was obtained from Universiti Putra Malaysia Medical Research Ethics Committee. The data were analysed using the Statistical Package for Social Science (SPSS) version 14.0. Kolmogorov-Smirnov test was done to test the distribution of the data. Mean ± SD is used to describe normally distributed data; while median ± IQR is used for data not normally distributed.

RESULTS

A total of 396 medical records of patients with type 2 DM which fulfilled the criteria were reviewed. The demographic and clinical characteristics are presented in Table 1. The mean age of the patients' was 58.7 ± SD 10.6 years, ranging between 25 to 95 years of age. The majority (57.6%) of the patients were females and 37.1% were of Chinese ethnicity. Approximately 40.0% of the patients had concurrent hypertension. Most (95.2%) of the patients were on oral hypoglycaemic agents, either on monotherapy or on combination therapy.

The process measures of diabetes care are summarised in Table 2. FBG and BP measurements were noted to be recorded in more than 90% of the visits over the previous one year. However, only 109 (27.5%) of the diabetic patients had HbA1c done at six monthly intervals.

Among those who had HbA1c done at six monthly intervals, the mean HbA1c was 8.3 ± SD 1.9 % (95% CI between 7.9– 8.6); with 17 of 109 (15.6%) having HbA1c less than 6.5%. The median fasting blood glucose was 8.3 ± IQR 4.3; 32.7% had FBG of 6.1 mmol/L and less. One hundred and ninety nine of the 393 patients (50.6%) had BP of 130/80mmHg and less;

Table 1. Demographic and clinical characteristics of patients with type 2 DM (N= 396)

Variables	Frequency (%) or Mean/median ± SD/IQR
Age	
Mean ± SD years	58.7 ± 10.6
< 50 years old	74 (18.7)
≥ 50 years old	322 (81.3)
Sex	
Male	168 (42.4)
Female	228 (57.6)
Race	
Malay	119 (30.1)
Chinese	147 (37.1)
Indians	126 (31.8)
Others	4 (1.0)
Smoking status	
Current smoke	45 (11.4)
Ex-smoker	8 (0.2)
Never smoked	227 (57.3)
Not documented	116 (29.3)
Duration of diabetes (N = 396)	
Median ± IQR, years	5.0 ± 7.0
< 10 years	284 (71.7)
≥ 10 years	112 (28.3)
Medical history (N = 396)	
History of hypertension	150 (37.9)
History of hyperlipidaemia	28 (7.1)
History of comorbid illness	
None	241 (60.9)
Presence of co morbid illness	155 (39.1)
Treatment received	
Treatment for diabetes:	
Lifestyle modifications alone	3 (0.8)
Oral hypoglycaemic agents (OHA)	374 (95.2)
OHA and insulin	19 (4.8)
Antihypertensive agents	161 (40.7)
Aspirin	31 (7.8)
Lipid lowering agents	30 (7.6)

Table 2. Process measures of diabetes care (N= 396)

Indicators	Frequency	Percentage
Fasting blood glucose recorded at every visit	385	97.2
Blood pressure recorded at every visit	393	99.2
Body mass index recorded at every visit	195	49.2
HbA1c recorded every 6 months	109	27.5
Fasting lipid profile recorded annually	123	31.1
Urine protein/microalbuminuria recorded annually	34	8.6
Fundoscopic examination recorded annually	218	55.1
Foot examination recorded annually	219	55.3

Table 3. Clinical outcome of diabetes care

Variables	Frequency (%) or Mean/median ± SD/IQR
HbA1c (N = 109)	
Mean ± SD, %	8.3 ± 1.9
HbA1c < 6.5%	17 (15.6)
HbA1c ≥ 6.5%	92 (84.4)
FBG (N = 385)	
Median ± IQR, mmol/L	8.3 ± 4.3
FBG ≤ 6.1 mmol/L	126 (32.7)
FBG > 6.1 mmol/L	259 (67.3)
BP (N = 393)	
Systolic BP, Median ± IQR , mmHg	130 ± 20
Diastolic BP, Median ± IQR, mmHg	80 ± 12
BP ≤ 130/80 mmHg	199 (50.6)
BP > 130/80 mmHg	194 (49.4)
LDL-C (N = 123)	
Median ± IQR, mmol/L	3.8 ± 1.2
LDL-C ≤ 2.6 mmol/L	16 (13.0)
LDL-C > 2.6 mmol/L	107 (87.0)
Body mass index (N = 195)	
Median ± IQR, kg/m^2	26.9 ± 6.2
Normal (18.5 – 22.99 kg/m^2)	35 (17.9)
Preobese (23 – 27.49 kg/m^2)	75 (38.5)
Obese (more than 27.5 kg/m^2)	85 (43.6.)

NB. SD = Standard deviation
IQR = Interquartile range

while only 16 of 123 (13.0%) had LDL-C of 2.6 mmol/L and less. Among the 195 patients with recorded weight and height, 160 (82.1%) had a body mass index (BMI) of 23 kg/m^2 and more. The clinical outcome of diabetes care is shown in Table 3.

DISCUSSION

The measurements of FBG and BP in the present audit were recorded in more than 90% of the times, at every visit in the two clinics. These findings were comparable to another audit done, which noted that measurements of FBG and BP done at every visit reached 83.5% and 83.3% respectively.[14] This could be due to these measurements been easily done during a consultation with no added cost especially for the BP measurement.

The documentation on monitoring of BMI, HbA1c, lipid profile, fundoscopic evaluation, foot examination, and urine protein or micro-albuminuria, as recommended by guidelines, were less than 80%. These results are similar to a study done previously.[14] The issue of higher cost in requesting laboratory tests (such as HbA1c, lipid profile and urine micro-albumin) in primary care clinics as compared to the tertiary care centres, could have impeded the provision of quality care by the doctors. The under-documentation of fundoscopic and foot examinations in this study could be due to doctors not conducting these examinations because they are time consuming.

In addition, the public primary care clinics, the patient load has increased tremendously over the recent years. The overall attendance in the public primary care clinics has increased from 23.1 million in 2003 to 25.4 million in 2005 [21] Therefore, with the increasing demand to see large number of patients in a day and time constraints with limited manpower may have contributed to the under prescription of the laboratory tests in the surveillance of glycaemic control and cardiovascular risk factors.

In the present audit, glycaemic control was suboptimal. Among 109 (27.5%) of the diabetes patients who had HbA1c done every 6 months, the mean HbA1c was 8.3 ± 1.9 % and only 17 (15.6%) had good glycaemic control. These results are comparable to other studies.[12, 15] In these two studies conducted at primary care facilities, it was found that approximately 20% had HbA1c level of 7.0% or less. The possible reason for this could be due to the under prescription of insulin therapy among primary care doctors, hence, contributing to higher HbA1c levels.[22] In addition, patients' suboptimal compliance may also contribute to the low percentage of good glycaemic control.[15,23] Furthermore, the patients may be inadequately educated to manage their illnesses.

The majority of the patients in this present audit did not achieve good BP control and the recommended LDL-C levels. Fifty percent achieved targeted BP level in this audit as compared to 24.5% in another study.[15] Only 13.0% had LDL-C of 2.6 mmol/L and less, which was similar to that found in a study by Eid *et al*.[11] In the presence of multiple cardiovascular risk factors in patients with diabetes, achieving recommended levels as in the guidelines may be difficult despite using multiple medications due to the course of disease progression.[24]

In this audit, most of the process of care and the outcome of care did not achieve the target level of performance. The possibility of polypharmacy could create a problem with treatment adherence which would have influenced the outcome of care. There is a need to

improve the provision of care; which should involve the healthcare team, the patient and families.[25, 26] The health delivery system of these clinics has to be evaluated to assure effective and efficient clinical care. A trained multidisciplinary care team (which includes the nurses and medical assistants) should be initiated with clear defined roles and duties; as well as updating them on evidence-based care via continuous medical education.[25] Implementation of a multidisciplinary team combined with arrangements for follow-up and patient education has been shown to improve the process of care and outcome measures.[27,28]

It is important to develop a good clinical information system by establishing a comprehensive registry for diabetes patients in the clinics.[25, 26] This will allow a proactive review on individual patient care; by providing timely reminders for needed services such as their annual eye or foot examination and scheduled visits.[28] In addition, a clinical information system can aid to track and plan care; for example, a staff could be designated to be responsible for follow up needs such as the six monthly HbA1c measurement and the annual assessment of eye examination and lipid profile.[29] An ongoing audit should be done to confirm improvement in healthcare delivery following any changes implemented in the care and this will facilitate performance monitoring and quality improvement efforts.[25,26]

In the management of chronic diseases, patients make decisions and engage in behaviours that would influence their health. This in turn would affect the control and outcome of their disease. Therefore, patients should be supported and empowered to manage their health care. [25,26] However, for this to be successful, the emphasis is on the patients' central role in their care and to foster a sense of responsibility for their own health. They should receive basic information of their disease, taught the strategies for living with chronic disease and given ongoing support from families and health care team. The health care team should also receive training on self-management and skill building to facilitate patients in achieving their goals.

In this audit, the retrospective nature of data collection was limited by the accuracy of the data obtained from medical records, with the possibility of undocumented clinical variables. Furthermore, the values of the laboratory tests could not be standardised in view of different laboratory facilities utilised by the clinics.

In conclusion, this audit shows there is a gap between guidelines and clinical practice in the provision of diabetes care. The quality of care was found to be suboptimal; however, by motivating the primary care doctors via combinations of health care professional education, audit and peer review, the quality of diabetes care in primary care setting could be improved.

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