ORIGINAL ARTICLE

Standard of Care for Type 2 Diabetic Patients in a Public Hospital General Medical Clinic: Report of a Self-Audit

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SUMMARY

We audited the standard of care provided to 200 consecutive type 2 diabetic patients attending our hospital general medical clinic. Data on diabetes related processes and outcome measures were collected. Annual testing rates (blood pressure 100%, fasting lipid profile 91.8%, HbA1c 69%) were higher compared to complications screening rates (Eye 69%, albuminuria 51%, foot 22.4%). Lifestyle intervention was lacking with BMI documented in 38.3% of patients and smoking history in 46%. Fifty percent and 41% of patients with HbA1c > 7.5% were referred to diabetes educator and dietitian respectively. For outcome measures, 26% of patients achieved HbA1c ≤ 7%, 33% achieved BP ≤ 130/80 while 56% achieved LDL ≤ 2.6 mmol/L. Aspirin was prescribed in 78% and ACE inhibitor or angiotensin receptor blocker in 91.8% of patients. Lifestyle intervention and complication screening are the two major areas of deficiencies in the care of type 2 diabetic patients in our hospital general medical clinic.

KEY WORDS:
Diabetes mellitus, Standard of care, Audit, Public hospital, General medical clinic

INTRODUCTION

The management of diabetes requires multifaceted management strategy which targets not only the glycemic control but also cardiovascular risk factors. There should also be early detection and management of diabetic complications. Intensified, targeted, multi-risk factors intervention has been shown to reduce both cardiovascular and microvascular complications[1]. The world in general and Asia in particular, is facing an epidemic of type 2 diabetes. Thus, a stratified, systematic approach to management of type 2 diabetic patients is important in order to reduce or retard costly long-term complications. Even though clinical practice guideline is widely available to guide management, adherence to these guidelines varies widely. Previous studies had highlighted treatment gap between recommendation and clinical practice[2-4]. In Malaysia and regionally, the bulk of diabetic patients are followed up in general medical clinic together with non-diabetic patients with various medical diseases. There is often lack of structured management plan specific for diabetic patients in these clinics and adherence to recommended clinical practice guidelines is unknown. We therefore undertook the following audit to assess the standard of care provided for type 2 diabetic patients followed up in our general medicine clinic.

MATERIALS AND METHODS

The audit was carried out in the general medical outpatient clinic in Sarawak General Hospital, the state hospital in Sarawak, Malaysia. This 700 bedded public hospital serviced a population of 600, 000. The general medical outpatient clinic which runs twice weekly, on every Tuesday and Thursday afternoon, provides treatment and follow-up for patients with various medical illnesses. Each clinic was run, on average, by four general physicians and eight medical officers (residents). In the year 2005, the clinic registered 12, 000 patient-visits. An estimated 9% of the clinic patients have a diagnosis of diabetes mellitus. The prevalence of diabetes in Malaysia was estimated to be 8.3% based on the 1996 Malaysian National Health and Morbidity Survey.

We started the audit in June 2005 and included 200 consecutive patients who attended the clinic with a diagnosis of type 2 diabetes mellitus. All patients had been followed up in the medical clinic for at least six months. Data were collected through structured review of the outpatient clinic cards, prescriptions and laboratory results by a single medical officer. Indicators for process measures included: percentages of patients with at least one measurement of glycated hemoglobin (HbA1c), blood pressure (BP) and fasting lipid profile during the last year; percentages of patients with eye screening (dilated funduscopy or referral to ophthalmologist), documented foot examination, urine protein testing (which must include testing for microalbuminuria if the initial urinalysis is negative for protein) during the last year; percentage of patients who received enquiry or advice on smoking habit, and percentages of patients with HbA1c > 7.5% who were referred to a diabetes educator or dietitian in the past 1 year. Data collected on intermediate outcome measures included the most recent HbA1c, blood pressure and LDL-cholesterol levels; the number of patients receiving aspirin, angiotensin converting enzyme inhibitor (ACE-I) or angiotensin receptor blocker (ARB) without obvious contraindication (Aspirin: history of active gastrointestinal bleeding or hemorrhagic stroke within past six months, allergy or intolerance to aspirin, ACE-I or ARB: hyperkalemia, creatinine >150 umol/L and/or a documented rise in creatinine >20% upon treatment initiation). We followed the recommendations and targets set by the American Diabetes Association [5]. Aspirin was indicated for secondary prevention or primary prevention in patients >40 years of age or who have additional cardiovascular risk factor; targets for intermediate outcome measures were HbA1c of ≤ 7%, systolic BP ≤130 mmHg, diastolic BP ≤ 80 mmHg and LDL values ≤ 2.6 mmol/L.

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Analysis was performed using SPSS version 10.0 (SPSS, Chicago IL, USA). All data represent the most recent results available within the preceding 12 months. Data more than 12 month old were not included. Data are expressed as mean ± SD unless otherwise specified. Lipid profiles were measured after an overnight fast (clinical chemistry workhorse system Roche/Hitachi 912®, Roche Diagnostics) and HbA1c was measured by high performance liquid chromatography method (Bio-Rad Variant® Haemoglobin testing system).

RESULTS

Of the 200 outpatient clinic cards studied, there were four patients with duplicates, leaving a total of 196 patients (52% male) for final analysis. There were 50% Chinese, 36% Malay, 13% Sarawak Natives, and 1% Indian. Mean age (SD) of the patients was 60 (11) years old. Mean duration of diabetes was 8.7 years. Thirty-six percent of patients had known ischemic heart disease while 20% had history of cerebrovascular accident.

Intermediate outcome measures

Table I showed the percentages of patients with measurement of HbA1c, blood pressure, fasting lipid profile in the preceding one year and the mean (±SD) values achieved. For diabetes treatment, only 5% of patients were on diet control, 31% were treated with oral monotherapy, 47% were on combination oral therapy and 17% were on insulin (7% on once daily insulin in combination with oral therapy, 10% on twice daily or multidose injection). HbA1c was strongly related to treatment where HbA1c levels were significantly higher in patients with increased therapeutic intervention (Table IIa). For the 183 (93.4%) of patients who were hypertensive, 20.2% of patients (37/183) were on monotherapy, 27.3% (50/183) were on two and 52.5% (96/183) were on three or more antihypertensives for blood pressure control. Similarly, systolic BP was found to be significantly higher in patients on multiple antihypertensives (Table IIb). Statin was prescribed for 81.5% (145/178) of patients with a LDL-cholesterol more than 2.6 mmol/L. For patients without contraindication to aspirin or ACE-I/ARB as listed above, 78% of patients received aspirin, (43% for primary prevention) while 91.8% of patients were on either an ACE-I or ARB.

Figure 1 showed the proportion of patients achieving different levels of HbA1c, BP and LDL-cholesterol. Overall, 56% of patients achieved LDL target of ≤ 2.6 mmol/L, 32% of patients achieved both systolic and diastolic targets of ≤130/80 mmHg (56% have BP ≤140/90) and only 26% achieved HbA1c ≤ 7%. Sixteen patients (8.2%) achieved all three targets.

Lifestyle Intervention

Although weight was routinely measured in each visit, (unless the patient is disabled), measurement of height, and thus BMI, was only available in 38.3% of the patients studied. None of the patients had their waist circumference or waist hip ratio documented. In addition, enquiry or advice on smoking was also lacking with only 46% of patients having a documentation of smoking status or advice on smoking cessation. For patients with HbA1c above 7.5%, 41% were referred to a dietitian, and 52% to a diabetes educator for counseling in the past 12 months. (Table III)

Complication screening

Sixty-nine percent of patients received eye screening during the past one year. However, foot examination for peripheral vascular disease and neuropathy was infrequently performed and poorly documented. Similarly, quantification of albuminuria was seldom performed. Many patients with negative urine protein on urinalysis were not screened for microalbuminuria. The results are summarized in Table III.

Table I: Rate of annual measurement and mean target achieved for HbA1c, blood pressure and fasting lipid.

	Annual measurement	
	Number (%)	Mean ± SD
HbA1c	134 (68.4)	7.4 (1.6)%
Blood Pressure	196 (100)	
SBP		142 (20) mmHg
DBP		83 (11) mmHg
Lipid profile	180 (91.8)	
TG		1.8 (1.2) mmol/L
HDL		1.2 (0.3) mmol/L
LDL		2.4 (0.9) mmol/L

Table IIa: Relation between treatment modality and HbA1c.

Diabetes Treatment	Diet or oral Monotherapy (n=39)	Combination oral therapy (n=71)	Insulin ± oral therapy (n=24)
HbA1c (%)*	6.9 (1.4)	7.3 (1.4)	8.6 (1.7)

Data are means (SD). *P < 0.001.

Table IIb: Relation between treatment modality and blood pressure level

Blood Pressure Medication	Single (n=37)	Dual (n=50)	>3 (n=96)
Systolic BP** / Diastolic BP***	138.9(18.5) / 85.1(10.8)	137.9 (15.9) / 79.9 (10.0)	148.3 (20.8) / 84.2 (11.7)

Data are means (SD). ** P= 0.003, ***P=0.043 between groups.

Table III: Diabetes process of care measures

Measures	Number (%)
Complication screening	
Dilated fundoscopy / referral to ophthalmologist	135 (68.9)
Foot examination	44 (22.4)
Testing for albuminuria	100 (51.0)
Normoalbuminuria	19 (9.7)
Microalbuminuria	6 (3.1)
Protein + on urinalysis	75 (38.2)
Lifestyle intervention	
Enquiry/advice on smoking	90 (45.9%)
Referral to DM educator*	97 (49.5%)
Referral to dietitian*	81 (41.3%)

* For patient with HbA1c above 7.5%

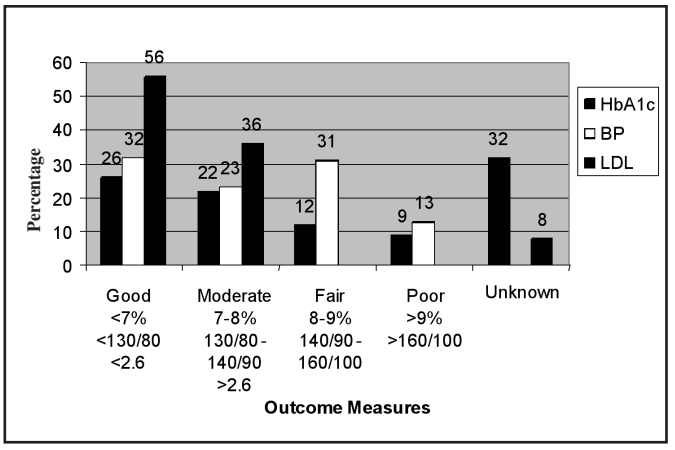

Fig. 1: The percentage of patients achieving different level of HbA1c, BP and LDL.

DISCUSSION

The audit identifies various areas of suboptimal diabetes care for potential improvement. Firstly, it highlights the deficiency in lifestyle assessment and intervention in the management of diabetes, which is a lifestyle disease. Lifestyle modifications like weight reduction, diet control and physical exercise are often considered the pillar for diabetes management and have been shown to improve metabolic control and improve cardiovascular risk [6-8]. However, assessment of BMI was documented in less than 40% of patients and none of the patients had any measurement for waist circumference or waist hip ratio. In addition, smoking history, an important modifiable cardiovascular risk factor, was only documented in 46% of the patients. Although lack of time, lack of knowledge and skills have been identified as barriers to provide lifestyle intervention to patients [9-10], physician's negative attitudes and perceptions towards importance and sustained effectiveness of lifestyle intervention [2, 11-12] may contribute to the low referral rate of patients (< 50%) with sub-optimally controlled diabetes (HbA1c > 7.5%) to trained medical personnel like the diabetes educator and dietitian for counseling and co-management. In contrast, prescription of medication and taking medication may be considered an easier task compare to lifestyle changes. This is reflected in the better result obtained for rate of prescription of medication in the audit. Ninety-two percent of patients were on an ACE-I or ARB and 78% were treated with aspirin. For patients with LDL> 2.6 mmol/L, 82% received statin therapy. The medication prescription rates for aspirin and ACE-I/ARB is higher than those reported in general medicine clinics run by residents (Aspirin 59%, ACE-I 69%) or faculty physicians (Aspirin 15%, ACE-I 35%) in a urban public hospital reported by Suwattee *et al* [13] and in other studies performed in non-hospital setting [3,14-16]. In addition, 80% of the hypertensive patients were on combination antihypertensives and 53% of them received three or more drugs for blood pressure lowering.

Annual testing rates for BP and fasting lipid profile were comparable to those reported in other studies [3, 13-15] although HbA1c testing rate of 69% was comparatively lower. Despite a fairly high testing and treatment rate, achievement of intermediate outcome measures with respect to goal attainment rates for glycemic, blood pressure and lipid control were only modest. Blood pressure control and HbA1c level deteriorate despite increased number of medications and escalation of therapy. These findings have been observed in other studies and have been attributed to progressive nature of the disease [16-19]. Although not assessed in the study, the other important contributing factor to consider is patient's compliance. The more non compliant the patient, the worse the glycemic and blood pressure control, resulting in more medications being prescribed which in turn makes it harder for the patient to be compliant with treatment. Aggressive treatment for both diabetes and hypertension right from the earliest stage of the disease as well as education and empowerment of patient to promote diabetes self care may help to improve the goal attainment rate.

Compare to other hospitals in Malaysia, the Diabcare-Asia project 2003 (Malaysia) which examined diabetes care in Diabetes Clinics in 19 public hospitals across Peninsular Malaysia reported annual testing rates of 67.9% for HbA1c, 80.1% for lipid profiles and 99.1% for BP [20]. Forty-one percent of the patients achieved HbA1c of < 7% while only 15% achieved BP < 130/80 mmHg and 32% had total cholesterol < 4.8 mmol/L. Studies on diabetes care in the community showed less favorable results. For instance, a study in 2003 involving 1031 diabetic patients in a busy community primary health care clinic in Sarawak, run solely by medical officers (residents) reported low goal attainment rates of 28% for HbA1c <6.5%, 6% for BP < 130/80 mmHg and 22% for LDL of < 2.6 mmol/L [21,22]. Another study in the same year evaluating BP control and treatment for type 2 diabetic patients in Malaysian government primary healthcare clinics in Melaka reported poor treatment and goal attainment rate

with only 3.1% of their diabetic patients achieving a BP of <130/80 mmHg. 39.5% of patients were not treated for their blood pressure and only 18.6% of them received an ACE-I or ARB [23]. The poorer results in the public primary healthcare clinics may be contributed by multiple factors like lack of awareness and adherence to clinical guidelines, heavy patient load, lack of specialist care and restricted access to "List A" drugs (which required specialist's prescription and included ARB, long acting calcium antagonist, premixed insulin and even the safer sulphonylurea, glicazide). A re-look into the diabetes care policy is very much desired and urgently needed to allow more aggressive and effective treatment of diabetes and its associated co-morbidities.

Finally, the audit reviewed poor adherence to guideline for annual complication screening for diabetic patients followed up in the general medical clinic. Screening for retinopathy was documented in 69% of patients while only 22.4% of patients received foot examination. For diabetic nephropathy, although urinalysis was frequently tested, only 12.8% of patients with negative protein in urinalysis were tested for microalbuminuria. Poor adherence to guidelines may occur due to various reasons including physician's ignorance, lack of time and various system issues and patient factors [2, 24-26]. For instance, some of the doctors may not be aware of the importance of testing for microalbuminuria when urinalysis for protein is negative, while foot examination may be thought to be too cumbersome in a busy general medical clinic. Previous studies had suggested that removing the responsibility of routine aspect of care (like ordering laboratory studies, referral for eye-screening, foot examination, BP and BMI measurement etc) from physician to non-physician staff improved adherence rate and patient care [27,28]. For instance, simple measure of allowing the nursing staff to instruct the patient to remove their shoes while waiting to see the physician could result in a sustained improvement in adherence to annual foot examination [2]. In addition, a multidisciplinary team approach with close coalition between physician and trained health care alliance have been shown to enhance implementation of diabetes guidelines and result in measurable improvement in patient outcome, compared to physician-care alone [29, 30].

There are several limitations in our audit. First of all, as data collection were solely through record review, some process measures like lifestyle intervention or foot examination may be underestimated if they are not documented in the clinic card. Secondly, we did not assess patient's compliance or practice of diabetes self care, nor did we assess the physician's knowledge or perception towards guidelines of diabetes care. In addition, as highlighted previously, the audit was performed in a public hospital setting and may not reflect the care in the community practice setting.

CONCLUSION

In summary, the audit showed that lifestyle intervention and complication screening are the two major areas of deficiencies in the care of type 2 diabetic patients managed in the general medical outpatient clinic in our hospital. It also revealed inadequate metabolic and blood pressure control despite relatively high treatment rate. There is a need to implement better strategies to improve adherence to diabetes guidelines. As diabetes care is complex and requires considerable patient self management and change in behaviors, a multi-faceted intervention with greater coalition between doctors and allied health care professionals may help in improving outcome.

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