

## Research paper

# Diabetes control in a university primary care setting in Thailand

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### ABSTRACT

**Objective** To evaluate diabetes control status in a university primary care setting in Thailand using the American Diabetes Association (ADA) clinical guideline, and to determine factors associated with good glycaemic control.

**Methods** Data were collected from 1510 medical records of patients with diabetes and compliant with reviews, attending the clinic regularly (at least three times) between January 2004 and June 2005.

**Results** The percentage of patients who attained ADA goal for haemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>) was 23.4%. The goals achieved by the highest and the lowest proportion of patients were measurement of triglycerides (49.6%) and low-density lipoprotein (LDL) (13.1%) respectively. Most patients (72%) received an annual eye examination and were evaluated for proteinuria. Approximately half the patients (50.5%) were not screened for microalbuminuria. Glycaemic control was significantly related to the

duration of the disease measured by years since diagnosis. Males had significantly better control than females (adjusted odds ratio = 1.4, 95% confidence interval 1.1–1.8). Physician teaching or training status and group education were not associated with patients' diabetic control.

**Conclusion** A considerable proportion of patients with diabetes in the clinic could not achieve the ADA target goals. Quality improvement strategies, such as a computerised tracking and recall system, should be developed to improve this. Improving glycaemic control especially in female patients with longer duration of disease, LDL management and microalbuminuria screening should be addressed as a priority in this primary care setting.

**Keywords:** diabetes mellitus, primary care, quality of health care

### How this fits in with quality in primary care

#### What do we know?

Diabetic control has been found to be poor in studies from Asia compared to European and North American settings.

#### What does this paper add?

Patients with diabetes in a university clinic in Thailand did not achieve the ADA target goals. Improving glycaemic control especially in female patients with longer duration of disease, LDL management and microalbuminuria screening should be addressed as a priority in this primary care setting.

## Introduction

Diabetes mellitus is a common metabolic disease in Thailand. In the year 2000, the number of adults with diabetes was estimated to be 2.4 million.<sup>1</sup> The disease causes a huge burden to patients and the country, due to its long-term complications. Strong evidence exists that good diabetes management results in significant benefits.<sup>2</sup>

In an attempt to improve diabetic control and prevent complications, the American Diabetes Association (ADA) has determined desired treatment goals such as haemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>) <7.0 %, fasting blood glucose <7.2 mmol/l (130 mg/dl), fasting lipid profile including high-density lipoprotein (HDL) cholesterol >1.1 mmol/l (40 mg/dl), triglycerides <1.7 mmol/l (150 mg/dl), low-density lipoprotein (LDL) <2.6 mmol/l (100 mg/dl), systolic blood pressure <130 mmHg, diastolic blood pressure <80 mmHg and body mass index (BMI) <25 kg/m<sup>2</sup>. The ADA also recommends that patients should be screened for retinopathy and microalbuminuria annually.<sup>3</sup>

Primary care physicians provide care to the majority of patients with diabetes, so it is important to understand its management in a variety of primary care settings. The main objective of this study was to determine diabetic control compared to ADA guidelines in an academic primary care clinic. The second objective was to identify factors associated with good glycaemic control in this setting. This information can be used to develop a quality improvement strategy for this group of patients.

## Methods

This study was conducted at a university primary care clinic in Bangkok, Thailand. The clinic provides over 60 000 primary care consultations each year for people in the catchment area of the universal coverage programme, and also for individuals outside the scope of the programme. The clinic is served by three groups of working physicians consisting of faculty members, family medicine residents and service general physicians. There are also registered nurses and dieticians who supervise group diabetic education.

Between January 2004 and June 2005, all of the outpatient records of diabetics were reviewed. We included patients who were compliant with reviews and attended the clinic regularly (at least three times in one year). Information about demographic data, year of first diagnosis, blood pressure, ophthalmologic examination, the most recent laboratory results, attendance to group education, and physician status were retrieved.

Statistical analysis was performed by SPSS 11.5. Means were expressed with standard deviation (SD). The associations between glycaemic control and potential predicting factors were evaluated with univariate and multiple linear regression analyses using HbA<sub>1c</sub> as the dependent variable.

## Results

During the study period, 1510 diabetes patients were included. Clinical characteristics of the patients are summarised in Table 1. The majority of patients had type 2 diabetes. Duration of disease ranged from 1 to 34 years. Patient age ranged from 17 to 92 years. The majority of patients who attended on at least three occasions were female. The service general physicians cared for more than half of the patients. About 10% of patients attended group education. The proportion of patients who received an annual eye examination and proteinuria screening was 71.6% and 72.5%, respectively. However, only 22% of patients were evaluated for urine microalbumin.

Faculty members comprised 34.5%, family medicine residents 10.3% and service general physicians 55.2% of physicians.

HbA<sub>1c</sub> values were available from 1266 (83.8%) medical records. Mean (SD) HbA<sub>1c</sub> was 7.8 ± 1.4%.

**Table 1** Characteristics of study patients (n = 1510)

Characteristic	Mean (standard deviation)
Age (years)	58.8 (10.9)
Male (%)	34.6
Type 2 diabetes mellitus (%)	99.3
Years since diagnosis	5.9 (5.0)
Body mass index (kg/m <sup>2</sup> )	26.3 (4.0)
Blood pressure (mmHg)	130 (15)/79 (8)
HbA <sub>1c</sub> (%)	7.8 (1.4)
Fasting blood glucose (mmol/l)	8.8 (2.5)
Triglycerides (mmol/l) <sup>a</sup>	1.8 (1.0)
HDL (mmol/l) <sup>a</sup>	1.1 (0.4)
LDL (mmol/l) <sup>a</sup>	3.5 (0.9)

<sup>a</sup>Fasting value.

According to the ADA guideline, only 23.4% of the patients would have been classified as having good control. Other parameters are shown in Figure 1.

Factors associated with glycaemic control are shown in Table 2. In univariate analysis, the variables that were significantly associated with good glycaemic control ( $HbA_{1c} < 7\%$ ) were male sex and years since diagnosis. After adjusting for the other variables in multivariate analysis, male patients had significantly better glycaemic control than females (odds ratio (OR) = 1.39, 95% confidence interval (CI) 1.07–1.81). Although patient age was not significantly associated with glycaemic control, the duration of disease was. Patients diagnosed within the previous five years had significantly better control than those diagnosed five years or more (OR = 1.56, 95% CI 1.20–2.02). Physician teaching or training status and group education were not shown to be associated with good diabetic control.

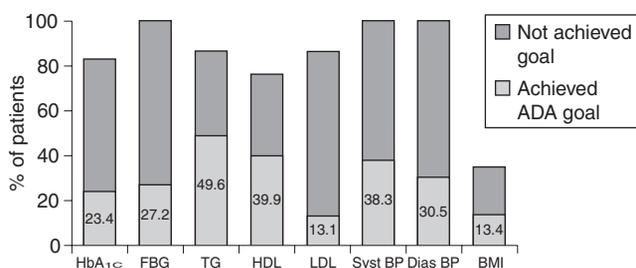
## Discussion

The mean age of the patients in our study (58.8 years) was comparable to other studies worldwide.<sup>1,4–6</sup> There

was a predominance of female patients compared to other studies,<sup>4–6</sup> which may have been because we included only those patients regularly followed up (at least three times a year).

During the study period, only 23.4% of the patients achieved optimal glycaemic control. This was lower than results from a study in another university primary care setting in the USA, where the proportion of patients with diabetes who achieved good control was 54.6%.<sup>6</sup> European studies showed that between 42% and 57% of diabetes patients treated in primary care had good glycaemic control.<sup>5,7</sup> However, a report of diabetes control in Asia showed that, from 18 211 patients, only 21% had  $HbA_{1c} < 7\%$ , with a mean  $HbA_{1c}$  of 8.6%.<sup>4</sup> In this latter study, taking the data from Thailand, only 20% of patients had  $HbA_{1c} < 7\%$ . Patients were from diabetes clinics of general hospitals and referral centres that represent secondary and tertiary health care settings.

From the Asian study,<sup>4</sup> it was found that glycosylated haemoglobin was underutilised in many of the hospitals studied, and more than half of recruited patients did not have  $HbA_{1c}$  assessments. Mean  $HbA_{1c}$  was lower in patients with  $HbA_{1c}$  assessed routinely than in those without. This may be one reason why glycaemic



**Figure 1** Percentage of patients achieving ADA target goals. FBG, fasting blood glucose; TG, triglycerides; Syst BP, systolic blood pressure; Dias BP, diastolic blood pressure; BMI, body mass index.

**Table 2** Patient–physician factors predicting good glycaemic control ( $HbA_{1c} < 7\%$ )

Factors	OR	95% CI	P value
Sex: male <sup>a</sup>	1.33	1.03–1.72	0.026
Age < 60 years	0.79	0.62–1.01	0.060
<5 years since diagnosis <sup>a</sup>	1.6	1.24–2.07	<0.001
<b>Status of physician:</b>			
faculty members	1.0		
family medicine residents	1.38	0.88–2.18	0.162
service general physician	0.89	0.68–1.16	0.378
Group education	0.66	0.43–1.01	0.053

<sup>a</sup>Statistically significant difference.

control in Asian countries including Thailand is poorer than in western countries. In our study only 83.9% of patients had HbA<sub>1c</sub> measurement, compared with 90–100% in western countries.<sup>5,6</sup> Although one study from England found no statistically significant association between percentage of HbA<sub>1c</sub> tests performed and average HbA<sub>1c</sub> level, this study involved a relatively small number of practices and may have lacked power to show such an association.<sup>7</sup> In our study, we found that male patients and shorter duration of disease were significantly associated with good glycaemic control. These findings are compatible with other studies from the UK.<sup>8</sup> Other studies have shown that patients with diabetes who neglect self-care have poorer metabolic control and that men are more compliant with diet and exercise than women.<sup>9,10</sup> This could explain the finding of poorer glycaemic control in women with diabetes in our study. Giving additional support to women with type 2 diabetes could improve metabolic control in this group.<sup>11</sup> Deterioration of beta-cell function could account for poorer glycaemic control in patients with longer disease duration in this study.<sup>12</sup>

We could not find any differences in glycaemic control with physician type, a finding consistent with previous studies showing that doctors' characteristics or training practice status were not associated with the good control.<sup>13,14</sup> Diabetic education was not significantly associated with patient glycaemic control either. This finding was at odds with a systematic review which demonstrated that addition of patient education and the enhancement of the role of nurses led to improvement in patient outcome.<sup>15</sup> The cross-sectional design and lack of power, which is a limitation of this study, may contribute to this discrepancy. Patients with poor glycaemic control may possibly have attended the group education more frequently than those patients with good control.

Of all ADA target goals, the highest proportion of patients (49.6%) achieved the goal for triglyceride (TG) measurement. However, the LDL goal was the parameter that the lowest proportion of our patients (13.1%) achieved. Evidence has shown that cholesterol lowering significantly improves the prognosis of patients with diabetes.<sup>16,17</sup> Therefore a strategy to improve patient LDL profile should be a priority.

Approximately half the patients (50.5%) were not screened for microalbuminuria. This test should be used more since using angiotensin-converting enzyme inhibitors in patients with diabetes and microalbuminuria can delay the progression of nephropathy.<sup>18</sup>

Many interventions have been studied to determine whether they improve diabetes care. Using traditional physician-targeted approaches such as chart audits and feedback of performance data does not increase adherence to diabetes guidelines by primary care physicians.<sup>19</sup>

However, computerised tracking and recall systems have been shown to improve standards of care.<sup>20</sup>

## Conclusion

This is the first report of the diabetes control in a Thai University primary care setting. A considerable proportion of patients with diabetes in this setting could not achieve ADA target goals. Strategies such as computerised tracking and recall system or physician reminders about HbA<sub>1c</sub> assessment and screening could be a tool to improve our patients' care. However, this paper provided a picture of diabetic care in patients adhering to follow-up. Further investigation is required to identify the causes of non-adherence to improve the overall quality in our primary care setting.

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#### ETHICAL APPROVAL

The study was approved by the ethical committee of the Faculty of Medicine, Ramathibodi Hospital, Mahidol University.

#### CONFLICTS OF INTEREST

None.

#### ADDRESS FOR CORRESPONDENCE

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