# DIABETES: CURRENT STRATEGIES FOR ITS CONTROL

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## INTRODUCTION

The population of Singapore is aging. There is an increased prevalence of obesity and a lack of physical activity in a large proportion of Singaporeans. All these contribute to an increased in prevalence of diabetes in Singapore. The National Health Survey in Singapore conducted in 1998 showed a 6.0% prevalence of obesity (BMI equal or greater than 30 kg/m$^2$) compared to 5.1% in 1992. More than one half of all Singaporeans reported of no leisure time physical activity in that survey. The prevalence of diabetes mellitus was found to be 9.0%, an increase from 8.6% in 1992[1].

Diabetes is a devastating disease with adverse consequences. It is a major cause of blindness, end stage renal failure, cerebrovascular and cardiovascular events. Studies have indicated the need for aggressive management of diabetes to decrease the morbidity and mortality of the disease[2,3].

Effective early management upon diagnosis and efforts at prevention of complications through effective on-going care are challenges that should be taken up by every Family Physician. He or she is in a very good position to co-ordinate the many aspects of patient care. Early diagnosis of diabetes in those at risk is a head-start. Upon confirmation of diabetes mellitus, the initiation of dietary intervention, exercise and weight control is required for every patient. Pharmacotherapy both for hyperglycemia and weight control may be needed if these are found to be inadequate. To manage the various aspects of diabetes care effectively, the patient should be involved in the treatment plan.

## EARLY DIAGNOSIS

Trials and studies published so far have indicated that complications of diabetes begin at glucose levels far lower than what was previously thought. Early diagnosis of the disease and intervention are therefore important in the prevention of such complications.

The diagnosis of diabetes is made in persons with typical symptoms of hyperglycemia if any of the following is present: a fasting plasma glucose of greater than 7.0 mmol/l or a 2hr post prandial or random glucose level of greater than and equal to 11.1 mmol/l. The oral glucose tolerance test is no longer recommended for routine screening of diabetes. It is indicated only in the evaluation of the patient with impaired fasting glucose (IFG) or when diabetes is still suspected despite a normal fasting blood glucose[4]. IFG is diagnosed in the patient who has a fasting blood glucose of 6.1 mmol/l to 6.9 mmol/l.

For the asymptomatic patient, two positive screening tests are required. Thus, all abnormal results in an asymptomatic patient should be confirmed with a fasting plasma glucose on another occasion as certain medications, stress, physical activity and carbohydrate load may affect the plasma glucose levels and cause a false positive screening result.

## INITITAL MANAGEMENT STRATEGY

Once diagnosed, a management strategy should be established. The patient's physical activity, dietary habits, weight, and heights should be evaluated. Concurrent co-morbidities such as hypertension, hyperlipidemia and other endocrine problems should be looked for. Baseline investigations such as electrocardiogram, lipid levels, electrolytes, HbA1c and creatinine levels should be obtained. Urinalysis should be performed for glucose, ketones, proteins and albumin.

## ONGOING CARE

In the ongoing care, screening for complications should be done yearly. Retinal photography and foot screening should be performed yearly. Ongoing yearly monitoring is important. As an aid to the physician on what is required in the ongoing yearly monitoring, a check list in the form of a flow chart or a list may served as a useful reminder to the physician. Such monitoring allow timely intervention to deal with diabetes related morbidities and prevent or delay downstream blindness, renal failure, lower limb amputation, cardiovascular and peripheral vascular complications.

In the ongoing care of the patient, maintaining glucose control to as normal as possible reduces the risk of microvascular and macrovascular complications of diabetes. This has been clearly established in the UK Diabetes Control and Complication Trials (DCCT)[2] and the Kumamoto study of type 2 diabetes in Japan[3].

During each visit, a progress history is taken, investigations are updated and scrutinized to detect complications of diabetes. Treatment goals should be reviewed and patient-reported difficulties discussed. The 5Cs approach of control, compliance, complications, counseling/concerns, and customization alluded to by Dr Tan Chee Beng in Unit 6[6] is a useful strategy for ongoing care.

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**Table 1. Goals of glycaemic control**

| Test | Ideal | Optimal | Suboptimal* | Unacceptable |
|---|---|---|---|---|
| $HbA_{1c}$ | 4.5-6.4% | 6.5-7.0% | 7.1-8.0% | > 8% |
| Pre-meal glucose** | 4.0-6.0 mmol/l | 6.1-8.0 mmol/l | 8.1-10.0 mmol/l | >10.0 mmol/l |
| 2 hr post-meal** | 5.0-7.0 mmol/l | 7.1-10.0 mmol/l | 10.1-13.0 mmol/l | > 13.0 mmol/l |

Source: Loh & Leow, 2002.
Notes: * = Acceptable goal in geriatric patients and individuals with advanced diabetic complications or other co-morbidities;
** = Values refer to capillary blood sample.

Diabetic patients who are stable can be followed-up in the clinic regularly at 2-3 monthly intervals but those whose treatment goals are not reached should be followed up as frequently as weekly or fortnightly until they are stable. Table 1 shows the goals of glycaemic control to guide the practitioner.

## TREATMENT STRATEGIES FOR DECREASING HYPERGLYCAEMIA

### Dietary treatment to achieve weight loss

The majority of type 2 diabetics are obese and weight loss is a primary therapeutic goal. In some weight loss in itself can produce a significant improvement in glycaemic control and the only form intervention that is required. Dietary treatment to achieve weight loss should be tailored to suit the individual food preference, ethnic group, lifestyle, cultural and social economic backgrounds. A referral to a trained dietician or a nurse practitioner may be necessary for some patients. Food choice and methods of food preparation should not only involve the patient but also the caregiver and the person preparing the meals. To sustain dietary treatment to achieve weight loss, it is important to educate the patient and his caregiver on the links between diet, weight control, good glycaemic control and the prevention of complications. Frequent discussion of these links help to reinforce desired behaviour.

### Exercise

Aerobic exercise increases and maintained insulin sensitivity. Walking, swimming, and stationary cycling are appropriate activities. If maintained for 6 weeks it can reduce the HbA1c levels by 1% to 1.5%. However patient should be fully evaluated for cardiovascular fitness before embarking on such activities. This is important as many diabetics have concomitant co-morbidities such as silent ischemic heart disease, retinopathy, nephropathy and hypertension.

### Pharmacotherapy

In many patients, their diabetes cannot be controlled by diet, exercise, and weight control alone. Nevertheless, every patient should be given an adequate trial of diet, exercise and weight control for at least 3 months before initiation of pharmacotherapy particularly in the overweight patient. There are now many oral agents from a number of classes available. Many of these have complementary actions and can be used in combination for an additive effect to achieve better glycaemic control. All oral hypoglycaemic agents reduce blood glucose by varying degrees. Most except for metformin and alpha-glycosidase inhibitors require the presence of insulin to work. When choosing a pharmacotherapy agent, the Family Physician will have to consider the benefits and actions of each group. The cost of some of the agents may be beyond the financial capabilities of some of the patient or their usage restricted by third party payers.

Insulin treatment is a needed option for some patient with type 2 diabetics. Most physicians and patients however use it as a last resort. There seems to be a general fear of injection therapy among diabetics in Singapore. Type 2 diabetes is a progressive disease with declining insulin production and insulin therapy may become necessary for many. Insulin therapy can be used as a combination therapy with oral hypoglycaemic agents. It is usually given at bedtime when used in combination therapy. The patient's fasting glucose level in mmol/l is used as an equivalent for the starting dose of insulin when initiating therapy. A split dose insulin regime may be required as the disease progresses.

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