DIABETES MELLITUS

1. Introduction

Diabetes is a global epidemic with 415 million people affected worldwide – equivalent to the total population of the USA, Canada and Mexico. In recognition of this, the United Nations passed a resolution in 2006 declaring diabetes to be a major, global health threat; the first time this has ever happened for a non-infectious disease. At present 1 in 12 of the world population has diabetes and this is estimated to rise to 10% of the world's population by 2040.

Diabetes is a chronic endocrine disorder characterized by high blood glucose levels resulting from an inability to produce or utilize the pancreatic hormone, insulin.

It is generally classified as:

Type 1 – insulin dependent.
This affects approximately 5-10% of those who suffer from diabetes.

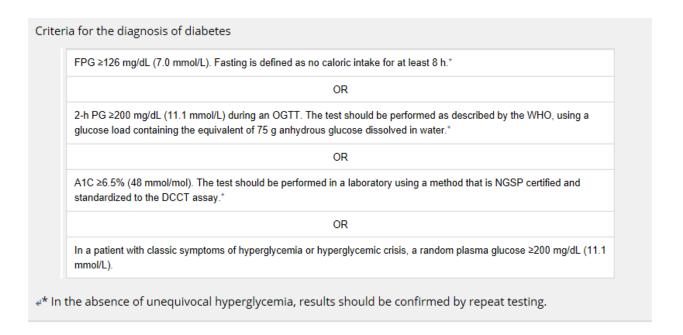Type 2 – often describes as 'late onset diabetes'.
This has traditionally been managed by weight control and/or oral medication but 60% of individuals with T2DM will require insulin within 5-10 years.

Although the hall mark of Type 1 diabetes is pancreatic beta cell destruction usually leading to absolute insulin deficiency and Type 2 diabetes is characterized by insulin resistance and ongoing decline in beta cell function, there may be some overlap between the two categories – see Appendix 1.

Every doctor, worldwide, has been educated in the diagnosis and management of diabetes and the most current information is available from the International Diabetes Federation, the American Diabetes Association, the European Association for the Study of Diabetes and NICE (see references).

2. Diagnosis and best practice treatment

The diagnosis of diabetes is made if the patient satisfies any one of the following criteria and, in all cases of Type 1 diabetes, treatment will involve regular injections of insulin.

Criteria for the diagnosis of diabetes

FPG ≥126 mg/dL (7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 h.*
OR
2-h PG ≥200 mg/dL (11.1 mmol/L) during an OGTT. The test should be performed as described by the WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.*
OR
A1C ≥6.5% (48 mmol/mol). The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay.*
OR
In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥200 mg/dL (11.1 mmol/L).

↵* In the absence of unequivocal hyperglycemia, results should be confirmed by repeat testing.

Type 2 Diabetes Mellitus – T2DM

The onset of T2DM is generally in later life but there has been a recent upsurge in children and adolescents. In addition, the management of T2DM has undergone a radical overhaul with the implementation of a strategy that includes the use of insulin at a much earlier stage.

This is strong contrast to the long-established practice of keeping patients on diet and oral medication for as long as possible, before considering the use on insulin.

Optimal T2DM management should maintain the HbA1c (glycosylated haemoglobin) below 7.0. If the HbA1c rises above this level, despite diet and oral medication, or if they are not achieving glycemic goals, treatment with insulin is indicated and should not be delayed.

It should be noted that the HbA1c is a measure of glycaemia control over the previous 2-3 months and will not change rapidly when insulin is introduced. In addition, switching to insulin will normally result in a weight gain of around 4kgs, which may be of significance in athletes involved in weight sensitive sports. In this situation, patients may continue to take METFORMIN after starting insulin because this medication attenuates the weight gain associated with a switch to insulin.

Although insulin is not usually considered as the first therapy of choice in T2DM, it may be utilized in the initial treatment for newly diagnosed T2DM if the patient is symptomatic and/or have an HbA1c over 10% and/or the fasting blood glucose is consistently over 250mg/dl (5.5 mmol/l).

Transient Intensive Insulin Treatment (TIIT)
Recent research indicates that utilising a short course on insulin, as soon as the initial diagnosis of T2DM is made, could successfully lay the foundation for prolonged good glycaemia control. TIIT involves 2-3 weeks of multiple daily injections of insulin or the use of an insulin pump. At the end of this course of treatment, individuals may be normoglycaemic for many months, without the need to take any medication (42-69% are euglycaemic at 12 months).

Despite vast expenditure on healthcare worldwide, management of T2DM remains woefully inadequate with patients spending an average of 5 years well outside the recommended glycaemia range before treatment is initiated. The latest standards of clinical practice entail the utilization of insulin therapy at a much earlier stage in the treatment continuum and this will directly impact the work of TUECs.

3. Prohibited substances

Insulin is prohibited under S4 of the WADA Prohibited List – Hormone and Metabolic Modulators. All individuals with diabetes on insulin require a TUE.

Individuals with T2DM, who are only on oral antihyperglycaemic, do not require a TUE.

4. Other non-prohibited alternative treatments

There are currently no alternatives to insulin.

5. Consequences to health if treatment is withheld

Failure to utilize insulin in the treatment of patients with Type 1 diabetes will result in the death of the patient.

As described above, in certain situation where T2DM is poorly controlled, insulin may be part of the recommended treatment regimen.

6. Treatment monitoring

Once the initial diagnosis of type 1 or T2DM is made, patients will be regularly monitored by a doctor or diabetes educator to ensure that the dosage of insulin is adequate for glycaemic control.

7. TUE validity and recommended review process

The initial TUE request must include details of the onset, investigation and diagnosis of the condition, with supporting documentation from a specialist in the management of diabetes, or a unit specializing in the management of diabetes. It is recommended that an initial TUE is granted for 12 months. After 12 months, the TUE should be reviewed (with documentation obtained from the General Practitioner and the specialist, or specialist unit) and a further TUE granted for 10 years. Thereafter, the TUE should be reviewed every 5 years, following receipt of the documentation listed above.

8. Any appropriate cautionary matters

None.

9. References

1. The International Diabetes Federation (IDF)
https://www.idf.org/

2. The American Diabetes Association (ADA)
http://www.diabetes.org/

3. NICE – The National Institute for Health and Care Excellence
https://www.nice.org.uk/guidance/ng17

4. European Association for the Study of Diabetes (EASD)
https://www.easd.org/statements.html

Appendix 1

Components of comprehensive diabetes evaluation
(Source: American Diabetes Association. Diabetes Care 2016 Jan; 39(Supplement 1): S23-S35. https://doi.org/10.2337/dc16-S006)

Medical history
- Age and characteristics of onset of diabetes (e.g., DKA, asymptomatic laboratory finding)
- Eating patterns, physical activity habits, nutritional status, and weight history; growth and development in children and adolescents
- Diabetes education history
- Review of previous treatment regimens and response to therapy (A1C records)
- Current treatment of diabetes, including medications, meal plan, physical activity patterns, and results of glucose monitoring and patient's use of data
- DKA frequency, severity, and cause
- Hypoglycaemic episodes
- Hypoglycaemia awareness
- Any severe hypoglycaemia: frequency and cause
- History of diabetes-related complications
- Microvascular: retinopathy, nephropathy, neuropathy (sensory, including history of foot lesions; autonomic, including sexual dysfunction and gastroparesis)
- Macrovascular: CHD, cerebrovascular disease, PAD
- Other: psychosocial problems, * dental disease*

Physical examination
- Height, weight, BMI
- Blood pressure determination, including orthostatic measurements when indicated
- Fundoscopic examination*
- Thyroid palpation
- Skin examination (for acanthosis nigricans and insulin injection sites)

- Comprehensive foot examination:
  - Inspection
  - Palpation of dorsalis pedis and posterior tibial pulses
  - Presence/absence of patellar and Achilles reflexes
  - Determination of proprioception, vibration, and monofilament sensation

Laboratory evaluation
- A1C, if results not available within past 2–3 months
  If not performed/available within past year:
- Fasting lipid profile, including total, LDL, and HDL cholesterol and triglycerides
- Liver function tests
- Test for urine albumin excretion with spot urine albumin-to-creatinine ratio
- Serum creatinine and calculated GFR
- Thyroid-stimulating hormone in type 1 diabetes, dyslipidemia or women over age 50