
DIABETES WITHOUT KETOACIDOSIS

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Objective

Treatment guideline for newly diagnosed diabetics who present without ketoacidosis.

For patients with ketoacidosis see diabetic ketoacidosis guideline

Definitions

Diabetes mellitus (ADA criteria) is the presence of symptoms and a random (or "casual") plasma glucose concentration >11.1 mmol/L due to an absolute/relative deficiency of insulin.

Background

Newly diagnosed Type 1 Diabetes Mellitus often presents with symptomatic hyperglycaemia without ketoacidosis (< 3% dehydration, no acidosis and not vomiting). Although not a medical emergency insulin therapy needs to be instituted to prevent decompensation to ketoacidosis.

Differential Diagnosis includes: (see Appendix)

- Stress induced hyperglycaemia
- Type 2 Diabetes Mellitus
- MODY (maturity onset diabetes of the young)
- Cystic Fibrosis related diabetes
- Hyperglycaemia secondary to medications.

History normally has some/all of the following: Polyuria (including nocturia and enuresis), polydipsia, weight loss, ?history of autoimmune disorders, most have no family history of type 1 diabetes. (If vomiting consider DKA or other secondary pathology).

Risk factors for type 2 Diabetes include: BMI >+4 SD, Acanthosis nigricans, Family history of Type 2 diabetes, History of Gestational diabetes in mother and being of a High risk ethnic group- Maori, Pacific Island or Asian.

DIABETES WITHOUT KETOACIDOSIS

Laboratory Values for New Diabetics without Ketoacidosis.

Blood glucose >11 mmol/l

Severe Ketoacidosis not present (pH>7.25, HCO₃ >15 mmol/l)

Ketonuria usually present.

Marked hyperglycaemia may require individualised therapy even if not in DKA (Blood Glucose >40 mmol/l), discuss all cases with Endocrinologist on call (phone 021 974 804).

Investigations

Essential for all cases:

1. Blood glucose, urea, electrolytes.
2. Capillary or venous blood gas (arterial blood gas rarely required)
3. Urine - ketones, glucose and routine culture
4. HbA1c (measure of 3 months glycaemia) - must be in purple top tube
5. Pre type 1 diabetes antibodies (GAD & IA2) - plain tube. Write 'pre-type 1 diabetes' on form and send to Waikato Hospital.

Consider:

- Check for precipitating cause eg. infection (urine, FBE, blood cultures; consider CXR).
 - Paired glucose/insulin level if considering Type 2 diabetes
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Principles of Management

- To stabilize blood sugar and institute appropriate education for the family.
 - All patients are initially admitted to stabilize and to start education. They will then be either put on a standard inpatient (3-5 day) or a rapid (2 day) education track as guided by the diabetes team on call.
 - Further education is then at the Greenlane Clinical Centre (GCC) diabetes centre over the ensuing weeks.
 - Most are managed with insulin by a syringe (mixing long and short) 2-3 times daily.
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Management Details for Type 1 Diabetes (no ketoacidosis)

Please discuss with Paediatric Endocrinologist on call before starting insulin, Endocrine 24-hour Cell Phone 021 974 804.

Insulin

Aim to start subcutaneous insulin before next meal if well:

Estimate total daily requirement of insulin

Pre pubertal 0.8 - 1 Units/kg/24 hours (varies if minimal symptoms and mild hyperglycaemia)

Pubertal up to 1.5 Units/kg/24 hours

- 1/3 Fast acting insulin (Novorapid or Actrapid)
- 2/3 long acting insulin (Protaphane)
- 2/3 Total daily dose given before breakfast
- 1/3 Total daily dose given before dinner

In the initial stages of treatment additional short acting insulin may be given as a sliding scale.

Fluids

The majority can be managed with oral fluids.

If blood sugar > 30 mmol/l consider IV fluids 0.45% saline + 20 mmol potassium chloride (KCl) /500 ml maintenance + 1/2 deficit.

Monitoring

Blood glucose monitoring before meals and 4 hourly overnight with sliding scale if appropriate, (normally reduced to 4x day and once overnight once stable).

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Appendix Classification of Diabetes Mellitus

Diabetes Care 2004, 27 Suppl:S5

Type 1 diabetes

- A. Immune-mediated
- B. Idiopathic

Type 2 diabetes

Other specific types

- A. Genetic defects of beta cell function
 1. Chromosome 12, hepatocyte nuclear factor (HNF)-1-alpha (MODY3)
 2. Chromosome 7, glucokinase (MODY2)
 3. Chromosome 20, HNF-4-alpha (MODY1)
 4. Chromosome 13, insulin promoter factor-1 (IPF-1/MODY4)
 5. Chromosome 17, HNF-1-beta (MODY5)
 6. Chromosome 2, NeuroD1 (MODY6)
 7. Mitochondrial DNA
 8. Others
- B. Genetic defects in insulin action
 1. Type A insulin resistance
 2. Leprechaunism
 3. Rabson-Mendenhall syndrome
 4. Lipotrophic diabetes
 5. Others
- C. Diseases of the exocrine pancreas
 1. Pancreatitis
 2. Trauma/pancreatectomy
 3. Neoplasia
 4. Cystic fibrosis
 5. Hemochromatosis
 6. Fibrocalculous pancreatopathy
 7. Others
- D. Endocrinopathies
 1. Acromegaly
 2. Cushing's syndrome
 3. Glucagonoma
 4. Pheochromocytoma
 5. Hyperthyroidism
 6. Somatostatinoma
 7. Aldosteronoma
 8. Others