Clinical Guideline

Care of the well child, newly diagnosed with Type 1 Diabetes Mellitus

SETTING  
Insert hospital name

FOR STAFF  
Medical and nursing staff

PATIENTS  
Children with diabetes and their families

Patient group

This guideline is intended for use in managing children presenting with newly diagnosed diabetes who are well, not acidotic, not significantly dehydrated and able to tolerate oral rehydration

Exclusion criteria

This guideline does not cover the management of children presenting in moderate or severe diabetic ketoacidosis (DKA). For children presenting in DKA the current national guideline for management of children presenting in diabetic ketoacidosis should be followed.¹

Diagnostic Criteria for Diabetes Mellitus in Childhood and Adolescence

WHO Diagnostic criteria for diabetes based on blood glucose measurements and the presence or absence of symptoms as detailed below².

1. Symptoms of diabetes plus casual plasma glucose concentration ≥11.1 mmol/L (200 mg/dL)*. Casual is defined as any time of day without regard to time since last meal.
2. Fasting plasma glucose ≥7.0 mmol/L (≥126 mg/dL).⁴ Fasting is defined as no caloric intake for at least 8 h.
3. 2-hour postload glucose ≥11.1 mmol/L (≥200 mg/dL) during an OGTT. The test should be performed as described by WHO (86), using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water or 1.75 g/kg of body weight to a maximum of 75 g (86).

*Corresponding values (mmol/L) are ≥10.0 for venous whole blood and ≥11.1 for capillary whole blood and
⁴≥8.3 for both venous and capillary whole blood.

Investigations to perform at diagnosis

- Random blood glucose
- HbA1c (glycated haemoglobin)
- Antibody markers predicting type 1 diabetes: Measure Islet Cell Antibodies (ICA) and Glutamic Acid Decarboxylase Autoantibodies (GAD antibodies)
  - Antibody negative diabetes is not unusual. Reports suggest somewhere between 20 to 30% of children may be antibody negative at diagnosis.³,⁴ Islet cell antibodies are more likely to be positive with studies reporting them positive in approximately 80% of children with diabetes³. There is significant variation though with age. In children diagnosed under the age of five approximately 10% are antibody negative. At 17yrs this increases to
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44% Alternative types of diabetes to type 1 should be considered if the patient is antibody negative and has a strong family history of diabetes.

- **Screening for coeliac disease:** Measure either IgA anti tissue transglutaminase antibodies (tTGA) or IgA anti-endomysial antibody (EMA). There is no evidence to support use of both. Do not carry out anti-gliadin antibody serological tests.\(^5,6,7\)
  - Measure total IgA
  - The IgA tTGA and IgA EMA serological tests show high levels of sensitivity and specificity in the diagnostic process for coeliac disease if IgA sufficient.
  - Anti-gliadin antibody serological tests show lower levels of sensitivity and specificity than tTGA and EMA.
  - If IgA deficient then use IgGtTGA or EMA as a screening test.

- **Screening for thyroid disease** – Measure both thyroid function tests (TSH) and Thyroid Peroxidase antibodies (TPO).
  - Literature suggests that between 4.2% and 9.6% of individuals will develop thyroid disease – with 39% developing it within 1 year of diagnosis.\(^8-11\)

- **Cataract:** Eye screening via simple fundoscopy is appropriate
  - Approximately 0.7% of children presenting with diabetes have a cataract secondary to metabolic disturbance.\(^12\)

- **C peptide:** This can be difficult to interpret, but may be useful where diagnosis of type of diabetes is unclear or for research purposes

**What insulin regimen should be started at diagnosis?**

- **Children are likely to benefit from an intensive insulin regimen and support at diagnosis** (either multiple daily insulin injections or continuous subcutaneous insulin infusion (CSII)). However due consideration needs to be given to patient and caregiver preferences.
- For those children / young people starting on multiple daily injections approximately 50% of the total daily dose should be basal insulin analogue (such as insulin glargine or insulin detemir) and 50% given as rapid insulin analogue (e.g.InsulinAspart, insulin Lispro, insulin Glulisine) in 3 divided doses before meals.
- Families should be taught carbohydrate counting soon after diagnosis.
- For those children requiring conventional mixed insulin regimen (e.g. twice daily Novomix 30 or Humalog mix 25) the total daily dose is the same but two thirds of the total daily dose needs to be given before breakfast and one third before the evening meal. The range of premixed insulin currently available is limited.
  - The Diabetes Control and Complication Trial demonstrated that adolescents and adults with type 1 diabetes managed with intensive insulin therapy and support achieved better control when compared to those on conventional insulin therapy.\(^13\)
  - SEARCH for Diabetes In Youth Study Group examined the impact of insulin regimen intensification on metabolic outcomes (over time) in 1,606 children and young people with type 1 diabetes who had a baseline visit and at least one follow-up. Insulin regimens were divided into five categories. Category 1 (basal-bolus insulin with CSII) was considered the most intensive and category 5 (1-2 insulin injections per day, excluding basal insulin glargine or detemir) was considered the least intensive. Between baseline and most recent follow-up visit, 51.7% of the participants changed to a more intensive regimen, 44.7% had no change in their regimen, and 3.6% changed to a less intensive regimen. Among the youth in the no-change group, 15% were already on CSII at their baseline visit, and 56% were in either insulin regimen category 1 or 2 at baseline, indicating an intensive regimen.
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at baseline. Over time, A1c levels increased significantly in all groups, but A1c levels were significantly lower in the more-intensive group than in the no-change group at the 1-year and 2-year visits (p<0.05). And both these groups showed a smaller increase in A1c than did the less-intensive group 14.

What dose of insulin should be used at diagnosis?

- The starting dose of insulin should be 0.5-0.75 units/kg/day. Adolescents and children with high levels of ketosis at diagnosis are likely to need doses at the higher end of this treatment range.

How often should the blood glucose levels be checked

Self-monitoring of blood glucose (SMBG) is essential to aid adjustment of insulin dosages. Advise the family to test blood glucose a minimum of 4 times a day (before breakfast, lunch, supper and bedtime).

- One systematic review identified poor quality studies which assessed the effect of frequency of self-monitoring on glycaemic control in people with type 1 diabetes. One non-randomised trial in children and two observational studies in adults reported that more frequent blood glucose monitoring (≥3 tests per day) was associated with improvements in glycaemic control 15.

- **Target blood glucose levels:**
  - between 4 - 8 mmol/L before meals 16,
  - less than 10 mmol/L post prandial 2 hours after meal 16
  - 5-8 mmol/L at 3 am
  - The ideal target blood glucose for each child may vary with age and stage of puberty. The aim is to achieve blood glucose levels as close to normal as possible whilst avoiding frequent or severe hypoglycaemia.

Ketone testing

- All children with diabetes need to be taught how to test for ketones as part of sick day rule advice.
  - There are two methods of monitoring ketone bodies; the measurement of beta-hydroxybutyric acid by capillary blood sample and measurement of acetoacetic acid by urine dipstick test. In a two centre randomised controlled trial (RCT) of low risk of bias, including 123 children, adolescents and young adults aged under 22 years, use of blood ketone monitoring resulted in a significant reduction (of about 50%) in the incidence of hospitalisation or emergency assessment 17.

Inpatient or outpatient care?

- Both home based (or ambulatory care) and in patient care are safe.
- The decision to offer either should be based on availability of well trained staff to offer safe home based care, time of presentation, individual family circumstances and parental choice.
  - Recent Cochrane review concluded that there is insufficient high quality data to answer the question whether outpatient and /or home based management is better than in patient care 18,19.

What structured Education topics should be covered at Diagnosis and during the first month following diagnosis?

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What follow up should the child have after initiation of insulin therapy?

- On discharge, the family should be offered daily contact (face to face, telephone, text, email or 2 way telecommunication systems using video computer technology) with Diabetes Specialist Team for first 7 days following diagnosis.
All children with diabetes mellitus should have access to 24 hour telephone advice
All school aged children should have a school care plan in place either before or soon after return to school
  - Families, children and young people with diabetes benefit greatly from a good start to diabetes care pathway with confident, clear, positive messages, support and advice. Frequent contact with the children’s diabetes team is recommended to help manage the changing requirements of diabetes in its early phases. The contacts may be in clinic, home visits or telephone.

References


