# DIABETES: MANAGEMENT OF THE NEWLY DIAGNOSED PAEDIATRIC PATIENT GUIDELINE

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The Trust strives to ensure equality of opportunity for all, both as a major employer and as a provider of health care. This Diabetes – management of the newly diagnosed paediatric patient guideline has therefore been equality impact assessed to ensure fairness and consistency for all those covered by it, regardless of their individual differences, and the results are available on request.

**Does this document replace or revise an existing document?**
Version 2 of the same document

## Contents

**Executive Summary**

**All patients referred in with possible diabetes mellitus need to be seen on the day of referral.**

The following **MUST BE DONE**

1. Inform the Paediatric Medical Registrar on call (bleep 2201).

2. Inform the following on the day of admission:

   - Dr. Trevelyan (bleep 1541 or mobile 07786 264448)) or her SpR (bleep 2027) AND
   - Diabetes Nurse Specialists on extension 6893 (please leave a message on answer phone) or their mobile phone 0870 626 0364
   - Dietitian – ext 6072 (please leave a message on answer phone)

   If the patient presents out of hours or on a weekend please leave a message on both the Nurse Specialist's office phone (ext 6893) and mobile phone (0870 626 0364) and inform Dr. Trevelyan and/or her SpR the following working day at morning handover.

3. Record the height and weight of the child.

4. Test urine for Glucose and Ketones.

5. The following bloods must be taken by the admitting doctor.

   - Capillary (or venous) blood gas
   - True blood sugar (*Fluoride oxalate*) and a capillary glucose if not already obtained
   - Urea and electrolytes, Thyroid function, C-Peptide (*Lithium Heparin*)
     **NB** sample must be in lab within 30min for C-Peptide
   - HbA1c (*EDTA*)
   - Full blood count (*EDTA*)
   - Islet cell antibodies, GAD antibodies, Tissue Transglutaminase antibodies (coeliac screen), thyroid peroxidise antibodies. (*10 ml clotted blood*).

**1**

### 1.1 Introduction

This guideline provides guidance on a Management of newly diagnosed diabetics.

### 1.2 Scope

This guideline applies to patients seen within Southampton Children's Hospital.

### 1.3 Purpose

To provide guidance on the management of newly diagnosed diabetics. To provide a consistent approach to the management of these patients in all ward areas.

**2 Related Trust Policies**

Paediatric venesection
Hand Hygiene
Waste Management

**3 Roles and Responsibilities**

Doctors and nurses should familiarise themselves with the content of this document.

## 4. NEWLY DIAGNOSED DIABETES general information

**All patients referred in with possible diabetes mellitus need to be seen on the day of referral.** The only exception to this would be if a clinically well patient (no vomiting well hydrated) who had elevated blood glucose but no ketonuria was referred in the evening. These patients can be seen first thing the following morning.

The following **MUST BE DONE**

1. Inform the Paediatric Medical Registrar on call (bleep 2201).

2. Inform the following on the day of admission:

   - Dr. Trevelyan (bleep 1541 or mobile 07786 264448)) or her SpR (bleep 2027) AND
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- HbA1c (*EDTA*)
- Full blood count (*EDTA*)
- Islet cell antibodies, GAD antibodies, Tissue Transglutaminase antibodies (coeliac screen), thyroid peroxidise antibodies. (*10 ml clotted blood*).

**NB** the sample for C-Peptide must be taken before starting insulin therapy, however blood tests for thyroid function, coeliac screen, HbA1c, GAD and islet cell antibodies can all be taken later in the admission if it is difficult to get sufficient blood at presentation.

If the child is **ILL** (vomiting, toxic or dehydrated), they will need the following:

- IV cannula and a blood gas (arterial, venous or capillary acceptable)
- Infection screen including Urine for M C&S and blood cultures.

If blood gas is abnormal (pH<7.3 or Bicarbonate <15) follow separate **PAEDIATRIC DIABETIC KETOACIDOCIS protocol.**

## 5. WELL CHILD with GLYCOSURIA and NO KETONES

First confirm the diagnosis of hyperglycaemia by doing both capillary blood glucose after ensuring the child has washed their hands, and then a true lab glucose on a venous sample.

If Type 1 diabetes is probable (i.e. the patient has a clear history of polyuria/polydipsia/weight loss) the patient should be commenced on sub-cutaneous Insulin (see below). This is given using insulin pens which are kept in the diabetes cupboard on PMU.

Discuss the results with someone from Dr Trevelyan's team (See page 3 for contact details). Out of hours discuss with the General Paediatric Consultant on call.

Consider other causes of hyperglycaemia including Type 2 diabetes, Maturity Onset Diabetes of the Young (MODY) and acute stress/infection induced hyperglycaemia.

## Insulin

This is given as **Novorapid** before each meal and **Glargine** before bed

The **total** daily dose of Insulin will be **0.5 units/kg/day**.

½ of the total dose should be given as Glargine before bed (i.e. 0.25u/kg/dose)

**Note:** If the child presents overnight or before 12 noon the dose of Glargine should be given ASAP after admission, and the same dose should be repeated before their next bedtime. If presenting after 12noon give the dose of Glargine at bedtime that evening.

The remaining ½ of the total dose should be divided into 3 and given as Novorapid immediately before breakfast, lunch and dinner (i.e. 0.08u/kg/dose) do not wait between giving injection and eating.

The time and the dose given **must** be recorded on the Prescription & Diabetic charts.

e.g. A 36kg child will need 36 x 0.5 u/kg/day = 18 units of insulin/day
**Glargine** 36 x 0.25 = 9 units before bed
**Novorapid** 36 x 0.08 = 3 units before each meal

## 6. Well child with both GLYCOSURIA AND KETONURIA (but not acidotic i.e. pH>7.28 and bicarbonate >18)

## Insulin

This is given as **Novorapid** before each meal and **Glargine** before bed

The **total** daily dose of Insulin will be **0.6 units/kg/day**.

½ of the total dose should be given as Glargine before bed (i.e.0.3units/kg/dose)

**Note:** If the child presents overnight or before 12 noon the dose of Glargine should be given ASAP after admission, and the same dose should be repeated before their next bedtime. If presenting after 12noon give the dose of Glargine at bedtime that evening.

The remaining ½ of the total dose should be divided into 3 and given as Novorapid immediately before breakfast, lunch and dinner (i.e. 0.1units/kg/dose) do not wait between giving injection and eating.

e.g. 24kg child will need 24 x 0.6 = 14 units insulin/day
**Glargine** 24 x 0.3 = 7 units before bed
**Novorapid** 24 x 0.1= 2.5 units before each meal

The time and the dose given **must** be recorded on both Prescription & Diabetic charts.

Eventually target blood glucose levels should be between 4 and 8. In the first few days of insulin therapy high blood glucose levels should be tolerated unless there is a recurrence of ketonuria in which case additional insulin is needed (discuss with diabetes team - phone 0870 626 0364)

## 7. Well child with both GLYCOSURIA AND KETONURIA and mild acidosis (i.e. pH>7.28 and bicarbonate 15 - 18)

Some children are clinically well at presentation (tolerating oral fluids and appear <5% dehydrated) but have an abnormal blood gas. Regardless of whether the pH is normal or near normal, if there is evidence of metabolic acidosis (Bicarb <18) on the gas, consideration should be given as to whether the child needs treating with IV fluids & insulin as per the DKA guideline.

The role of insulin in these children is to switch off ketogenesis and therefore correct the metabolic acidosis. Children started on IV insulin will receive 0.1units/kg/hour insulin (equivalent to 2.4units/kg/day). This dose is known to be very effective at halting ketogenesis and reversing the metabolic acidosis. Children started on SC insulin will only receive 0.6units /kg/ day SC. This insulin is in the form of long acting insulin, usually Glargine, which takes 24-48 hours to start working effectively and Novorapid given at mealtimes. The smaller dose of insulin given SC will correct the ketosis and acidosis but more slowly than the higher IV dose.

Many of the children presenting with mild acidosis (pH>7.28 and Bicarb 15-20) can be safely managed on oral re-hydration and SC insulin. However for this to be effective several doses of Novorapid often need to be given (with food) over several hours. This works well if, for example, the child presents in the morning so that Novorapid can be given first with a snack, then again with lunch and again with tea. However if the child presents at a time of day eg. late evening / overnight, when they are unlikely to be eating regularly and therefore unlikely to be given Novorapid SC for several hours, it may be safer and more effective to start the child on IV fluids and insulin for the first few hours (as per the DKA guideline), until the dehydration has been corrected and the acidosis improved before starting SC insulin during daytime hours.

## 8. Management of the child on the ward including Diabetes Education for the Child and Parent

- Blood sugars (BM's) should be measured just before meals and once during the night (**7.30am, 11.30am, 5.00pm, before bed**, and **2.00 am)**. The reason for checking the BMs this frequently is to monitor the child's response to insulin and ensure hypoglycaemia is avoided. A BM should also be measured if the child feels wobbly/unwell as they may be hypoglycaemic.
  These results should be recorded on the Diabetes chart.
- Generally speaking high blood glucose levels should be tolerated over the first 24-48 hours of SC insulin therapy as long as the ketone levels

are dropping or are negative. Additional doses of Novorapid should not be given to treat high blood sugar levels unless the ketone levels are rising.

- **Prior to discharge the child and parent need**:

1. Teaching about how and when to give subcutaneous injections of insulin using insulin pen device (Insulin pen devices will be supplied and the protocol for their use will be taught to parents by the diabetes nurse specialists prior to discharge).
   It is very important for children and parents to take responsibility for their own injections and BM testing from the first dose of insulin / first blood test. This is to enable early discharge from hospital. The involvement of the play specialist, who can provide a preparation play kit for diabetes, can be helpful.

2. Teaching about how and when to do BM readings (pre each meal, pre bed and if the child feels unwell) using a sugar meter (devices are kept in the Diabetes cupboard on PMU)
   The demonstration of injection/capillary BM testing techniques should be carried out by the Named Nurse using insulin pen devices /accu–check strips.

3. Teaching about the basics of a diabetes diet (see handouts in New Diabetes Folders kept in PMU Diabetes cupboard). Ideally the child and parent should be seen by the dietician prior to discharge.

4. Teaching about the signs and symptoms of a hypoglycaemic episode and how to treat them – including scenarios in which the child is conscious, conscious but not co-operative and unconscious (see Appendix 1)

5. To know how to check blood for ketones using a blood ketone meter.

6. To know how to contact the team if there is a problem once discharged from the ward.

The nurse responsible for the patient should mark competency of the parents / patient in the above tasks on the Diabetes Check list. This must be carried out by the ward nurse responsible for the patient.

Teaching of the above should not be delayed if the child is ready for discharge over a weekend. If the child is sent home over the weekend and they have not been seen by the Diabetes Nurse Specialists or dietitian prior to discharge please leave a message for the nurses on 0870 626 364 and for the dietitians on ext 6072 at discharge so that the child can be seen by the relevant people on the next working day. (When possible the diabetes nurse specialist will come in and deliver education at the weekend).

If the child is < 7 years old **EACH PARENT/GUARDIAN** should have done at least **3 injections and 6 blood sugars prior to discharge.**

If the child is 7 years or older the child should be encouraged to do his/her own injections and blood sugars. In addition **ONE** other parent should have

done at **least 3 injections and 6 blood sugars** prior to discharge.

## 9. DRUGS TO TAKE HOME

Please prescribe the **'Newly Diagnosed Diabetic'** Drug package.

(this can be found at the bottom of the Drug/TTO tab on the electronic discharge summary in a drop down box under 'drug package').

**To be supplied by the Diabetic Specialist nurse**

- Finger pricking device (Fastclix/Multiclix) and lancet drums
- Chosen meter and test strips (there are spare meters (Accu-Chek Aviva and test strips stored in the Diabetes cupboard in the PMU treatment room)
- Abbott FreeStyle Optium Blood ketone monitor
- Insulin pens (Novopen 4 / Novopen Echo and ClikSTAR)
- Diabetes information pack including Tots to Teens and Just for You magazines
- GP repeat prescription letter

### 10 Implementation

The Guideline will be displayed on the Staffnet, and sent to the relevant Care Group clinical teams. The team leaders will be expected to cascade to all relevant staff groups. All medical, nursing and midwifery staff caring for women and newborns should have support and training in implementing the contents of the guideline.
In addition, the guidelines will be included in local induction programmes for all new staff members.

### 11. Process for Monitoring Compliance/Effectiveness

The purpose of monitoring is to provide assurance that the agreed approach in the guidance is being followed to ensure we get things right for patients, use resources well and protect our reputation. Our monitoring will therefore be proportionate, achievable and deal with specifics that can be assessed or measured.

Audit results will be circulated and presented at the multidisciplinary audit meetings, identified in the monitoring table. Any areas of non compliance or gaps in assurance that arise from the monitoring of this guideline will result in an action plan detailing recommendations and proposals to address areas of non compliance and/or embed

learning. Monitoring of these plans will be coordinated by the group/committee identified in the monitoring table.

Those responsible for instigating the resulting actions will be identified in the audit meeting minutes and the action plans and results will also reviewed by paediatric grand round. The resulting actions will be reviewed or followed up at the subsequent multidisciplinary audit meeting(s).

Key aspects of the procedural document that will be monitored:

| What aspects of compliance with the document will be monitored | What will be reviewed to evidence this | How and how often will this be done | Detail sample size (if applicable) | Who will co-ordinate and report findings (1) | Which group or report will receive findings |
|---|---|---|---|---|---|
| Retrospective | Notes | 3 Yearly | 20 sets of notes | Paediatric Consultant | Paediatric grand round |
| | | | | | |

(1) State post not person.

## 12. Arrangements for Review of the Policy

Guideline to be reviewed after three years or sooner as a result of audit findings or as any changes to practice occurs.

## 13. References

## 14. Appendices

# APPENDIX 1 - Hypoglycaemia

## Definition

- Hypoglycaemia is defined as a blood sugar level less than 4 mmol/L in children taking insulin (or a blood sugar level of less than 2.8 mmol/L in children not taking insulin).

## Symptoms

These vary according to the age of the child

**Infants**

– Pallor, Jittery, sweatiness, floppiness, apnoea, irritability, an abnormal cry, convulsions, coma.

**Older children**

– Hunger, pins & needles, pallor, tremor, headache, nausea or vomiting, abdo pain, Irritability, tearfulness, blurred vision, confusion, dizziness, fainting, convulsions, coma.

## Causes

- In someone without diabetes – very rare
- In a child with diabetes
    - Too much insulin
    - Too little food (carbohydrate)
    - Exercise

## Treatment

- ALWAYS CONFIRM THAT THE CHILD'S SUGAR IS LOW if possible

- **If the child is alert & co-operative**
    - 10g fast sugar
        - e.g. 50ml original lucozade or 100ml full fat coke or 100ml fresh orange juice, 2 to 3 dextrose tablets or 2 teaspoons sugar
    - Followed by a starchy snack
        - e.g. couple of biscuits or a cereal bar or a piece of toast or a bowl of cereal

- **If the child refuses to eat or drink anything**
    - Give hypostop gel between the lips & gums – squeeze in whole tube
    - If there is no improvement in 5 to 10 mins, give another tube
    - If there is still no improvement phone 999 (call on call doctor if child on the ward) & give Glucagon (see below)
    - If the child improves give a starchy snack (see below) & recheck sugar in 1 hour

- **If the child is unconscious**
    - Give glucagon & phone 999 (on call doctor if child on the ward)
    - If once Glucagon is given the child wakes up, give a starchy snack as soon as the child will tolerate it

- **If the child is fitting**
    - As for unconscious child

# Appendix 2 Newly Diagnosed Diabetes management Flow chart