Guideline No: 14 DIABETES IN CHILDREN: Newly diagnosed	University Hospitals of Leicester NHS Trust NHS Children's Services Medical Guideline

1. DIAGNOSIS confirmed by doctor using below guidelines:

(a) History of – polyuria (usually nocturia ± enuresis) Polydipsia
± weight loss
(b) Glycosuria
(c) Blood Glucose (BG) > 11 mmol/l (confirm from a lab sample).

2. ADDITIONAL INVESTIGATIONS (VENOUS BLOOD)

FBC, HbA1c, U/E, FT4, Blood Gas, Thyroid antibodies, TSH, Coeliac screen, GAD antibodies, Islet cell antibodies, and insulin antibodies.

3. EXPLAIN to parents and child in simple terms the following

Diagnosis -	Is simple from history and tests done today. Hyperglycaemia, Glycosuria +/- ketonuria confirm the diagnosis
Polyuria -	Passing lots of sugar (glucose) in the urine. The word 'diabetes' means 'a fountain'
Thirst -	Hyperglycaemia (high blood glucose) causes polyuria (excessive urinating) that increases thirst (the bodies way of stopping you becoming dehydrated)
High blood glucose-	Is due to insulin deficiency. Insulin controls blood glucose levels, however in diabetes the pancreas gland is not producing enough insulin.
Pancreas failure –	In diabetes the immune system mistakes islet cells of the pancreas as foreign and destroys them causing insulin deficiency and poor glucose control
Why? -	The causes of diabetes are multifactorial, including inheriting an increased risk of developing the condition, other reasons for the development of diabetes are a matter for research and we don't yet know the reason. We do know that it is nothing that the child with diabetes, or the family has done that has caused the development of diabetes.
How often? -	The incidence of T1DM varies greatly between different countries, within countries, and between different ethnic populations. Annual

incidence rates for childhood T1DM (0–14 yr age group) per 100 000 in England is approximately 20.

Is it serious? - Yes it is a serious condition that is permanent, but with regular blood glucose monitoring and daily injections of insulin we can manage the condition. Now that the child has started insulin their condition is going to improve quickly.

4. a) Inform Dr James Greening of diagnosis and patient details.
b) Complete referral to Children's Diabetes Specialist Nurses team using paperwork in starter pack and leaving telephone message on extension 6796.

5. MANAGEMENT OF THE 1ST INJECTION

Remember that you can use every injection time as a teaching session. Encourage the child or family to perform injections themselves. If the child is well, the first injection can wait until next meal (breakfast/tea) is due. I.e., if a child comes in overnight and is well, they can wait until breakfast time with no short acting or long acting insulin.

Insulin Regime: All administered SUBCUTANEOUSLY
The starting doses of insulin are as follows

Remember when writing insulin doses you can only prescribe in whole or half units

Calculate the total daily dose of insulin required this is done according to weight.
0.3 units/kg/day <30 kg
0.6 units/kg/day > 30 kg

Next select the type of insulin regime.
If under 5 yrs : Start on insulatard only

Type of insulin	Breakfast (0730-0800)	Dinner (1730-1800)
Long acting Insulin Insulatard	2/3rd of the total daily dose	1/3rd of the total daily dose

OR

If over 5 yrs or in primary school education: Free mixing regime

If starting on free mixing the long acting and short acting insulin are drawn up into the same insulin syringe and mixed together before injection. The proportions of rapid to long acting insulin are outlined below. (learning point: The principal is that 2/3rd of the total dose is the morning and a 1/3rd in the evening).

Free mixing insulin regime		
Type of insulin	Breakfast (0730-0800)	Dinner (1730-1800)
Fast acting insulin Novorapid	2/9th of the total daily dose	1/9th of the total daily dose
Long acting Insulin Insulatard	4/9th of the total daily dose	2/9th of the total daily dose

OR

If in Secondary school: Multiple dose injections /Basal Bolus regime

If starting a Basal Bolus insulin regime this involves one injection in the evening of long acting insulin that is equal to ½ the total daily dose in insulin. This dose must be given at the same time of day every day, and for reasons of practicality early evening is usually suggested. Then with each subsequent meal (typically 3 times a day) a separate injection of fast acting insulin is given. Please see the proportions outlined below

Basal Bolus Insulin Regime			
Type of insulin	Breakfast	Lunchtime	Dinner
Fast acting insulin Novorapid	1/6th of the total daily dose of insulin	1/6th of the total daily dose of insulin	1/6th of the total daily dose of insulin
Long acting Insulin Glargine			½ of the total daily dose

6. IT IS IMPORTANT TO ORDER THE TTO'S SHORTLY AFTER ADMISSION TO ENABLE A SPEEDY DISCHARGE.

From Hospital Pharmacy				
Drug	Preparation	Dose	quantity	Route
Novorapid *	3ml penfill cartridges	100 units /ml	1 box of 5	SC
Insulatard *	3ml penfill cartridges	100 units /ml	1 box of 5	SC
Glargine	3ml penfill cartridges	100 units /ml	1 box of 5	SC
Novorapid	3ml penfill cartridges	100 units /ml	1 box of 5	SC
Glucagon	Injection	1mg	1kit	IM
Glucogel	Gel	28 grams	3 tubes	oral
From Starter Pack				

Consumables	Supplier	Type	Quantity	Notes
Syringes	Becton Dickinson	0.3 mls	6 packets	In starter pack
Glucose meter	Roche	Accuchek Aviva	2	In starter pack
Blood lancets	Roche	Multiclix lancets		In starter pack
Blood glucose testing strips	Roche	Accuchek test strips		In starter pack
Further equipment from GP				
Safe clip	Becton Dickinson		1	Can wait for GP
Sharps Bin		1 litre	1	Initially supply 1 from ward

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For free mixing regime order insulin's labelled *

For basal bolus regime order insulin labelled **

Nurses to ensure GP Prescription letter (found in starter pack) is completed and faxed through to surgery ASAP enabling the family to initiate the repeat prescription process and receive supplies of blood glucose testing strips and lancets quickly.

7. TITRATING INSULIN ON SUBSEQUENT DAYS

Free mixing Insulin (age above 5 yrs +/- pre-school).

Assess overall blood glucose levels every 24 hours to look at trends in glucose levels.

If pre-breakfast levels are high (above 10 mmols) increase evening Insulatard (see below)

If lunchtime levels are above 10 mmols inform diabetes team only.

If evening meal levels are above 10 mmols increase morning dose of Insulatard.

Age of child	Increase by:
Under 5	Discuss with diabetes team
5-8	1 unit
Over 8 years	2 units

Basal Bolus Insulin

Assess mealtime glucose levels after 24 hours to look at trends in glucose levels..

If blood glucose levels are above 15mmol/l before the lunchtime or evening meal increase previous meal's fast acting insulin by 1-2 units.
I.e. Lunch level is 17 mmol's, increase breakfast dose by 1- 2 units.

Assess basal insulin needs after 48 hours.

If the pre-breakfast levels are above 10 mmol/l increase the dose of glargine by 10%. (Do not further change the dose of glargine until discussed with the diabetes team.)

N.B If the blood glucose level is not persistently rising and the child is on regular insulin don't be concerned about hyperglycaemia. We will aim to bring the blood glucose levels into the normal range over a period of days by titration of insulin.
In addition don't restrict the amount of food the patient may want to eat. They will receive dietary advice in the next few days.

8. BLOOD GLUCOSE TESTING

If the child is well there is no need for intensive blood glucose testing. It is sufficient to test 4 times a day (before meals and before bed). Start to record this is in a home monitoring diary so that the family get used to the routine of this at home.
The family will have a home blood glucose monitor in the starter kit; it is important they become familiar with its use and that they start to use it as soon as is possible after diagnosis. Encourage the child and family to use this monitor at every opportunity.

9. DIETARY ADVICE

Diabetes does not mean following a strict diet or avoiding all the foods the child enjoys. The recommended diet is healthy eating, with an emphasis on regular starchy carbohydrate and a reduced sugar intake.

Starchy carbohydrate foods, such as breads, breakfast cereals, potatoes, pasta and rice eaten regularly will help to prevent hypoglycaemia (low blood sugar). Children and young adults with diabetes can still eat small amounts of foods containing sugar, but should try to choose lower sugar alternatives where possible (e.g. sweeteners instead of sugar; plain or fruit biscuits; diet or sugar free soft drinks). They can choose smaller portions of sweet foods after a main meal, as a dessert.

Special "diabetic foods" are NOT necessary and should be discouraged.

After diagnosis and commencement of insulin, many children and young people with type 1 Diabetes find that they have a much bigger appetite. This usually settles within a few weeks. Food should not be

refused, but we should encourage lots of sensible foods, such as breakfast cereal, toast, sandwiches and fruit.

Free Mixing regime

For children on free mixed insulin, it is important to have 3 meals each day and 3 snacks in between these meals. All meals and snacks will need to contain carbohydrate. Snacks could be for e.g. plain biscuits, fruit or a packet of crisps between meals and at bedtime ensure a more substantial snack to last through the night, such as, a bowl of cereal or a couple of rounds of toast.

Basal Bolus regime

For children and young adults on basal bolus regimens, the quick acting insulin can be given directly before or immediately after eating a meal containing starchy carbohydrate. There is no need for snacks between meals or supper using this type of insulin regime. If the child is hungry try and encourage a healthy snack and at this point do not inject Novorapid again.

10. HYPOGLYCAEMIA - DEFINITION AND TREATMENT

Hypoglycaemia – defined as "low glucose blood" clinically we define this as any level below 4 mmol/l.

Remember that the child may show symptoms at higher or lower levels than this. Every child's symptoms are different and we cannot say exactly what every child will do. The greater the drop and the speed at which blood glucose levels falls can trigger a hypo response at a higher level than 4 mmol/l.

Remember to explain to the child and family that because the brain has become starved of glucose at this point the child's behaviour may become erratic and inappropriate to the situation. Once glucose levels are restored the child's behaviour will settle. It may be necessary to enforce an intake of glucose rather than offer a choice to ensure that the hypo is treated quickly.

Mild – the child may appear pale looking, shaking, sweating, trembling, or simply hungry. The child is able to cooperate with commands drinking and eating themselves to correct the hypo.

Moderate – the child is not able to drink or eat without assistance. They can still follow commands but need assistance.

Severe – the child has become unconscious or has started to fit. Use of glucagon is appropriate at this stage.

Suggested Treatments for Hypoglycaemic episodes:

As soon as mild to moderate hypoglycaemia is detected, use one of the following treatments:

	< 5 years old	5 – 7 years old	> 7 years old
	3-5g carbohydrate	5-7g carbohydrate	10g carbohydrate
Glucose tablets	1	2	3
Lucozade	25 ml	40 ml	60 ml
Cola	40 ml	60 ml	100 ml
Fruit juice	40 ml	60 ml	100 ml
GlucoGel	1/3 tube	½ tube	1 tube

Re test 10-15 minutes following this treatment.

If blood glucose is still < 4 mmol/l, use above table to treat again. Delay starchy carbohydrate intake until blood glucose is above 4 mmol/l

When blood glucose reaches 4 mmol/l or above, if you are not due to eat a meal, use one of the following snacks to prevent further hypoglycaemia:

	< 5 years old	5 – 7 years old	> 7 years old
	3-5g carb	5-7g carb	10g carb
Cheese biscuits (e.g. Tuc, Cheddar)	2	3	4
Plain biscuit (e.g. Malted Milk, Rich Tea)	1	1	2
Rice cake / Ryvita	1	1	2
Milk	80 ml	120 ml	200 ml
Chocolate	1 small individual e.g. (Roses / Quality Street)	1 large individual (e.g. Celebrations / Heroes)	1 funsize bar

For severe hypoglycaemia – NOTHING BY MOUTH.

Administer Glucagon injection IM, 0.5ml if under 10 years, 1ml if over 10 years

Advise the parents to call an ambulance before administration of glucagon ensuring they have back up coming to them. Once the child is awake you must continue with giving them carbohydrate (use one of each from above list) to keep glucose level up and prevent reoccurrence. Warn the parents that some children will vomit after administration of glucagon but it is important to keep giving them glucose.

There is written information in the starter kit to back up this verbal education.
Further education will happen with the diabetes team over coming weeks. Encourage the families to write down all questions they have so that they can be answered when they next see the diabetes team

11. DISCHARGE FROM HOSPITAL & FOLLOW-UP

The criteria for a safe discharge are that the child or parent can safely administer an injection of insulin, they are able to perform a blood glucose test, they understand how to treat a mild and moderate hypoglycaemic episode (severe hypo's and use of glucagon is generally taught at a home visit) and understand the basics of dietary advice.

Once competent in the above area's the family can be allowed home and further education and support will be provided by the Children's Diabetes Specialist nurses.

Follow up: An Outpatient appointment should to be made within 1 week of discharge in the Thursday or Monday Diabetes Clinic. Please telephone Keats Clinic coordinators on Ex 6225. Write an appointment card for family and give to them before discharge. If the child is well it is fine to return to school prior to the clinic appointment. The diabetes team will liaise with the school and if required arrange a visit to the school.

Contact numbers of the Diabetes Team

1. Consultant – Dr James Greening/ via switchboard ask for the mobile phone

2. Paediatric Diabetic Specialist Nurses (PDSN's)

   Specialist Nurses Office 0116 258 6796 (9.00 am to 4.00 pm – answer phone available)

3. Children's Specialist Diabetes Dietitian: Emma Marcus - 0116 258 5095 or 07789926868

Previous version: Dr Carrihill, Dr Greening 2008

Current Version: Dr Greening 2009

Acknowledgements; Paediatric Diabetes Specialist Nurses and Dietitian

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