

## Document Control

<b>Title</b> <b>Management of Children and Young People with Newly Diagnosed Type 1 Diabetes Mellitus Guideline (not in DKA)</b>			
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<b>Approval and Review Process</b> <ul style="list-style-type: none"> <li>• Paediatric Diabetes Team</li> <li>• Paediatric Specialist Governance Group</li> <li>• Clinical Audit and Guideline Group</li> </ul>			
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## 1. Purpose

The purpose of this document is to detail the process for the management of children and young people newly diagnosed with type 1 diabetes mellitus, but NOT in diabetic ketoacidosis (DKA).

For the management of children and young people in DKA refer to the separate 'Southwest Paediatric Diabetes Regional Network Integrated Care Pathway for Children and Young People with Diabetic Ketoacidosis.'

The guideline is to be used by paediatrics medical and nursing staff at North Devon District Hospital. It is for the care of children and young people up to the age of 18 years. Please print off a copy for the medical notes at the time of admission (or at resolution of DKA when starting subcutaneous insulin injections).

## 2. Definitions

Type 1 Diabetes Mellitus is diagnosed by:

a) The presence of classic presenting symptoms - polyuria, nocturia, polydipsia, lethargy, and weight loss. The 4Ts – Toilet, Thirst, Tired, Thinner (Diabetes UK).

AND

b) The presence of a random laboratory blood glucose of >11.1mmol/L or fasting laboratory glucose concentration of >7mmol/L.

- If these two conditions are met commence insulin (see below) and inform the family that a diagnosis of Type 1 Diabetes Mellitus is likely.

## 3. Abbreviations

**DKA** = Diabetic Ketoacidosis

**PDT** = Paediatric Diabetes Team

**CNS** = Clinical Nurse Specialist (in Paediatric Diabetes)

**TDD** = Total Daily Dose (of insulin)

## 4. Responsibilities

### 4.1. Role of Consultant Paediatricians and CNS

- Ensuring that medical staff are aware of the guideline and that it is followed

#### *Role of Nursing Staff on Caroline Thorpe Ward*

- Ensuring that the guideline is followed.

- Ensuring that all professional groups within the PDT (see below) are informed of referrals for newly diagnosed patients with diabetes by phone as soon as possible on the first working day.

- The PDT are:

Consultant Paediatricians – Dr John-Paul Smith

CNS – Richard Todd and Beverly Anderson

Dietitians – Claire Morgan and Lindsey Cook

Clinical Psychologist – Dr Joanne Crossley

## 5. Overview

### 5.1. When to Use this Guideline

- This guideline is for the initiation of subcutaneous insulin in one of the following two patient groups:
  - a) Children and young people with a new diagnosis of type 1 diabetes mellitus, who are **NOT** in DKA. These will be patients who are: Clinically well, venous pH >7.3, not >5% dehydrated, tolerating oral fluids, not vomiting, with a GCS 15/15.

**If the patient is in DKA, refer to the *Southwest Paediatric Diabetes Regional Network Integrated Care Pathway for Children and Young People with Diabetic Ketoacidosis (available in ED / Caroline Thorpe Ward / paediatrics shared drive).***

- b) Children and young people who have been newly diagnosed with diabetes who were in DKA and are now clinically well enough to be commenced on subcutaneous insulin and fit the above criteria.
  - Use the Newly Diagnosed Pathway (Appendix 1)
  - Contact the on-call CNS and Consultant Paediatrician on referral of the child and prior to assessment if during working hours. It is possible that the child will not require admission to hospital and can be managed at home.
  - If at any point the patient looks unwell, starts vomiting, or blood ketones rise – then **revert back to the DKA protocol.**

### 5.2. Assessment

- A child or young person with symptoms of diabetes must be seen and assessed on the same day as referral.
- Out of hours a message must be left on the CNS mobile phone. The CNS working hours are available on Caroline Thorpe Ward or via switchboard.
- This guideline should be printed and put in the medical notes for reference. Initial clerking to include full history and examination,

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recording height and weight (and plot on growth chart), and blood pressure.

- Bedside (capillary): Glucose and ketones.
- Venous blood tests: Laboratory glucose, Blood gas, U+Es, FBC, Vitamin D, Coeliac screen (TTG and IgA), TSH, HbA1c, Anti-GAD and IA2 antibodies, Anti-thyroid (TPO) antibodies.

### 5.3. Principles of Management

- The aim is to start children on a regimen that will match their lifestyle, not to change what the patient eats to fit the insulin they have taken.
- The 'basal-bolus' regimen (also known as 'MDI') with carbohydrate counting is the treatment regimen best suited to this. The regimen is designed to allow a more physiological insulin level during the day, altering the dose of rapid-acting insulin to fit what and when the child eats.
- If an admission to the ward is required the discharge is agreed by the PDT and the family on a case-by-case basis.
- As part of multi-disciplinary team care the child should be seen by the dietician and clinical psychologist as soon as can be arranged after diagnosis. The child's named nurse on Caroline Thorpe Ward should co-ordinate the schedule so that the CNS, diabetes doctor, dietitian and psychologist can meet with the child and family during the hospital admission.
- Families, children and young people with diabetes benefit from consistent, clear, positive messages.

### 5.4. The Two Components of a Basal-Bolus Regimen

- Basal: A long-acting insulin given at the same time of day (usually once a day) to provide the background dose. Insulin glargine (Lantus) is usually used at NDDH.
- Bolus: A dose of rapid-acting insulin with each carbohydrate intake, with an added 'correction' dose if necessary to correct for a glucose level >6mmol/l. Novorapid insulin is usually used at NDDH. Only one correction dose can be given per each 4-hour period.

## 6. The Insulin Treatment Calculations

- Please use the calculations below and involve the child and parents. The child and family are taught carbohydrate counting from the first dose. Record all calculations in the medical notes.

- 
- The starting doses are estimates and will be adjusted by the CNS with each subsequent dose.
  - Insulin prescribing must be by the CNS, registrar or consultant. All insulin doses must be prescribed in 'units', never 'U' or 'IU' to avoid drug errors. Insulin doses should be prescribed to the nearest 1 unit.
  - For rapid-acting insulin: Initial carbohydrate and correction ratios must be prescribed in the 'as required' section of the drug chart using the pre-prepared stickers.
  - For long-acting insulin: This dose is unlikely to change for the first 3-5 days and must be prescribed in the 'regular' section of the drug chart.
  - An insulin pen must be used for administration. Insulin must not be given by syringe.
  - The parents, or the child, are encouraged to administer the insulin, with support, as soon as they are able i.e. day 1 of admission.

## 6.1. Calculation of the Total Daily Dose (TDD) of insulin

- The TDD is 0.7 units / kg

<u>Example</u>
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Weight of patient on admission: 30kg

*TDD of insulin is 21 units*

## 6.2. Calculation of the long-acting (Lantus) insulin dose

- $1/3 \times \text{TDD}$

### Example

Weight of patient on admission: 30kg.

TDD of insulin is 21 units.

*Dose of (Lantus) insulin is:  $1/3 \times 21 = 7$*

## 6.3. Calculation of the rapid-acting (Novorapid) insulin dose for carbohydrate intake

- The dose, as a carbohydrate ratio, is calculated as follows:
- $500 / \text{TDD} = x$  (where 1 unit of insulin is given for x grams of carbohydrate)
- The carbohydrate content of the meal / food is calculated using carbohydrate counting reference tables available on the ward.
- The lowest dose (minimum) carbohydrate ratio should be 1:40.

### Example

Weight of patient 30kg and meal contains 100 grams of carbohydrate.

$500 / 21 = 23.8$  (→ round up to 24)

So, the carbohydrate ratio is 1:24 (or 1 unit of insulin per 24g of carbohydrate).

*Therefore, dose of (Novorapid) insulin is 4 units*

## 6.4. Calculation of the rapid-acting (Novorapid) insulin dose for the correction of hyperglycaemia

- The dose, as a correction ratio, is calculated as follows:
- $100 / \text{TDD} = \text{Ratio of 1 unit of insulin required to bring the blood glucose level down by Xmmol/L}$

- Aiming for a 'normal' blood glucose level of 6mmol/l.

#### Example

Weight of patient 30kg and current bedside blood glucose level 21mmol/l.

Step 1. Calculate the correction ratio:  $100 / 21 = 4.8$  (→ round up to 5)

So, the correction ratio is 1:5 (or 1 unit of insulin required to bring the blood glucose level down by 5mmol/l).

Step 2. Calculate blood glucose difference above 6mmol/L:  $21-6 = 15$

*Therefore, dose of (Novorapid) insulin is 3 units.*

### 6.5. Add the 'carbohydrate intake dose' and the 'correction dose' together

- Give as one injection shortly before carbohydrate intake.

#### Example

Carbohydrate ratio dose: 4 units

Correction dose: 3 units

Add doses together:  $4+3 = 7$

*Give 7 units of rapid-acting (Novorapid) insulin before carbohydrate intake.*

## 7. On-going management on Caroline Thorpe Ward

- A dose of subcutaneous insulin should be given for every carbohydrate-containing meal or snack. The exception would be if the carbohydrate intake is insufficient to give a dose of insulin (i.e. calculates to less than 1 unit) – in which case no insulin should be administered.
- Blood glucose monitoring: Finger-prick blood glucose testing at least 4 times per day – before breakfast, lunch, evening meal and bedtime. Do additional tests if the child appears unwell or has unusual behaviour.
- Target blood glucose levels are 4-7mmol/l before meals, less than 9mmol/L at other times.

- Hypoglycaemia in type 1 diabetes is defined at a blood glucose level of less than 4mmol/l. This needs to be treated by immediately. Refer to the NDDH guideline 'Hypoglycaemia Guideline for Children and Young People (age 0-18 years) with Type 1 Diabetes ' which is in the paediatric resources folder on the shared drive.<sup>1</sup>
- Clinical Nurse Specialists should make initial decisions about changes to insulin doses.
- Diabetes education should be initiated by the admitting team – medical and nursing staff. The education checklist (see Appendix 2) should be printed off and used during the admission. The Paediatric Diabetes Team uses a structured approach to education, which may be delivered in the hospital or the home setting. This includes the newly diagnosed 'bag' and DeApp (on iPad). The checklist can then be completed by the CNS after discharge from hospital, and filed in the medical notes once complete (ideally at the first clinic appointment).
- Parents should be encouraged to take time off work – suggest 2 weeks. Use or amend the 'letter to parents' in Appendix 3 – discuss and give this to the parents as soon as possible.
- Follow-up will be in a paediatric diabetes clinic – aim for first appointment within 6 weeks of discharge home. First appointment should be for one hour and will be arranged by the CNS.
- TTAs should be prepared well in advance of discharge. They should be prepared at the time of the initial admission and prescription to avoid delays in discharge.
- The child's GP should receive a discharge letter within one week. A copy should also be sent to the Paediatric Diabetes Team.

## 8. Discharge Prescriptions

### 8.1. On letter to GP for repeat prescription

<b>Insulin:</b> Lantus - 3ml Penfill cartridge NovoRapid - 3ml Penfill cartridge	<b>Blood glucose testing strips:</b> Accu-check Aviva 200 per month
<b>Lancets:</b> Fastclix 200 per month	<b>Blood ketone testing:</b> Freestyle Optium ketone test strips
<b>Needles:</b> 4mm BD Fine Needles 200 per month	'GlucoGel' (3x 25g tubes)
'Sharps' disposal bin 1 litre	BD safeclip disposal system
Lantus 'JuniorSTAR' injecting pen	Novopen (or Echo ½ unit pen) injecting pen

	for Novorapid
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## 8.2. Initial prescription to give to patients

<b>From hospital pharmacy</b>
<b>Insulin:</b>
NovoRapid - 3ml Penfill cartridge (x2)
Lantus - 3ml Penfill cartridge (x2)
'GlucoGel' (3x 25g tubes)

<b>From GP</b>
BD safeclip disposal system

<b>From ward stocks</b>
Needles:
4mm BD Fine Needles – 1 box
'Sharps' disposal bin 1 litre
Blood glucose testing strips:
Accu-check Aviva – 1 box of 50
Lancets:
Fastclix – 1 box

<b>From Paediatric Diabetes Team</b>
Blood ketone testing:
Freestyle Optium ketone test strips
Lantus 'JuniorSTAR' injecting pen
Novopen (or Echo ½ unit pen) injecting pen for Novorapid

## 9. Standards/ Key Performance Indicators

### 9.1. Key performance indicators comprise:

- All newly diagnosed children and young people with type 1 diabetes mellitus to be discussed with the Paediatric Diabetes Team within 24 hours of admission to hospital.<sup>2</sup>
- All newly diagnosed children and young people with type 1 diabetes should be seen by the Paediatric Diabetes Team on the same or next working day.<sup>2</sup>
- Evidence that the patient has received a structured education programme at diagnosis of type 1 diabetes mellitus.<sup>2</sup>

### 9.2. Process for Implementation and Monitoring Compliance and Effectiveness

- Dissemination of guideline to medical and nursing staff in the Paediatrics department and onto BOB.
- Staff to be informed of any revised documentation.

- Non-adherence to the guideline should be reported by use of the Datix system. Incidents to be monitored and reviewed by the clinical governance team and in the Paediatrics Diabetes Team meetings.
- This guideline will be subject to an audit review by the Paediatrics Diabetes Team prior to the next review date.

## 10. References

- 1 'Hypoglycaemia Guideline for Children and Young People (age 0-18 years) with Type 1 Diabetes', NDDH Guideline 2016
- 2 Paediatric Diabetes Best Practice Tariff 2014/15

## 11. Associated Documentation

- Southwest Paediatric Diabetes Regional Network Integrated Care Pathway for Children and Young People with Diabetic Ketoacidosis, 2016
- Paediatrics Resources shared drive → Diabetes folder

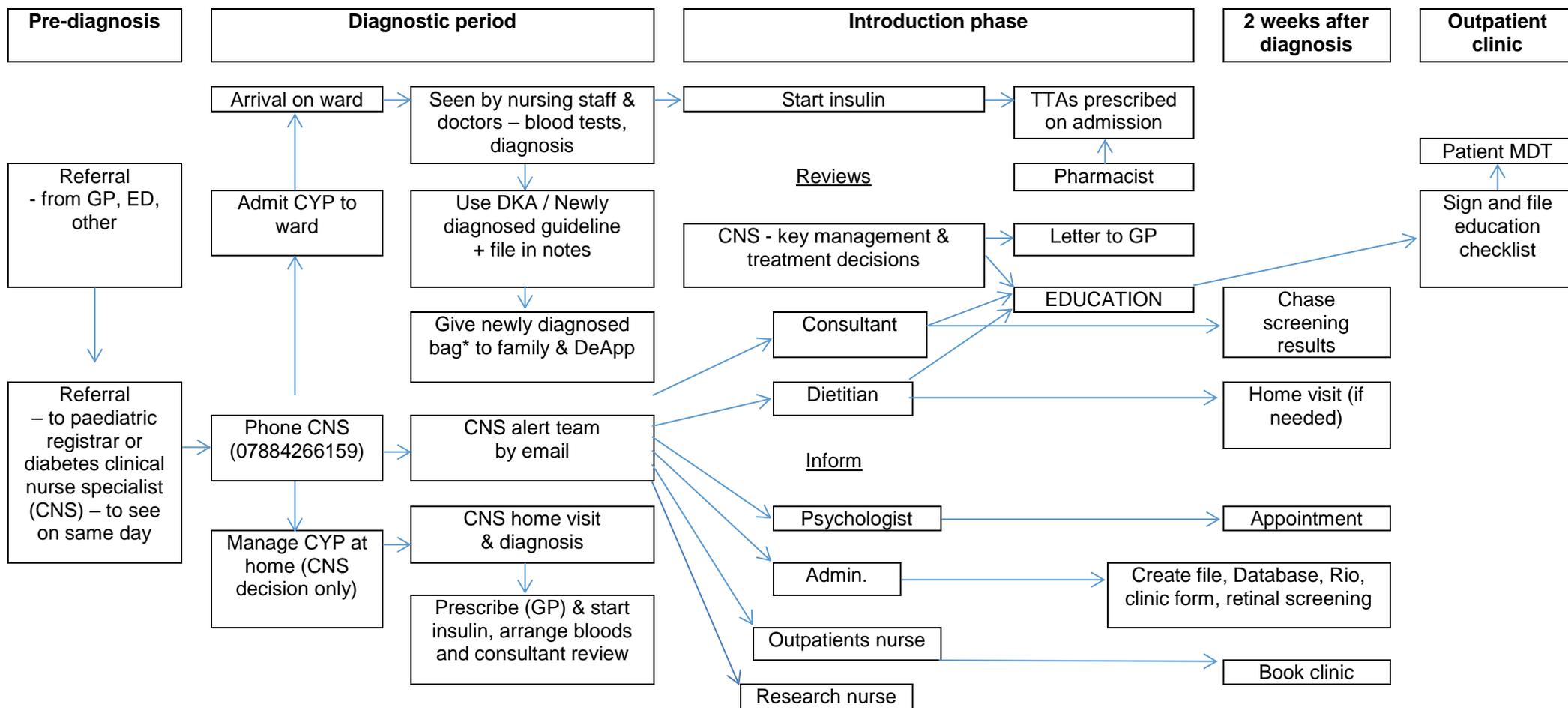
## 12. Equality Impact Assessment

Table 1: Equality impact Assessment

Group	Positive Impact	Negative Impact	No Impact	Comment
Age	X			
Disability			X	
Gender			X	
Gender Reassignment			X	
Human Rights (rights to privacy, dignity, liberty and non-degrading treatment), marriage and civil partnership			X	
Pregnancy			X	
Maternity and Breastfeeding			X	
Race (ethnic origin)			X	
Religion (or belief)			X	
Sexual Orientation			x	



**Appendix 1 - Children & Young Person's (CYP) Care Pathway for Newly Diagnosed Diabetes (aged < 18 years)**



\*Bag (collect from diabetes nursing office) contains: Children's Diabetes Care Guide, dietetic leaflets, Carbs & Cals book, Novo booklet, BG diary, NDJDG information

## Paediatric Diabetes Clinical Nurse Specialist

North Devon District Hospital

Paediatric Diabetes Nursing Office  
Ground floor, Main block

Raleigh Park

Date of diagnosis: . . . . / . . . . / 20 . . . .

Barnstaple

Name : .....

EX31 4JB

### Appendix 2 - Diabetes Education Checklist

	Sign	Date
<b><u>The condition</u></b>		
What is diabetes?	.....	.....
What is the function of insulin	.....	.....
Signs & symptoms at diagnosis – the 4 T's	.....	.....
Why the symptoms happen	.....	.....
Long-term complications	.....	.....
<b><u>Insulin &amp; Injections.</u></b>		
How injected insulin works	.....	.....
Preparing insulin pens / changing needles.	.....	.....
Cartridge changing	.....	.....
Identifying injection sites	.....	.....
Importance of site rotation	.....	.....
Looking after your insulin: in use and storage	.....	.....
Health and safety – disposal of sharps	.....	.....
Provided with .....and.....insulin	.....	.....
Provided with .....and..... pen	.....	.....
Practice giving an injection by parent /young person	.....	.....
Competent at giving injection	.....	.....
<b><u>Diet</u></b>		
Principles of healthy eating / Diabetes diet	.....	.....
Importance of regular meals and snacks	.....	.....
Discussion of 'fast acting sugars' and 'long acting carbohydrates'	.....	.....
Sports snacks and exercise	.....	.....
'Diabetic' products	.....	.....
Eating out and alcohol	.....	.....
Dietician informed	.....	.....
Carbohydrate counting theory	.....	.....
Carbohydrate counting practice	.....	.....
<b><u>Blood Glucose Monitoring</u></b>		
Meter explained and demonstrated	.....	.....
Using lancing device	.....	.....
Recording and interpretation of results	.....	.....
Provided with x2.....meter	.....	.....
Competent at testing blood glucose levels using meter	.....	.....

**Sign**

**Date**

### Hypoglycaemia

What is hypoglycaemia? .....  
 Why it occurs .....  
 Signs and symptoms .....  
 Treatment .....  
 Awareness and prevention .....

**Diabetes hyperglycemia and ketoacidosis**

What is hyperglycaemia? .....  
 What is ketoacidosis? .....  
 Why it occurs .....  
 Signs and symptoms .....  
 Importance of early detection .....  
 Awareness and prevention .....  
 Treatment .....

**Ketone testing**

How to test for ketones in the blood .....  
 Interpretation of results (fasting/ illness/insulin deficit) .....  
 What action to take .....

**Illness**

What happens with diabetes in times of illness? .....  
 Discussion of 'Sick Day Rules' .....

**Healthcare Professionals**

Psychologist informed .....  
 Diabetes consultant informed .....  
 GP letter Faxed... posted... .....

Date referred to retinal screening? (refer on diagnosis at any age) .... / .... / .....  
 Research project (ADDRESS 2) – inform research nurse if interest .....

**School**

School: ..... Year: .....  
 Written information given/ sent to school .....

Meeting with school staff arranged Date & Time :.....

Message left for school nurse Date & Time ..... Letter sent: Date sent.....

**Social**

Disability living allowance .....  
 Travel / holidays .....  
 Alcohol / drugs .....  
 Sex, contraception and pregnancy .....

**On completion please ask parent and child to sign the form below:**

**I have discussed all of the above information with the clinical nurse specialist for paediatric diabetes. I have been given the opportunity to ask any questions that have arisen. I know that the learning process is lifelong and that I can call to ask questions in the future.**

**I feel that I would like to know more about** .....

**Signed** ..... **Date** ..... **Relationship** .....

**Signed** ..... **Date** .....

**Dept of Paediatric Medicine**

Direct Line: 01271 314112

Direct Fax:

North Devon District Hospital  
Raleigh Park  
Barnstaple  
Devon, EX31 4JB

**Date –**

PRIVATE AND CONFIDENTIAL

The parent / legal guardian of

Tel: 01271 322577  
Fax: 01271 311541  
Minicom: 01271 322746

[www.northdevonhealth.nhs.uk](http://www.northdevonhealth.nhs.uk)

**Re:**

**X** has been diagnosed with type 1 diabetes on 14/10/19. **He/She** had been unwell for a few weeks, and then yesterday went to the GP surgery and was referred into the children's ward. **He/She** is going to need to stay in hospital for a few days, and then have treatment with insulin injections, with lots of support from the paediatric diabetes team.

This is an important and serious condition. In order to manage type 1 diabetes it is crucial that the family have lots of education and support from our team, and going forward, it is mostly about \_\_\_\_\_ and child and the family learning to manage the blood sugar levels and insulin injections at home. It is vital they have a good understanding, and therefore we provide lots of education in the first few weeks.

I strongly recommend that **X's** parents have at least a week off work starting from now, so that they can both be part of the learning process. It would also be useful to include other family members if possible. This way **X** and both parents have the same knowledge and understanding, and are consistent in looking after **his/her** diabetes. I am providing this letter as I hope it is useful for the parents to ask their employers to have the time off work. In our experience, this is invaluable and I am very grateful for the support of the employers.

Please do let us know if further information is required.

Yours sincerely

Dr  
Consultant Paediatrician