Worcestershire Acute Hospitals NHS Trust

Management of Children and Young People Newly Diagnosed with Type 1 Diabetes

This guidance does not override the individual responsibility of health professionals to make appropriate decision according to the circumstances of the individual patient in consultation with the patient and /or carer. Health care professionals must be prepared to justify any deviation from this guidance.

Introduction

This guideline is aimed at giving consistent treatment and care to children, young people (CYP) and their families on the diagnosis of Type 1 diabetes through a multidisciplinary team approach. All patients diagnosed between 17-18 years of age who choose to be admitted to an adult ward should be discussed with the paediatric diabetes team to meet the paediatric diabetes Best Practice Tariff criteria.
There is evidence that good glycaemic control soon after diagnosis (through intensive support, education and by encouraging the patient and their family to make learning how to manage diabetes a priority) results in better long term glycaemic control, through metabolic memory. This guideline outlines the initial management both at diagnosis and over the subsequent 2 weeks

This guideline is for use by the following staff groups :

General Paediatrics, Paediatric Diabetes Teams, Emergency Department

Lead Clinician(s)

Dr Corinne Hield	Paediatric Consultant with a specialist interest in Paediatric Diabetes, Paediatric Department
Approved by *Paediatric Governance Meeting* on:	15th May 2024
Approved by Medicines Safety Committee on: *Where medicines included in guideline*	8th May 2024
Review Date: This is the most current document and should be used until a revised version is in place	15th May 2027

Key amendments to this guideline

Date	Amendment	Approved by:
October 2020	• Tresiba/Degludec the long acting insulin of choice for CYP ≥ 2 years of age • Starting total daily dose of insulin 0.75 units/kg/day for CYP ≥ 2 years of age in severe DKA	Dr J West
26th March 2021	Document reviewed and approved for 3 years	Paediatric Guideline Review meeting
9th Feb 2024	Document extended due to pathway review	Paediatric Guideline Review meeting

May 2024	Document reviewed and approved	Paediatric Governance/Medicines Safety Committee
25/10/2024	Both basal and bolus insulin to be prescribed on the normal drug chart Additional nursing basal-bolus insulin chart added.	Paediatric Governance and MSC October 2024

Introduction

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The teams are as follows:

Kidderminster

Consultant	Dr James West	01905 763333 Switchboard to contact
PDSNs	Siobhan Nangle Chloe Holden-Jones	01562 826393 Mobile 07436037361
Dietitian	Dorota Amador Bueno	Mobile 07834172228
Psychologist	Helen Cunnane	
Orchard Service Kidderminster		01562 512359 Mobile 07803 745849

Redditch

Consultant	Dr Corinne Hield	01905 763333 Switchboard to contact
PDSNs	Becki Walling Lee-Ann Edwards	01527 488656 Mobile 07786 981146 01527 488656 Mobile 07881787239
Dietitian	Prinith De Alwis Jayasinghe	07596042090
Psychologist	Helen Cunnane	
Orchard Service Redditch		01527 503030 Ext 44539 Mobile 07887 687458

Worcester

Consultant	Dr James West	01905 763333 Switchboard to contact
Specialty Doctor	Dr Jessica Dale	01905 763333 Switchboard to contact
PDSNs	Jane Francis Esther Anstey Chloe Holden-Jones	01905 760225 Mobile 07879440181
Dietitian	Dorota Amador Bueno	Mobile 07834172228
Psychologist	Dr Amy Symonds	
Orchard Service Worcester		01905 760733 Mobile 07958800129

Guideline

When a child or young person is admitted to Riverbank ward newly diagnosed with Type 1 diabetes mellitus, the ward clerk should inform the paediatric diabetes multi-disciplinary team via email of the patient's details.

Diagnostic Criteria for Type 1 Diabetes

The WHO diagnostic criteria for diabetes is based on blood glucose measurements and the presence or absence of symptoms suggestive of a diagnosis of diabetes:

1. Symptoms of diabetes plus a random plasma glucose concentration ≥11.1 mmol/l
    i. Random is defined as any time of day without regard to time since last meal.
2. Fasting plasma glucose ≥7.0 mmol/l
    i. Fasting is defined as no caloric intake for at least 8 hours.
3. During an OGTT, a 2-hour post-glucose load plasma glucose of ≥11.1 mmol/l
    i. The test should be performed as described by WHO 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 max of 75 g.

If diabetic ketoacidosis (DKA) is confirmed (i.e: pH <7.3 and/or bicarbonate less than 15mmol/l with elevated blood ketones > 3 mmol/l) then the existing 'Guideline for the Management of Children and Young People under the age of 18 years with Diabetic Ketoacidosis', based on the BSPED guidelines, should be used.

Some children may be admitted with nausea and vomiting but not in DKA. They may need to be treated using the DKA guideline. If in DKA, notify the on-call consultant.

If the child is clinically well and:

If the blood glucose is <14mmol/l the diagnosis of diabetes should be questioned and starting treatment is NOT urgent.

All children with a blood glucose of ≥14mmol/l suspected of having a diagnosis of type 1 diabetes mellitus should be admitted to Riverbank ward with initial investigations taken. They should be commenced on subcutaneous insulin therapy and education on type 1 diabetes mellitus and its management should be initiated.

Newly Diagnosed Type 1 Diabetes Mellitus Flowchart (quick guide to initial management)

Patient presents with new diagnosis of Type 1 diabetes mellitus

NOT IN DKA
- pH >7.3 and ketones < 3.0mmol/L

IN DKA
- pH <7.3 and/or bicarbonate <15mmol/L and ketones >3.0mmol/L
- Follow 'BSPED Guideline for the Management of Children and Young People under the age of 18 years with Diabetic Ketoacidosis' - on the intranet

Admit to Riverbank

Investigations for newly diagnosed Type 1 diabetes

Select 2 tabs on ICE under: specialty → paediatrics → **New Diabetic Profile 1 + 2**
Request samples under Dr J West or Dr C Hield
Collect samples in:
EDTA (purple top) – one for FBC, one specific for HbA1c (if possible)
Lithium heparin (Min 3x 500microlitre orange top paediatric bottles or 2x gold top adult bottle)
Serum bottles (white top paediatric) – specific for TTG
Fluoride/oxalate (Yellow top paediatric, grey top adult) – specific for glucose

Prescribe basal (long-acting) subcutaneous insulin on the regular section and bolus (rapid-acting) insulin on the 'as required' section of the paediatric drug chart

Please follow 'Commencing Subcutaneous Insulin' section of this guideline for advice on dosing
for those on the DKA protocol, please prescribe long-acting insulin analogue at night as per guidance and rapid-acting insulin analogue once they are no longer on the DKA protocol

Check child/young person and families have received the newly diagnosed patient information pack and signpost to download DigiBete app (Worcestershire clinic code: KZHTM) and the free version of the Carbs and Cals app

Check ward clerks have informed diabetes team of admission and requested follow-up in 6 weeks in the appropriate hospital diabetes clinic (Worcester, Redditch or Kidderminster)

Complete TTOs as soon as possible

- Complete 'Diabetic kit order sheet' (see appendix, available on the ward) and send to pharmacy
- Complete the discharge drug section on Bluespier, ensuring INSULIN CARTRIDGES are selected, NOT prefilled insulin pens
- Ward to provide child/young person and families with red and blue NovoPen Echo devices

Prior to discharge

Nursing staff to ensure:

- Child/young person and family confident and competent to test blood glucose levels, check ketones, give insulin injections in the legs and manage hypoglycaemic episode.
- When discharging, please ensure they know their insulin doses, how to look up the carb content of their meals using the Carbs and Cals app/book and how to work out the mealtime insulin doses using the Insulin Calculator Chart appropriate for their age group.
- Please ensure they know what time they are planning to administer their Levemir/Tresiba if they are not having this insulin prior to discharge.
- Child/young person and family have their PDSN's contact details for advice in normal working hours (Monday-Friday, 9am-5pm) and Riverbank Ward's phone number (for advice out of hours and ongoing open access related to their diabetes).
- Ensure there is appropriate or adequate community support from either Orchard Service or PDSNs in place. If a patient is discharged on a Friday, please make a referral to Orchard Service, as PDSNs are not available over the weekend. If the patient is being discharged in the afternoon/evening their long acting insulin (Levemir or Tresiba) can be injected at 5pm to facilitate discharge and prevent the community team needing to perform a home visit to give this injection.
- Ensure the family have appropriate supplies:
    - NovoPen Echo x2 devices from ward stock
    - Caresens blood glucose meter
    - Sharps box
    - Information starter pack
- Patient should not be discharged before EDS complete or discharge letter given to patient

Initial Investigations

Blood tests should be requested by the medical team on ICE by clicking on the 'New diabetic profile 1 + 2' tabs under paediatric speciality and should include:

- Initial blood gas and blood ketones to assess for DKA (venous or capillary samples are often adequate)
- Laboratory blood glucose
- HbA1c (glycated haemoglobin)
- Diabetes autoantibodies
- Full blood count
- Urea and electrolytes
- Coeliac screen - measure total IgA and TTG
- Thyroid function tests (TSH and Free T4)

(C peptide and genetics may be requested where diagnosis of the type of diabetes is unclear – discuss with Dr West or Dr Hield before performing)

Self-monitoring of Blood Glucose

Self-monitoring of blood glucose is essential to aid adjustment of insulin dosages. The blood glucose should be checked a minimum of 5 times a day (including pre-breakfast, pre-lunch, pre-tea and pre-bed). Ward nurses should teach blood glucose monitoring to CYP (if age appropriate) and parents/carers using the Caresens blood glucose meter which they will be discharged home with.

- **Target blood glucose levels**:
  - between 4-7 mmol/L before meals
  - between 5-9 mmol/L post prandial 2 hours after meal
  - 4-7 mmol/L at waking
  - >5 mmol/L for driving
  - The ideal target blood glucose level 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.

Use of Continuous Glucose Monitors (CGM)

We aim to commence all CYP newly diagnosed with type 1 diabetes on continuous glucose monitoring (CGM) whilst still an inpatient, which will be initiated by the Paediatric Diabetes Team. This is not a mandatory requirement and should not delay a patient's discharge if they are clinically stable and safe for discharge prior to CGM being commenced. CGM can be used for glucose reading pre-meals and pre-bed and trends in glucose levels between meals can be observed. We advise using finger prick blood glucose testing if the CYP's glucose sensor is reading <4mmol/l and this does not match their symptoms.

Commencing Subcutaneous Insulin

Basal (background, long-acting) Insulin

Basal insulin is the background, long-acting insulin that is administered usually in the evening. Children and young people usually need up to 40-50% of their total daily insulin dose (TDD) as basal insulin at diagnosis and will require on-going review and adjustment by the paediatric diabetes team. The long-acting insulin should be prescribed on the regular section of the paediatric drug chart.

Injections will be given in the form of cartridges delivered via a blue NovoPen Echo device for Levemir/Detemir or Tresiba/Degludec ('L' in blue for long-acting). **Long-acting insulin injections should be given in the legs or upper outer buttock region.**

If a child over the age of 2 years presents in **severe DKA** at diagnosis, then we recommend calculating their total daily dose and basal insulin dose at a higher amount, as documented in the table below. **All children who present in DKA at diagnosis, should be given the first basal insulin dose the evening of admission, even whilst they are still on the DKA protocol.**

Table 1: Starting Total Daily Dose and Basal Insulin Dose

Age (yrs)	Total Daily Dose of Insulin (units/kg/day)	Total Daily Dose of Insulin if present in Severe DKA	Basal Insulin to prescribe	Basal Insulin dose (units/kg/day)	Basal Insulin dose if present in Severe DKA
<1	Discuss with Dr West/Dr Hield or on-call BCH Endocrine consultant				
1-2	0.5 units/kg/day	0.5 units/kg/day	Levemir	0.25 units/kg/day	0.25 units/kg/day
2-5	0.5 units/kg/day	0.75 units/kg/day	Tresiba	0.25 units/kg/day	0.3 units/kg/day
5-12	0.5 units/kg/day	0.75 units/kg/day	Tresiba	0.25 units/kg/day	0.3 units/kg/day
>12	0.75 units/kg/day	0.75 units/kg/day	Tresiba	0.3 units/kg/day	0.3 units/kg/day

Bolus (mealtime/snack, rapid-acting) Insulin

Mealtime insulin is rapid-acting and should ideally be given 15 minutes **before** meals or carbohydrate containing snacks. The dose of insulin given with a meal or snack is based on insulin to carbohydrate ratios and carbohydrate counting, which will be taught from diagnosis. The nursing staff can document each meal with pre-meal glucose reading, calculated carbohydrates and insulin amount given on the nursing basal-bolus insulin chart (see appendix and the document can be found on the nursing shared drive).

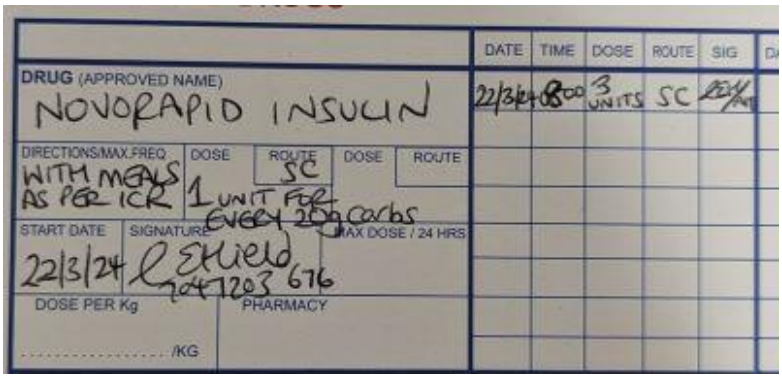
Injections will be given in the form of cartridges delivered via a red NovoPen Echo device for NovoRapid/Aspart ('r' in red for rapid-acting). **Rapid-acting insulin injections can be given in the legs at diagnosis whilst on the ward.**

The rapid-acting insulin (Novorapid) should be prescribed on the 'as required' section of the paediatric drug chart, using the relevant insulin: carbohydrate ratios from table 2. There are also insulin calculator charts for each age group in the appendix.

Table 2: Novorapid (rapid-acting) Insulin, 1 unit per grams of carbohydrate

Age (years)	Breakfast units : carbs (g)	Lunch units : carbs (g)	Tea/evening meal units : carbs (g)	Bedtime/night units : carbs (g)
<2	To be discussed with Dr West/Dr Hield or on-call BCH endocrine consultant			
2-5	1 unit: 30g	1 unit: 30g	1 unit: 30g	1 unit: 40g
6-8	1 unit: 20g	1 unit: 20g	1 unit: 20g	1 unit: 40g
9-11	1 unit: 15g	1 unit: 15g	1 unit: 15g	1 unit: 30g
>12	1 unit: 10g	1 unit: 10g	1 unit: 10g	1 unit: 20g

Example of how to prescribe the mealtime insulin on the drug chart:



How to work out the mealtime insulin dose using the Insulin Calculator Chart:

- Estimate the carbohydrate content of the meal using the Carbs and Cals app/book, food labels or the ward menus.
- Find in Appendix 2 the Insulin Calculator Chart specific for the patient's age.
- Look at the table in the middle, in the left column choose the carbohydrate amount and go across the table to read off the insulin dose for that meal.
- Use the Insulin Calculator Chart to show the patient how to work out the mealtime insulin doses.

How to work out the mealtime insulin dose using an equation:

Amount of carbohydrate (in grams) ÷ Insulin to Carb Ratio for this age child = number of units of Novorapid to be given before the meal

Example:

A 7-year-old child having breakfast, the breakfast is estimated to be 60g of carbohydrates

Calculation:

60g carbohydrates ÷ 20g (ICR for this age child) = 3 units of Novorapid to be given before eating breakfast

Insulin Sensitivity Factor/Correction Dose (rapid-acting) Insulin

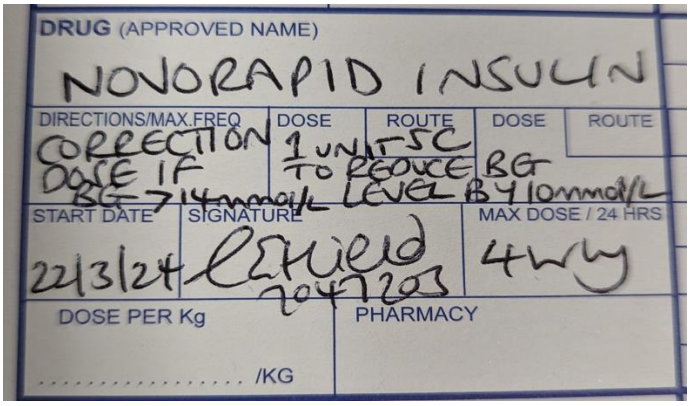
Insulin sensitivity factor (ISF), also called the correction dose, is calculated from table 3. We recommend correction doses to be given with meals after diagnosis, if pre-meal glucose levels are above 18mmol/l in patients aged 2-5 years and above 14mmol/l in patients 6 years and over. If glucose levels are high overnight and it has been 4 hours post food, then you can give a correction based on correcting to a glucose level of 10mmol/l. **Correction boluses must not be given more frequently than 4 hourly.**

The rapid-acting insulin (Novorapid) for corrections should be prescribed on the 'as required' section of the paediatric drug chart, using the relevant insulin sensitivity factors from table 3. There are also insulin calculator charts for each age group in the appendix with corrections doses.

Table 3: Insulin Sensitivity Factor (1 unit to reduce by mmol/l)

Age (years)	Insulin Sensitivity Factor – to aim for target glucose reading of 8mmol/l in the daytime and 10mmol/l in the evening/overnight
<2	To be discussed with Dr West/Dr Hield or on-call BCH endocrine consultant
2-5	0.5 unit to reduce glucose level by 10 mmol/l, if glucose level is **above 18mmol/l**
6-8	1 unit to reduce glucose level by 10 mmol/l, if glucose level is above 14mmol/l
9-11	1 unit to reduce glucose level by 8 mmol/l, if glucose level is above 14mmol/l
>12	1 unit to reduce glucose level by 5 mmol/l, if glucose level is above 14mmol/l

Example of how to prescribe the correction dose of insulin on the drug chart:



How to work out the ISF / Correction dose using the Insulin Calculator Chart:

- Look at the glucose reading. If 14mmol/l or higher, check for ketones.
- Find in Appendix 2 the Insulin Calculator Chart specific for the patient's age.
- Look at the table on the left-hand side and use the column for the time of the day and find the glucose level, then go across to find the correction dose.

How to work out the ISF / Correction dose using an equation:

- **Calculate the amount BG level needs to drop by:**
  Blood glucose level – target blood glucose level
- **Then divide it be the Insulin Sensitivity Factor = correction dose**

(Blood glucose level – target blood glucose level) ÷ by ISF

Example:

7-year-old child, pre-lunch has a blood glucose level of 28mmol/l

Calculation:

Blood glucose level – target blood glucose level = 28mmol/l – 8mmol/l = 20mmol/l

Insulin sensitivity factor calculation: Find the ISF in Table 3 specific for the age:

Amount BG level needs to drop by ÷ ISF: 20mmol/l ÷ 10 = 2 units of additional insulin, to be added to the calculated insulin for carbohydrate amount.

Structured Education

The initial goal is for CYP (if age appropriate) and their families to become confident at testing blood glucose levels and giving insulin injections whilst minimising the risk of causing a hypoglycaemic episode. Therefore, achieving normal blood glucose readings in the first few days following diagnosis may not be possible. However, it should be emphasised to families that we aim to achieve normoglycaemia by 2 weeks after diagnosis (as well as a HbA1c ≤48 mmol/mol 3-6 months post diagnosis).

This will be achieved through intensive education which will include:

- The CYP/families will be reviewed on the ward at diagnosis by a member of the diabetes multi-disciplinary team as soon as possible, who will explain the diagnosis and management of type 1 diabetes.
- The CYP/families are to be taught and to become competent in using their Caresens blood glucose meter and know when and how to check for ketones.
- It is expected for the CYP to stay on the ward to have support with their pre-meal NovoRapid Injection and their Long-acting Insulin before being discharged. Following discharge, a member of the Diabetes Team will aim to see them at home the following day to support with their mealtime injections and deliver further education. **If the CYP is to be discharged over a weekend or Bank Holiday, an Orchard Service Referral needs to be completed to provide support over the phone until handed over to the Diabetes Team.**
- All patients/carers are provided with Riverbank ward's telephone number in case they need out-of-hours advice.
- Carbohydrate awareness/counting education will be initiated at diagnosis by ward staff helping patients with carb counting meals on the ward. CYP/families will be shown how to download the Carbs and Cals app and given a book (if available, otherwise it will be provided by the diabetes team within the first few days). The paediatric diabetes dietitian will aim to see CYP newly diagnosed on the ward; otherwise they will arrange either face-to-face or online/telephone follow up as soon as possible post discharge. Patient information leaflets will be given out in the ward folder, including the "Initial Dietary Advice for young people with diabetes", 'Healthy Eating' and 'Carbohydrate Counting' in case the dietitian isn't available to review the family pre-discharge. Post discharge, the paediatric diabetes dietitian will continue further dietary education on healthy eating, carbohydrate counting and exercise management, aiming for 2-3 follow up reviews within 2 weeks of diagnosis. CYP will be offered, according to patients' needs, home visits, online

and telephone reviews. **For full dietary advice provided from diagnosis, please look at the Newly Diagnosed Dietetic Guideline**.

- The team will discuss the psychosocial impact of diabetes and the risk of burn out early after diagnosis and the CYP/families will be supported by our diabetes psychology team members. **For further information on psychology support after diagnosis, please look at Clinical Psychology Newly Diagnosed Guideline**.

Appendix 1
Diabetic Kit Order Sheet

Affix Patient Label here or record:
Name:
NHS No:
Hosp No:
D.O.B: D D / M M / Y Y Y Y Male Female

NHS Worcestershire Acute Hospitals NHS Trust

DIABETIC KIT ORDER SHEET FOR CHILDREN

Ward:	**Consultant:**
Date:	**Ordered by:** **Bleep:**

INSULIN

Prescriptions for insulin must be completed on trust approved prescription stationery. This form cannot be used to supply insulin

DIABETIC KIT ITEMS

Tick	Kit item	Label	Quantity	Disp	Check
☐	BD Viva 4mm pen needles (WAY587D)	Use as directed	1 box		
☐	Caresens Pro Blood Glucose Strips (WAY650L)	Use as directed	1 box		
☐	Ketosens Ketone Test Strips (WAY6061)	Use as directed	1 box		
☐	Caresens Lancets 28g (WAY696Z)	Use as directed	1 box		
☐	Dextrose tablets (WAH117R)	Use as directed	1 packet		
☐	Glucogel (DUI774X)	Use as directed	1 tube		
☐	Glucagen Hypokit 1mg syringe (DUI207Y)	Use as directed	1 syringe		
☐	Sharps box reminder sticker	Put on the box of needles	1 sticker		

OPTIONAL ITEMS

Tick	Kit item	Label	Quantity	Disp	Check
☐	BD AutoShield Duo 5mm safety needles (WAH365T) (instead of BD Viva needles when insulin administered via pen device by a Healthcare Professional)	Use as directed	1 box		
☐	GlucoRx safety lancets (if a Healthcare Professional is helping a patient measure their blood glucose)	Use as directed	1 box		

PF WRS588 Diabetic Kit Order Sheet for Children Version 2 Page 1 of 1

Appendix 2: Insulin Calculator Charts

Insulin Calculator Chart for children aged 2 to 5 years old

Step 1: Calculate the correction dose of rapid insulin to bring your blood glucose back in target using the Insulin Sensitivity Factor (ISF)

1. Take blood glucose.
2. If >14mmol/l & ketones 0.6mmol/l or more use Red Ketone Table, otherwise the Correction Table.

Correction insulin dose of rapid units table using (ISF)		
ISF = 1 unit rapid insulin lowers my blood glucose by (mmol/l)		Rapid Insulin units to bring glucose to target level
20.0	20.0	
Daytime Blood Glucose mmol/l	Bed/ night Blood Glucose mmol/l	
4.0	4.0	0.0 units
18.0	20.0	0.5 units
28.0	30.0	1.0 units

Ketone Table if blood glucose > 14.0mmol/l		
Ketones	Rapid Insulin units	Phone call
0.6-1.5mmol/l	0.0	*diabetes nurse*
>1.5mmol/l	0.0	*call Riverbank*

Step 2: Calculate the insulin dose of rapid insulin to cover the meal time carbohydrate using the Insulin Carbohydrate Ratio (ICR)

1. Count your meal carbohydrate.
2. Go down the carbohydrate grams column to the nearest 5g. Then go across the columns to time of day to find insulin dose.

Carbohydrate insulin dose of rapid units table using insulin to carbohydrate ratio (ICR)				
	ICR = 1unit rapid insulin : grams carbohydrate			
	30	30	30	40
Carbohydrate (grams)	Breakfast	Lunch	Evening Meal	Bed/Night
5	0	0	0	0
10	0.5	0.5	0.5	0
15	0.5	0.5	0.5	0.5
20	0.5	0.5	0.5	0.5
25	1	1	1	0.5
30	1	1	1	1
35	1	1	1	1
40	1.5	1.5	1.5	1
45	1.5	1.5	1.5	1
50	1.5	1.5	1.5	1.5
55	2	2	2	1.5
60	2	2	2	1.5
65	2	2	2	1.5
70	2.5	2.5	2.5	2
75	2.5	2.5	2.5	2
80	2.5	2.5	2.5	2
85	3	3	3	2
90	3	3	3	2.5
95	3	3	3	2.5
100	3.5	3.5	3.5	2.5

Step 3: Calculate the total rapid insulin dose to be delivered

1. Add together steps 1 + 2
2. Deliver the rapid insulin 15 minutes before eating
3. If all carbohydrate not eaten, make up with snack.
4. Record blood glucose, carbohydrate and insulin dose

Name

D.O.B

2 to 5 years old

Date Issued

Maximum dose (units)

7

Worcestershire NHS
Acute Hospitals NHS Trust

Insulin Calculator Chart for children aged 6 to 8 years old

Step 1: Calculate the correction dose of rapid insulin to bring your blood glucose back in target using the Insulin Sensitivity Factor (ISF)

1. Take blood glucose.
2. If >14mmol/l & ketones 0.6mmol/l or more use Red Ketone Table, otherwise the Correction Table.

Correction insulin dose of rapid units table using (ISF)		
ISF = 1 unit rapid insulin lowers my blood glucose by (mmol/l)		Rapid Insulin units to bring glucose to target level
10.0	10.0	
Daytime Blood Glucose mmol/l	Bed/ night Blood Glucose mmol/l	
4.0	4.0	0.0 units
13.0	15.0	0.5 units
18.0	20.0	1.0 units
23.0	25.0	1.5 units
28.0	30.0	2.0 units

Ketone Table if blood glucose > 14.0mmol/l		
Ketones	Rapid Insulin units	Phone call
0.6-1.5mmol/l	0.0	*diabetes nurse*
>1.5mmol/l	0.0	*call Riverbank*

Step 2: Calculate the insulin dose of rapid insulin to cover the meal time carbohydrate using the Insulin Carbohydrate Ratio (ICR)

1. Count your meal carbohydrate.
2. Go down the carbohydrate grams column to the nearest 5g. Then go across the columns to time of day to find insulin dose.

Carbohydrate insulin dose of rapid units table using insulin to carbohydrate ratio (ICR)				
	ICR = 1unit rapid insulin : grams carbohydrate			
	20	20	20	40
Carbohydrate (grams)	Breakfast	Lunch	Evening Meal	Bed/Night
5	0	0	0	0
10	0.5	0.5	0.5	0.5
15	1	1	1	0.5
20	1	1	1	0.5
25	1.5	1.5	1.5	0.5
30	1.5	1.5	1.5	1
35	2	2	2	1
40	2	2	2	1
45	2.5	2.5	2.5	1
50	2.5	2.5	2.5	1.5
55	3	3	3	1.5
60	3	3	3	1.5
65	3.5	3.5	3.5	1.5
70	3.5	3.5	3.5	2
75	4	4	4	2
80	4	4	4	2
85	4.5	4.5	4.5	2
90	4.5	4.5	4.5	2.5
95	5	5	5	2.5
100	5	5	5	2.5

Step 3: Calculate the total rapid insulin dose to be delivered

1. Add together steps 1 + 2
2. Deliver the rapid insulin 15 minutes before eating
3. If all carbohydrate not eaten, make up with snack.
4. Record blood glucose, carbohydrate and insulin dose

Name

D.O.B

6 to 8 years old

Date Issued

Maximum dose (units)

10

Worcestershire NHS
Acute Hospitals NHS Trust

Insulin Calculator Chart for children aged 9 to 11 years old

Step 1: Calculate the correction dose of rapid insulin to bring your blood glucose back in target using the Insulin Sensitivity Factor (ISF)

1. Take blood glucose.
2. If >14mmol/l & ketones 0.6mmol/l or more use Red Ketone Table, otherwise the Correction Table.

Correction insulin dose of rapid units table using (ISF)		
ISF = 1 unit rapid insulin lowers my blood glucose by (mmol/l)		Rapid Insulin units to bring glucose to target level
8.0	8.0	
Daytime Blood Glucose mmol/l	Bed/ night Blood Glucose mmol/l	
4.0	4.0	0.0 units
12.0	14.0	0.5 units
16.0	18.0	1.0 units
20.0	22.0	1.5 units
24.0	26.0	2.0 units
28.0	30.0	2.5 units

Ketone Table if blood glucose > 14.0mmol/l		
Ketones	Rapid Insulin units	Phone call
0.6-1.5mmol/l	0.0	*diabetes nurse*
>1.5mmol/l	0.0	*call Riverbank*

Step 2: Calculate the insulin dose of rapid insulin to cover the meal time carbohydrate using the Insulin Carbohydrate Ratio (ICR)

1. Count your meal carbohydrate.
2. Go down the carbohydrate grams column to the nearest 5g. Then go across the columns to time of day to find insulin dose.

Carbohydrate insulin dose of rapid units table using insulin to carbohydrate ratio (ICR)				
	ICR = 1unit rapid insulin : grams carbohydrate			
	15	15	15	30
Carbohydrate (grams)	Breakfast	Lunch	Evening Meal	Bed/Night
5	0	0	0	0
10	0.5	0.5	0.5	0.5
15	1	1	1	0.5
20	1.5	1.5	1.5	0.5
25	1.5	1.5	1.5	1
30	2	2	2	1
35	2.5	2.5	2.5	1
40	2.5	2.5	2.5	1.5
45	3	3	3	1.5
50	3.5	3.5	3.5	1.5
55	3.5	3.5	3.5	2
60	4	4	4	2
65	4.5	4.5	4.5	2
70	4.5	4.5	4.5	2.5
75	5	5	5	2.5
80	5.5	5.5	5.5	2.5
85	5.5	5.5	5.5	3
90	6	6	6	3
95	6.5	6.5	6.5	3
100	6.5	6.5	6.5	3.5

Step 3: Calculate the total rapid insulin dose to be delivered

1. Add together steps 1 + 2
2. Deliver the rapid insulin 15 minutes before eating
3. If all carbohydrate not eaten, make up with snack.
4. Record blood glucose, carbohydrate and insulin dose

Name

D.O.B

9 to 11 years old

Date Issued

Maximum dose (units)

13

Worcestershire NHS Acute Hospitals NHS Trust

Insulin Calculator Chart for children aged over 12 years old

Step 1: Calculate the correction dose of rapid insulin to bring your blood glucose back in target using the Insulin Sensitivity Factor (ISF)

1. Take blood glucose.
2. If >14mmol/l & ketones 0.6mmol/l or more use Red Ketone Table, otherwise the Correction Table.

Correction insulin dose of rapid units table using (ISF)		
ISF = 1 unit rapid insulin lowers my blood glucose by (mmol/l)		Rapid Insulin units to bring glucose to target level
5.0	5.0	
Daytime Blood Glucose mmol/l	Bed/ night Blood Glucose mmol/l	
4.0	4.0	0.0 units
10.5	12.5	0.5 units
13.0	15.0	1.0 units
15.5	17.5	1.5 units
18.0	20.0	2.0 units
20.5	22.5	2.5 units
23.0	25.0	3.0 units

Ketone Table if blood glucose > 14.0mmol/l		
Ketones	Rapid Insulin units	Phone call
0.6-1.5mmol/l	0.0	*diabetes nurse*
>1.5mmol/l	0.0	*call Riverbank*

Step 2: Calculate the insulin dose of rapid insulin to cover the meal time carbohydrate using the Insulin Carbohydrate Ratio (ICR)

1. Count your meal carbohydrate.
2. Go down the carbohydrate grams column to the nearest 5g. Then go across the columns to time of day to find insulin dose.

Carbohydrate insulin dose of rapid units table using insulin to carbohydrate ratio (ICR)				
	ICR = 1unit rapid insulin : grams carbohydrate			
	10	10	10	20
Carbohydrate (grams)	Breakfast	Lunch	Evening Meal	Bed/Night
5	0.5	0.5	0.5	0.5
10	1	1	1	0.5
15	1.5	1.5	1.5	1
20	2	2	2	1
25	2.5	2.5	2.5	1.5
30	3	3	3	1.5
35	3.5	3.5	3.5	2
40	4	4	4	2
45	4.5	4.5	4.5	2.5
50	5	5	5	2.5
55	5.5	5.5	5.5	3
60	6	6	6	3
65	6.5	6.5	6.5	3.5
70	7	7	7	3.5
75	7.5	7.5	7.5	4
80	8	8	8	4
85	8.5	8.5	8.5	4.5
90	9	9	9	4.5
95	9.5	9.5	9.5	5
100	10	10	10	5

Step 3: Calculate the total rapid insulin dose to be delivered

1. Add together steps 1 + 2
2. Deliver the rapid insulin 15 minutes before eating
3. If all carbohydrate not eaten, make up with snack.
4. Record blood glucose, carbohydrate and insulin dose

Name

D.O.B

Over 12 years old

Date Issued

Maximum dose (units)

20

Worcestershire NHS Acute Hospitals NHS Trust

Appendix 3: Riverbank Nursing Basal-bolus Insulin chart (example)

Date/Time	Glucose reading	Blood Ketones	Food Eaten	Carbs Counted	F

This nursing chart can be found correctly formatted on the nurses shared drive for printing.

Appendix 4: Structured Education Checklist

Structured education topics covered at diagnosis and during the first month following diagnosis:

TOPIC	DATE	DATE	DATE	DATE
What is Diabetes?				
Causes				
Symptoms				
Explanation of Honeymoon Period				
Insulin				
Different types of insulin, action & duration of action				
Dosages				
Use of correction doses				
Storage				
Leaflets				
Injections				
Technique				
Sites/rotation				
Pen/pump device				
Disposal of sharps				
Blood Glucose Monitoring				
Why we test				
How often & when				
Normal range				
When & how to seek advice				
Ketone testing				
Why, how and when to test				
Interpretation of results and actions to take				
When & how to seek advice				
Hypoglycaemia				
What is hypoglycaemia				
Causes/symptoms/prevention				
Management including use of glucose tablets, Glucagon etc.				
Dietary advice				
Healthy eating				
Carbohydrate counting				
Illness Management				
Sick day rules and Diabetic Ketoacidosis prevention				
24hr Telephone contact numbers				
Exercise				
Encouragement of exercise				
Management of exercise with diabetes				
Prescriptions – what is available on the NHS				
Identification				
Medic alert / diabetes card				
Disability Living allowance				
Managing at home and school				
School				
School care plan				
Equipment for school including hypoglycaemia treatment				
Support services including Digibete, Diabetes UK and JDRF				

This guideline is for use by the following staff groups :
General Paediatrics, Paediatric Diabetes Teams, Emergency Department

Monitoring

Page/ Section of Key Document	Key control:	Checks to be carried out to confirm compliance with the Policy:	How often the check will be carried out:	Responsible for carrying out the check:	Results of check reported to: *(Responsible for also ensuring actions are developed to address any areas of non-compliance)*	Frequency of reporting:
	WHAT?	**HOW?**	**WHEN?**	**WHO?**	**WHERE?**	**WHEN?**
	These are the 'key' parts of the process that we are relying on to manage risk. We may not be able to monitor every part of the process, but we MUST monitor the key elements, otherwise we won't know whether we are keeping patients, visitors and/or staff safe.	What are we going to do to make sure the key parts of the process we have identified are being followed? (Some techniques to consider are; audits, spot-checks, analysis of incident trends, monitoring of attendance at training.)	Be realistic. Set achievable frequencies. Use terms such as '10 times a year' instead of 'monthly'.	Who is responsible for the check? Is it listed in the 'duties' section of the Policy? Is it in the job description?	Who will receive the monitoring results? Where this is a committee the committee's specific responsibility for monitoring the process must be described within its terms of reference.	Use terms such as '10 times a year' instead of 'monthly'.
Pg 7-9	Prescribing of insulin and review of doses	Audit	2 times a year	Paediatric Diabetes Team	Countywide Diabetes Meetings	2 times a year

References

Birmingham Children's Hospital Paediatric Diabetes Team clinical guideline, 'Guideline for Care and Education of Children and Young People Newly Diagnosed with Type 1 Diabetes'.
University Hospital Coventry and Warwickshire NHS Trust Paediatric Diabetes Team clinical guideline, 'Diabetes: Management of the newly diagnosed child with diabetes'.
Gloucestershire Royal Hospital Paediatric Diabetes Team clinic guideline, 'TRUST GUIDELINE: PAEDIATRIC DIABETES MANAGEMENT OF NEWLY DIAGNOSED WELL CHILD'.
NICE NG 18 Diabetes (type 1 and type 2) in children and young people: diagnosis and management.
ISPAD Clinical Practice Consensus Guidelines 2022: Insulin treatment in children and adolescents with diabetes.

Contribution List

Contribution List

This key document has been circulated to the following individuals for consultation;

Designation
Worcestershire Paediatric Diabetes Team
General Paediatric Consultants
Riverbank Ward Manager
Paediatric Nurse Educator
Paediatric Lead Pharmacist

This key document has been circulated to the chair(s) of the following committee's / groups for comments;

Committee
Medicines Safety Committee
Paediatric Governance Meeting

Supporting Document 1 - Equality Impact Assessment Tool

To be completed by the key document author and included as an appendix to key document when submitted to the appropriate committee for consideration and approval.

Please complete assessment form on next page;

Herefordshire & Worcestershire STP - Equality Impact Assessment (EIA) Form
Please read EIA guidelines when completing this form

Section 1 - Name of Organisation (please tick)

Herefordshire & Worcestershire STP		Herefordshire Council		Herefordshire CCG	
Worcestershire Acute Hospitals NHS Trust	x	Worcestershire County Council		Worcestershire CCGs	
Worcestershire Health and Care NHS Trust		Wye Valley NHS Trust		Other (please state)	

Name of Lead for Activity	**Dr Corinne Hield**

Details of individuals completing this assessment	**Name**	**Job title**	**e-mail contact**
Date assessment completed			

Section 2

Activity being assessed (e.g. policy/procedure, document, service redesign, policy, strategy etc.)	**Title:**			
What is the aim, purpose and/or intended outcomes of this Activity?				
Who will be affected by the development & implementation of this activity?	❑ x ❑ ❑	Service User Patient Carers Visitors	x ❑ ❑ ❑	Staff Communities Other _____
Is this:	x Review of an existing activity ❑ New activity ❑ Planning to withdraw or reduce a service, activity or presence?			
What information and evidence have you reviewed to help				

inform this assessment? (Please name sources, eg demographic information for patients / services / staff groups affected, complaints etc.	
Summary of engagement or consultation undertaken (e.g. who and how have you engaged with, or why do you believe this is not required)	
Summary of relevant findings	

Section 3

Please consider the potential impact of this activity (during development & implementation) on each of the equality groups outlined below. **Please tick one or more impact box below for each Equality Group and explain your rationale**. Please note it is possible for the potential impact to be both positive and negative within the same equality group and this should be recorded. Remember to consider the impact on e.g. staff, public, patients, carers etc. in these equality groups.

Equality Group	Potential positive impact	Potential neutral impact	Potential negative impact	Please explain your reasons for any potential positive, neutral or negative impact identified
Age		x		
Disability		x		
Gender Reassignment		x		
Marriage & Civil Partnerships		x		
Pregnancy & Maternity		x		
Race including Traveling Communities		x		
Religion & Belief		x		
Sex		x		
Sexual Orientation		x		
Other Vulnerable and Disadvantaged Groups (e.g. carers; care leavers; homeless; Social/Economic deprivation, travelling communities etc.)		x		
Health Inequalities (any		x		

Equality Group	Potential positive impact	Potential neutral impact	Potential negative impact	Please explain your reasons for any potential positive, neutral or negative impact identified
preventable, unfair & unjust differences in health status between groups, populations or individuals that arise from the unequal distribution of social, environmental & economic conditions within societies)				

Section 4

What actions will you take to mitigate any potential negative impacts?	Risk identified	Actions required to reduce / eliminate negative impact	Who will lead on the action?	Timeframe
		.		
How will you monitor these actions?				
When will you review this EIA? (e.g in a service redesign, this EIA should be revisited regularly throughout the design & implementation)				

Section 5 - Please read and agree to the following Equality Statement

1. Equality Statement

1.1. All public bodies have a statutory duty under the Equality Act 2010 to set out arrangements to assess and consult on how their policies and functions impact on the 9 protected characteristics: Age; Disability; Gender Reassignment; Marriage & Civil Partnership; Pregnancy & Maternity; Race; Religion & Belief; Sex; Sexual Orientation

1.2. Our Organisations will challenge discrimination, promote equality, respect human rights, and aims to design and implement services, policies and measures that meet the diverse needs of our service, and population, ensuring that none are placed at a disadvantage over others.

1.3. All staff are expected to deliver services and provide services and care in a manner which respects the individuality of service users, patients, carer's etc, and as such treat them and members of the workforce respectfully, paying due regard to the 9 protected characteristics.

Signature of person completing EIA	
Date signed	
Comments:	

Signature of person the Leader Person for this activity	Dr Corinne Heild
Date signed	
Comments:	

Supporting Document 2 – Financial Impact Assessment

To be completed by the key document author and attached to key document when submitted to the appropriate committee for consideration and approval.

	Title of document:	Yes/No
1.	Does the implementation of this document require any additional Capital resources	No
2.	Does the implementation of this document require additional revenue	No
3.	Does the implementation of this document require additional manpower	No
4.	Does the implementation of this document release any manpower costs through a change in practice	No
5.	Are there additional staff training costs associated with implementing this document which cannot be delivered through current training programmes or allocated training times for staff	No
	Other comments:	

If the response to any of the above is yes, please complete a business case and which is signed by your Finance Manager and Directorate Manager for consideration by the Accountable Director before progressing to the relevant committee for approval.