Royal United Hospitals Bath
NHS Foundation Trust

Information for Clinicians

Paediatric Diabetes Department

Carbohydrate Counting from Diagnosis in Paediatric Type I Diabetes: How to prescribe insulin and set up an ACCU-CHEK EXPERT meter

Key Changes in Guidance

1) **Carbohydrate Counting from Diagnosis**

2) **Correction doses to be given as per expert meter advice with every blood glucose check, regardless of whether eating or not**

3) **Blood glucose checks will be performed at midnight and 3am and a correction dose given as advised by expert meter if required**

Introduction

Large scale clinical trials have demonstrated that good metabolic control achieved early in the course of diabetes substantially reduces the development and progression of diabetes associated microvascular complications.

In order to improve our patients glycaemic control in the first year of diagnosis of Type I diabetes, and to achieve greater consistency of team message, we will now be starting carbohydrate counting and expert meters on all patients with a new diagnosis of Type I diabetes at diagnosis.

Level 3 carbohydrate counting is where the amount of Novorapid® insulin required for each meal and snack is determined by both the carbohydrate content of the food and whether or not a correction dose of insulin is needed to bring blood glucose levels back into the target range of 4-7mmol.

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Expert meters allow Level 3 carbohydrate counting to be performed on the ward at diagnosis and safely permit correction doses of insulin to be given with all meals and snacks where indicated.

The information in this guideline will also be useful in aiding prescribing of insulin for established patients managing their diabetes with an Expert® meter who are admitted to the ward for any other reason.

Initial carbohydrate ratios and insulin sensitivity

The initial insulin carbohydrate ratio (the number of grams of carbohydrate eaten per unit of insulin given) and insulin sensitivity (the amount 1 unit of insulin will lower the blood glucose by in mmols) for new patients is based on their age as per the table below. It is the responsibility of the prescriber of insulin and the nurse responsible for the patient to ensure these have been correctly programmed into the expert meter and written on the insulin drug chart.

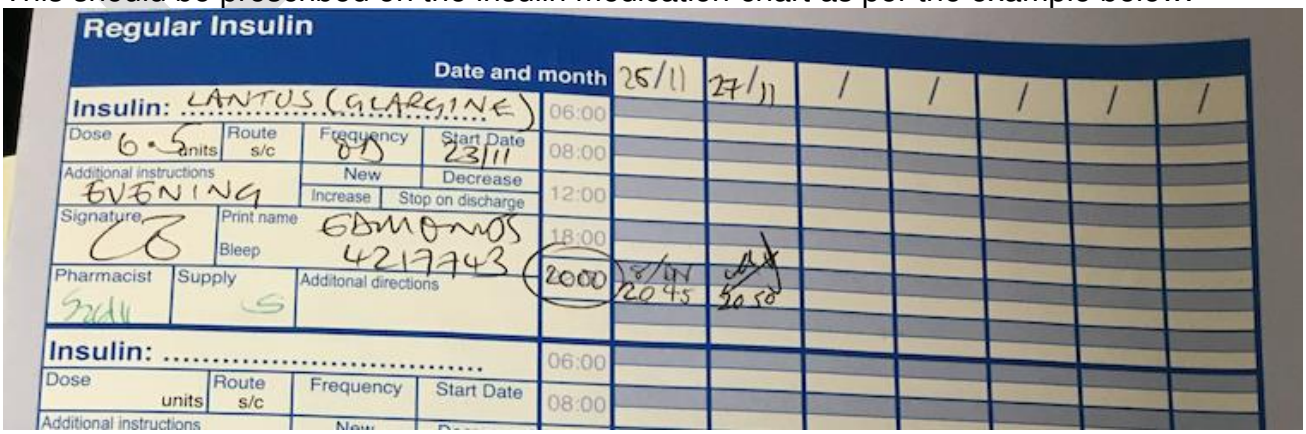
Age	Carbohydrate Ratio (CHO)	Insulin sensitivity (ISF)
Under 5 years	1:25g	1:20mmol
5-8 years	1:15g	1:10mmol
9-11 years	1:10g	1:7mmol
12-14 years	1:7g	1:5mmol
15-18 years	1:5g	1:5mmol

Prescribing insulin and documenting insulin administration

All patients will be given background insulin in the form of glargine (Lantus®) at 8pm in the evening.

The dose of glargine (Lantus) for all new patients is 0.25 units/kg rounded down to the nearest half unit.

This should be prescribed on the insulin medication chart as per the example below:



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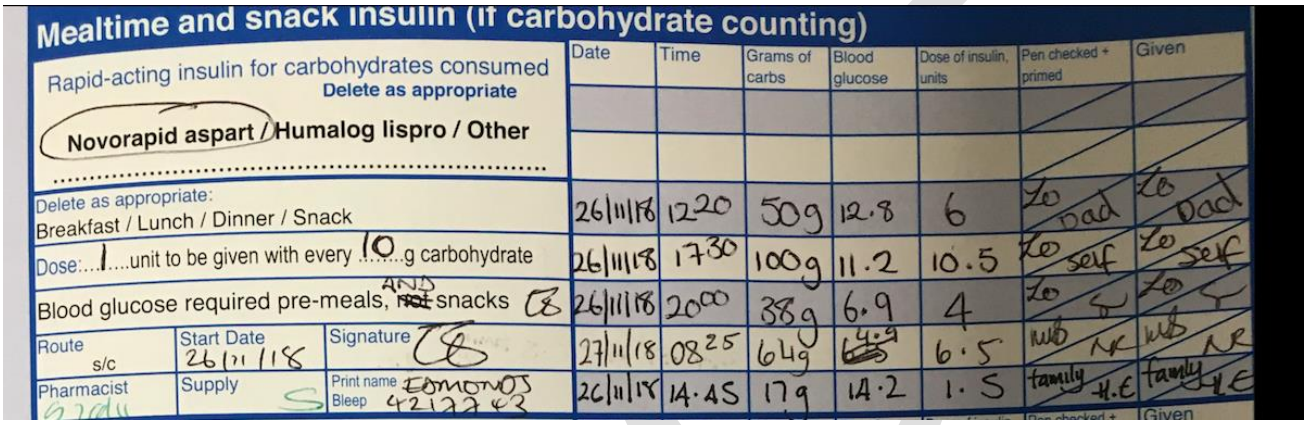
Meal time and snack doses of insulin should be written up on the insulin medication chart in the carbohydrate counting section as shown below. Note a blood glucose level is required before all meals and snacks, therefore please annotate the medication chart to reflect this as shown below, remembering to sign the annotation. When a dose of Novorapid is given the nursing staff will record the total dose of insulin given as advised by the expert meter on the chart as shown.



Mealtime and snack insulin (if carbohydrate counting)

Rapid-acting insulin for carbohydrates consumed
Delete as appropriate
Novorapid aspart / Humalog lispro / Other

Delete as appropriate:
Breakfast / Lunch / Dinner / Snack
Dose: 1 unit to be given with every 10 g carbohydrate
Blood glucose required pre-meals, ~~not~~ AND snacks
Route s/c | Start Date 26/11/18 | Signature
Pharmacist | Supply | Print name EDMONDS Bleep 4217743

Date	Time	Grams of carbs	Blood glucose	Dose of insulin, units	Pen checked + primed	Given
26/11/18	12 20	50g	12.8	6	Lo Dad	Lo Dad
26/11/18	17 30	100g	11.2	10.5	Lo self	Lo self
26/11/18	20 00	38g	6.9	4	Lo [illegible]	Lo [illegible]
27/11/18	08 25	64g	4.9	6.5	MB NR	MB NR
26/11/18	14.45	17g	14.2	1.5	family H.E	family H.E

Correction doses of insulin will now be given with all meals and snacks, before bed, at midnight and 3-4am if required. The inpatient care plan has been updated to reflect these changes. Correction does will no longer be given using the correction dose calculator but as advised by the expert meter. Please amend the medication chart as shown overleaf to reflect these changes; remembering to sign the amendments.

The expert meter uses an algorithm to calculate to take into account when insulin was last given and how much Novorapid insulin is likely to be working in the patient at any time (insulin on board). It is therefore essential that the expert meter is used for all blood glucose checks and that its bolus advice followed and documented for each dose of Novorapid given.

If the child is eating, the total dose of insulin given should be recorded in the mealtime and snack dose insulin part of the medication chart. Nursing staff will then document on the daily diet record sheet the amount of insulin given for correction and the amount given for carbohydrates at meals and snack times.

If the child is not eating and just requires a correction dose for blood glucose above target range this should be recorded in the correction part of the medication chart and also on the daily diet record sheet. An example of this is shown below overleaf:

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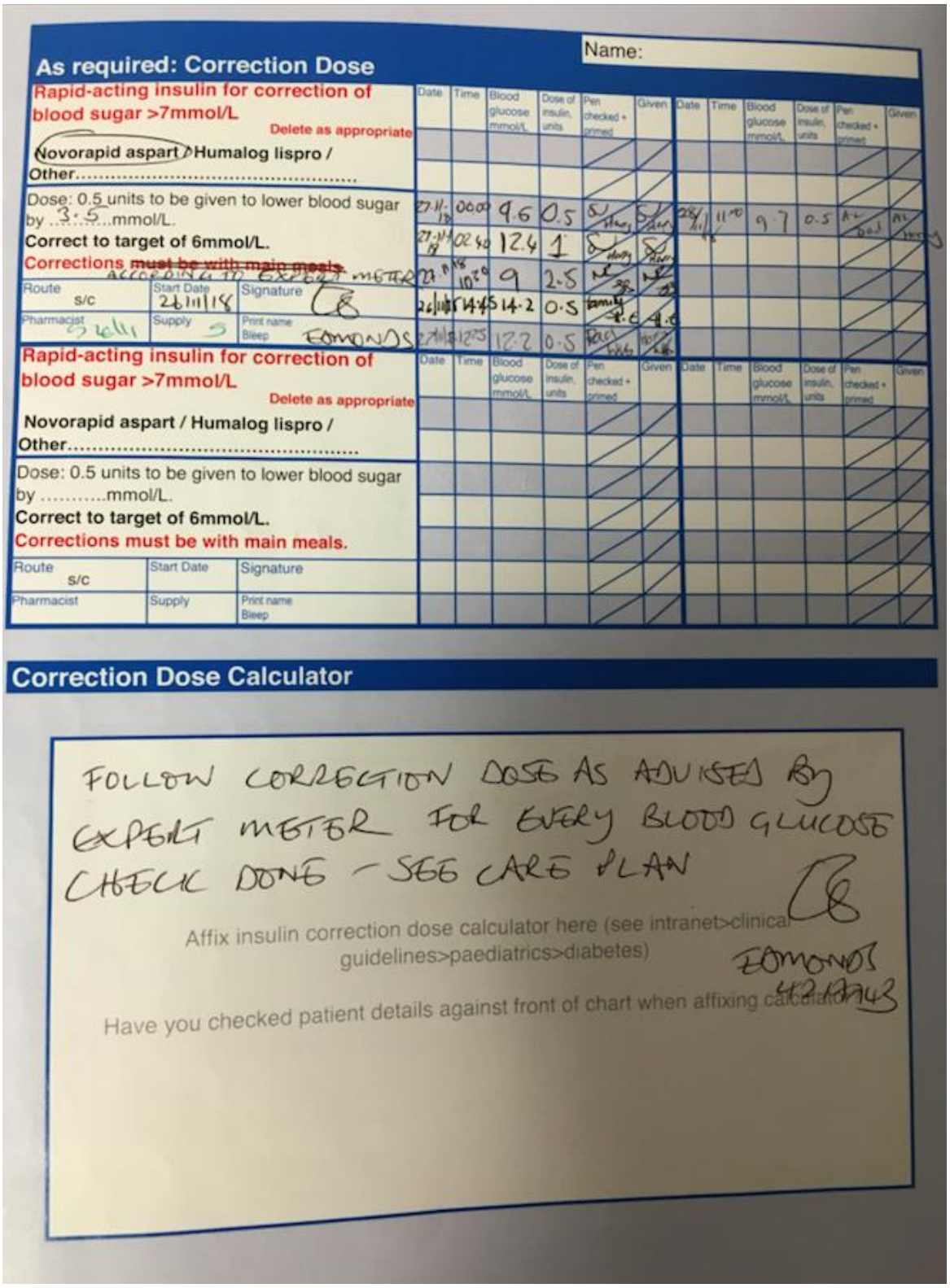

As required: Correction Dose

Name:

Rapid-acting insulin for correction of blood sugar >7mmol/L

Delete as appropriate

Novorapid aspart / Humalog lispro / Other.....

Dose: 0.5 units to be given to lower blood sugar by 3.5 mmol/L.

Correct to target of 6mmol/L.

Corrections ~~must be with main meals~~ ACCORDING TO EXPERT METER

Route s/c | Start Date 26/11/18 | Signature CB

Pharmacist | Supply 3 | Print name Bleep EDMONDS

Date	Time	Blood glucose mmol/L	Dose of insulin, units	Pen checked + primed	Given
27.11.18	0000	9.6	0.5	SU	SU
27.11.18	0240	12.4	1	SU	SU
27.11.18	1050	9	2.5	NK	NK
26/11/18	1445	14.2	0.5	family	
27/11/18	1225	12.2	0.5	[illegible]	

Date	Time	Blood glucose mmol/L	Dose of insulin, units	Pen checked + primed	Given
28/11/18	1130	9.7	0.5	AL	AL

Rapid-acting insulin for correction of blood sugar >7mmol/L

Delete as appropriate

Novorapid aspart / Humalog lispro / Other.....

Dose: 0.5 units to be given to lower blood sugar by .....mmol/L.

Correct to target of 6mmol/L.

Corrections must be with main meals.

Route s/c | Start Date | Signature

Pharmacist | Supply | Print name Bleep

Correction Dose Calculator

FOLLOW CORRECTION DOSE AS ADVISED BY EXPERT METER FOR EVERY BLOOD GLUCOSE CHECK DONE - SEE CARE PLAN

CB

Affix insulin correction dose calculator here (see intranet>clinical guidelines>paediatrics>diabetes)

EDMONDS 42/12/18

Have you checked patient details against front of chart when affixing calculator?

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How to set up an ACCU-CHEK EXPERT meter?

The practical guide

This meter has several features to assist in managing a patient's diabetes.
It is important that you understand the features and how to operate correctly.
Not only can this blood glucose meter test blood glucose levels, it can also provide bolus advice based on insulin carbohydrate ratios (ICRs) and insulin sensitivity factors (ISFs) which can be programmed into the meter.

The first time you turn on the meter, the Setup Wizard is activated.

The Setup Wizard assists you in selecting settings for:
- Meter language
- Time and date
- Units (carbs)
- Warning limits for hypo (low) and hyper (high) blood glucose levels
- Time blocks
- Bolus advice (to activate when CHO counting)
- BG test reminders (optional) *Blood glucose & bG are interchangeable & mean the same thing.*

You must set up these items in order to complete a blood glucose test

A PATIENT LABEL MUST BE STUCK TO THE BACK OF EACH METER DURING THE SET UP PROCESS. DO NOT USE A METER THAT IS NOT LABELLED AND ONLY USE METERS ON A NAMED PATIENT BASIS.

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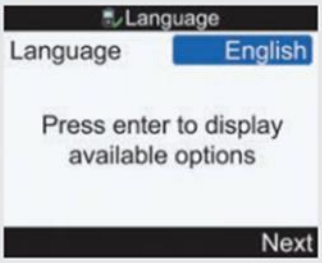
Follow the Step-by-Step Guide

1.

- Press ⏻. The meter beeps and displays this splash screen (ACCU-CHEK logo screen) for a short period of time (this screen appears each time the meter is turned on).

2.



To Change the Language:
- Press ◯ to display the Language options.
- Select the desired Language and press ◯.

To Continue:
- Select Next.

3.

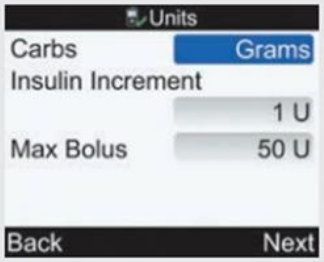
To Change the Time Format:
- Select the Time Format entry field and press ◯.
- Select 12 hr or 24 hr Time Format and press ◯.

To Change the Time:
- Select the Time entry field and press ◯.
- Set the Hour and press ◯.
- Set the Minutes and press ◯.
- If Time Format is 12 hr, select am or pm and press ◯.

To Change the Date:
- Select the Date entry field and press ◯.
- Set the Day and press ◯.
- Set the Month and press ◯.
- Set the Year and press ◯.

To Continue:
- Select Next.

4.



To Change the Carbs Units:
- Press ◯.
- Select Grams*, BE, KE, or CC and press ◯.

Note: Once this is set and bolus advice is activated, this unit cannot be changed. If this unit needs to be changed, contact the ACCU-CHEK

To Change the Insulin Increment:
- Select the Insulin Increment entry field.
- Select 0.5 U or 1 U Insulin Increment and press ◯.

Please select 0.5U insulin increment

To Change the Max Bolus:
- Select the Max Bolus entry field and press ◯.
- Set the Max Bolus and press ◯.

Max Bolus:
≤5yrs: 10U
6-9yrs: 20U
10+yrs: 30U

To Continue:
- Select Next.

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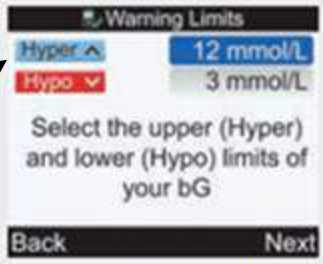
5.



Please set:
Hyper: 14mmol/l
Hypo: 3.9mmol/l

To Change the Hyper (Upper) Blood Glucose Level:

- Select the Hyper entry field and press ⬭.
- Set the hyper (upper) blood glucose level and press ⬭.

To Change the Hypo (Lower) Blood Glucose Level:

- Select the Hypo entry field and press ⬭.
- Set the hypo (lower) blood glucose level and press ⬭.

To Continue:

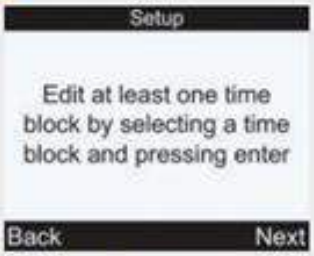
- Select Next.

6.

ALWAYS select yes to receive bolus advice.

- To receive bolus advice, select Yes and proceed to Step 8.
- If you do NOT want to receive bolus advice, select No and continue to Step 7.

7.



If you Choose NOT to set up Bolus Advice:

You must edit at least one time block in order to complete the Setup Wizard.

- Select Next.

To Change the Time Blocks:

- Select a time block to edit and press ⬭.

To Change the End Time:

- Select the End Time entry field and press ⬭.
- Set the end time and press ⬭.

Target range must be **4-7mmol/l**

To Change the Target Range:

- Select the entry field for the lower value of the target range and press ⬭.
- Set the lower value and press ⬭.
- Select the entry field for the upper value of the target range and press ⬭.
- Set the upper value and press ⬭.

To Continue:

- Select Save.

The target range is copied to all time blocks. You may edit the target range for any other time block, if necessary.

- Select OK.

- Repeat the previous steps to change another time block.
- To continue, select Next and proceed to Step 11.

Leave time blocks as per factory settings – **do not change these**

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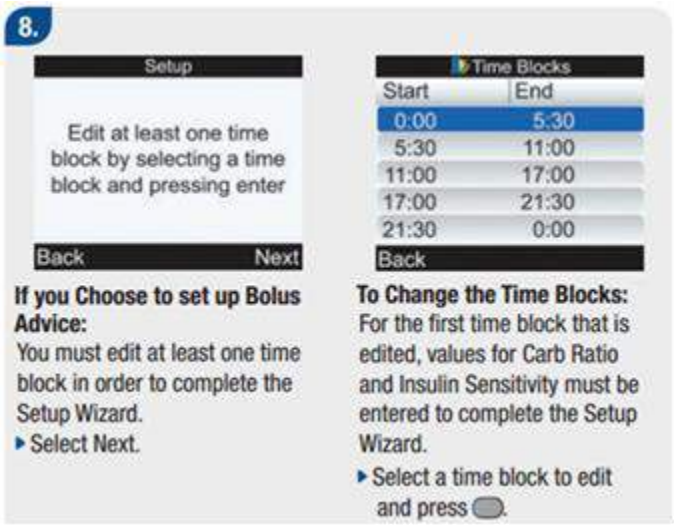

If you Choose to set up Bolus Advice:
You must edit at least one time block in order to complete the Setup Wizard.
- Select Next.

To Change the Time Blocks:
For the first time block that is edited, values for Carb Ratio and Insulin Sensitivity must be entered to complete the Setup Wizard.
- Select a time block to edit and press ⬭.

Target range must be **4-7mmol/l**

To Change the End Time:
- Select the End Time entry field and press ⬭.
- Set the end time and press ⬭.

To Change the Target Range:
- Select the entry field for the lower value of the target range and press ⬭.
- Set the lower value and press ⬭.
- Select the entry field for the upper value of the target range and press ⬭.
- Set the upper value and press ⬭.

To Change the Carb Ratio:
- Select the entry field for the number of insulin units and press ⬭.
- Set the number of insulin units and press ⬭.
- Select the entry field for the amount of carbs and press ⬭.
- Set the amount of carbs covered by the selected units of insulin and press ⬭.

To Change the Insulin Sensitivity:
- Select the entry field for the number of insulin units and press ⬭.
- Set the number of insulin units and press ⬭.
- Select the entry field for the insulin sensitivity level and press ⬭.
- Set the insulin sensitivity level and press ⬭.

To Continue:
- Select Save.

Insulin Carbohydrate Ratio (ICR)
e.g. 1U for 10g

	ICR
Under 5 yrs	1:25g
5-8yrs	1:15g
9-11yrs	1:10g
12-14yrs	1:7g
15yrs+	1:5g

Insulin sensitivity (ISF) AKA Correction dose

	ISF
Under 5 yrs	1:20mmols
5-8yrs	1:10mmols
9-11yrs	1:7mmols
12-14yrs	1:5mmols
15yrs+	1:5mmols

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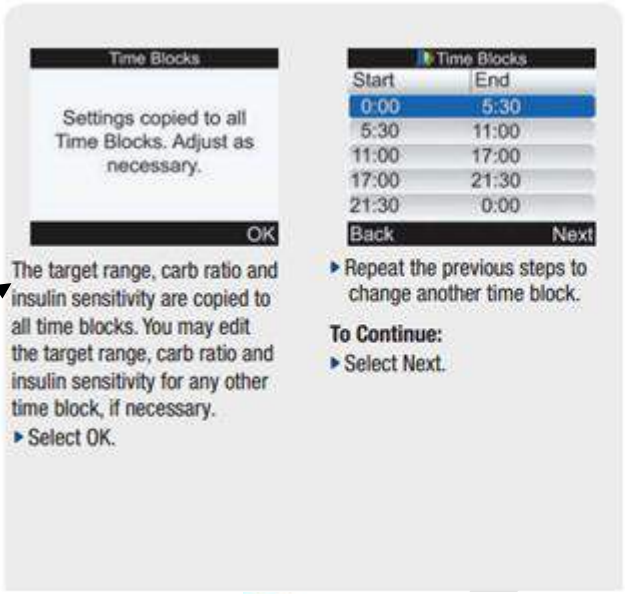
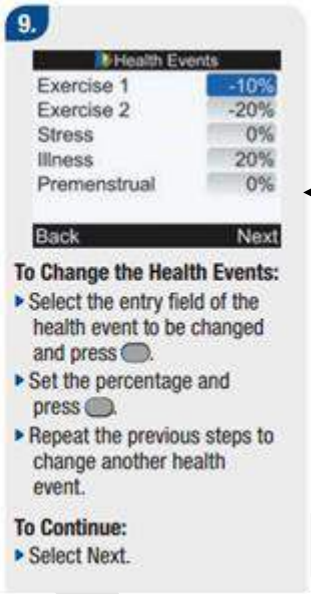
Settings will be copied to all time blocks. No need to adjust these during initial setup





For now, leave **all** Health Event options at 0%:

Exercise 1: 0%
Exercise 2: 0%
Stress: 0%
Illness: 0%
Premenstrual: 0%

Please set on meter:

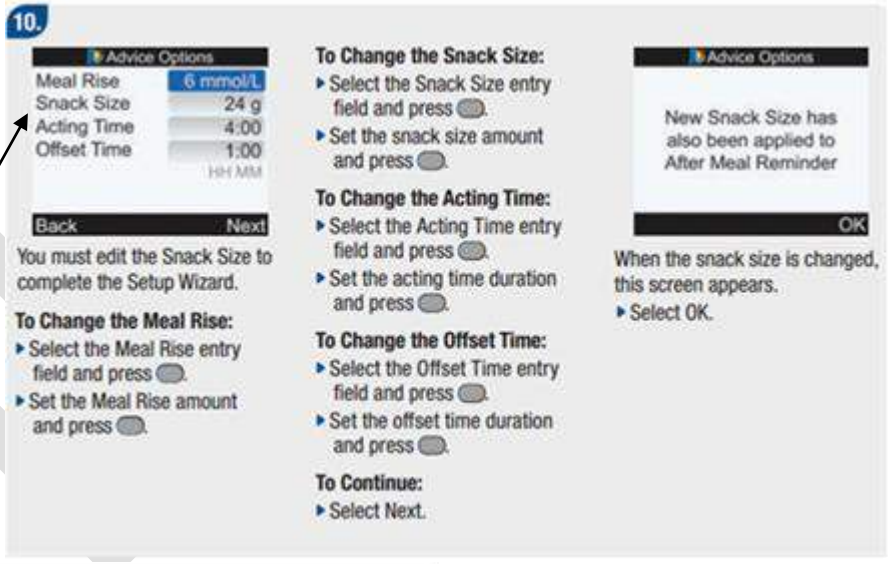
Meal rise: 2.8mmol

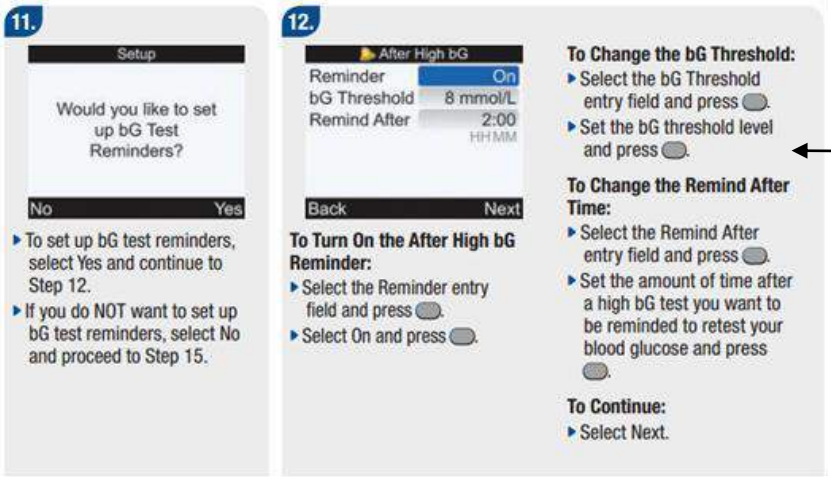
Snack Size (This is a setting which the meter algorithm uses – it is not related to food being eaten so please just set as per the guidance below)

<5yrs: 10g
5-11yrs: 15g
>11yrs: 24g

Acting time: 3 hours (4 hours pre-school)

Offset time: 1 hour.





Select Yes for bG Test reminders but turn off high bG reminders

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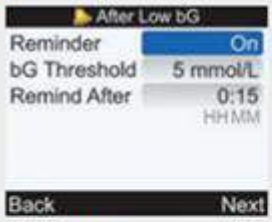
13.



To Turn On the After Low bG Reminder:

- Select the Reminder entry field and press ⬭.
- Select On and press ⬭.

To Change the bG Threshold:

- Select the bG Threshold entry field and press ⬭.
- Set the bG threshold level and press ⬭.

To Change the Remind After Time:

- Select the Remind After entry field and press ⬭.
- Set the amount of time after a low bG test you want to be reminded to retest your blood glucose and press ⬭.

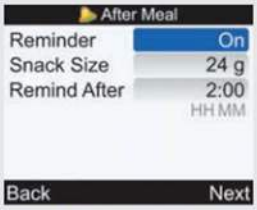
To Continue:

- Select Next.

Please set a low blood glucose level reminder for hypoglycaemia.

BG threshold: 4mmol/l
Remind after: 0:15 minutes

14.



To Turn On the After Meal Reminder:

- Select the Reminder entry field and press ⬭.
- Select On and press ⬭.

To Change the Snack Size:

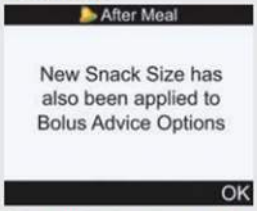
- Select the Snack Size entry field and press ⬭.
- Set the Snack Size amount and press ⬭.

To Change the Remind After Time:

- Select the Remind After entry field and press ⬭.
- Set the amount of time after a meal you want to be reminded to test your blood glucose and press ⬭.

To Continue:

- Select Next.

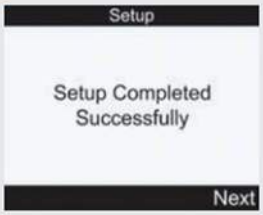


If Bolus Advice is set up and the Snack Size is changed, then this screen appears.

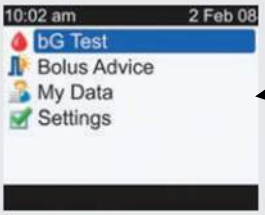
- Select OK.

Please turn reminder after meals **off** during initial set up

15.



- Select Next.



You are ready to begin using your new meter.

Congratulations on completing the Setup Wizard!

Now try a blood glucose test with the patient and show them what to do.

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Document Control Information

Consultation Schedule

Name and Title of Individual	Date Consulted

The following people have submitted responses to the consultation process:

Name and Title of Individual	Date Responded

Name of Committee/s (if applicable)	Date of Committee

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Ratification Assurance Statement

Dear _____

Please review the following information to support the ratification of the below named document.

Name of Guideline: _____

Name of author: _____

Job Title: _____

I, the above named author, confirm that:

- The Guideline presented for ratification describes best practise known to me at the time of the development of the guideline.
- I will bring to the attention of my clinical director or line manger any information which may affect the validity of this Guideline as soon as this becomes known to me;
- I have undertaken appropriate consultation on this Guideline and have considered all responses.
- I acknowledge that the policy will be kept under review, and that I may be asked to refine the guideline. If no interim changes are required it will then be formally reviewed on its documented review date.

Signature of Author: _____ **Date:** _____

Name of Person Ratifying this Guideline: _____

Job Title: _____

Signature: _____ **Date:** _____

To the person approving this Guideline:

Please ensure this page has been completed correctly, then print, sign and **post this page only** to: Director's Office, Wolfson Centre (D1), Royal United Hospital

The **whole guideline** must be sent electronically to: ruh-tr.policies@nhs.net

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