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Equality & Diversity Impact Assessed	

# BGH Management of Child with TYPE I DIABETES WITH INTERCURRENT ILLNESS OR HYPOGLYCAEMIA

## Authors and References

Dr.J.Stephen, Dr. Eunson, R. Collins & K. Forsyth. Borders General Hospital Dept of Child Health, April 2015

Adapted with thanks from RHSC Edinburgh ICP No 5 Version 5, 2015

With permission from Dr.L.Bath and Dr. K Noyes

Review date April 2018

Further reference

1.International Society of Paediatric and Adolescent Diabetes [ISPAD] updated consensus guidelines for Hypoglycaemia. *Pediatric Diabetes* 2009; 10:134-145. Also available at <http://www.ispad.org>

2.International Society of Paediatric and Adolescent Diabetes [ISPAD] updated consensus guidelines for Sick Day Management. *Pediatric Diabetes* 2007; 10:146-153. Also available at <http://www.ispad.org>

## REVISION DATE August 2017

**HISTORY:** briefly confirm diagnosis - polydipsia, polyuria, weight loss

### **IMMEDIATE -**

1. Glucose NPT (near patient testing) using Blood Glucose Meter and UNILET DISPOSABLE LANCETS (contra-indication: severe dehydration - 9% with shock - in which case a lab glucose must be done on a venous sample)
2. Venous or capillary blood gas (if any anticipated problems with venepuncture obtain capillary blood gas at same time as finger prick for glucose NPT).
3. Urinalysis - glycosuria ketonuria

**DOES THE CHILD MEET THE CRITERIA FOR THE DIABETIC KETOACIDOSIS (DKA) CARE PATHWAY?**

Urinary ketones PLUS blood gas pH <7.3  
AND/OR  
Serum bicarbonate  $\leq$  15mmol/l

YES

NO

**PROCEED TO DKA PATHWAY**

**FOLLOW PLAN FOR CHILD WHO IS NOT DECOMPENSATED**

If there is glycosuria but the blood glucose is <10mmol/l, the Consultant On Call should be contacted prior to any venepuncture.

## **TYPE I DIABETES WITH INTERCURRENT ILLNESS OR HYPOGLYCAEMIA**

**Please complete Clerking Sheet**

### **HISTORY**

#### **PRESENTING HISTORY**

##### **History**

**Reason for admission**

**1) Intercurrent illness**

- a. Vomiting**
- b. Diarrhoea**
- c. Pyrexia**
- d. Other\_\_\_\_\_**

**2) Hypoglycaemia**

- e. Glucogel administered**
- f. Glucagon administered**
- g. Seizure**

**Recent average 7-,14 and 30 day Blood sugars from diary or meter**

**Recent HbA1c**

**Recent weight**

**Previous admissions for Diabetes related illness eg DKA, Hypo's**

#### **CURRENT INSULIN REGIMEN:**

**1) Basal Bolus with carb counting and dose adjusting**

**Basal Insulin Dose Time**

**Bolus Insulin Dose Time (Ratio of insulin to g CHO, Insulin sensitivity correction factor, total daily bolus insulin)**

**2) Basal Bolus with fixed doses and carbohydrate consistency**

**3) Alternative Regimen**

**CURRENT INSULIN REGIMEN:**

- 1) Basal Bolus with carb counting and dose adjusting
- 2) Basal Bolus with fixed doses and carbohydrate consistency
- 3) Alternative Regimen

- (Please remember to use CHO count/insulin calculation sheets)
- 
- 

A) BASAL BOLUS (carb. counting + dose adjusting)

B) OTHER REGIMEN

**Bolus**

	Insulin:CHO ratio	Correction factor	BG target
Breakfast			
Lunch			
Tea			
Supper			

**Basal**      Once daily       OR      Twice daily

	Insulin	Dose	Time
Morning			
Evening			

	Insulin and dose	Target CHO for meal (g)
Breakfast	Dose 1 _____ units Dose 2 _____ units Dose 3 _____ units Plus Background _____ units Or Pre-mixed _____ units	
Lunch	Dose 1 _____ units Dose 2 _____ units Dose 3 _____ units	
Tea	Dose _____ units Dose 2 _____ units Dose 3 _____ units Background _____ units Or Pre-mixed _____	
Supper	Fast acting Dose 3 only _____ units  Background _____ units	

## **OBSERVATIONS ON ADMISSION**

**Glucose**  
**Temperature**  
**Ketones**  
**Pulse**  
**Capillary refill time**  
**Respirations**  
**Blood Pressure**  
**Weight (plot on growth chart)**

## **URINALYSIS**

**INITIAL BLOOD TESTS TO BE TAKEN : (performed on arrival)**

**10ml Blood Required**  
**2ml Li Hep    2x1ml Plain    0.5ml Flox    0.5ml EDTA    5ml Blood culture**

**NPT Blood Glucose [BG]**  
**NPT Blood Ketones**  
**Cap Blood Gas**

**Venepuncture - Plasma glucose and HbA1c (in yellow FLOX)**  
**Venous or capillary blood gas**  
**FBC (ETDA)**  
**Blood cultures and CRP**  
**Urea, electrolytes esp Na,K, LFTs,**

**Urine MCS**  
**Throat swab for MCS and Viral PCR**  
**Chest X Ray**  
**Consider Lumbar puncture**  
**Stool MCS**

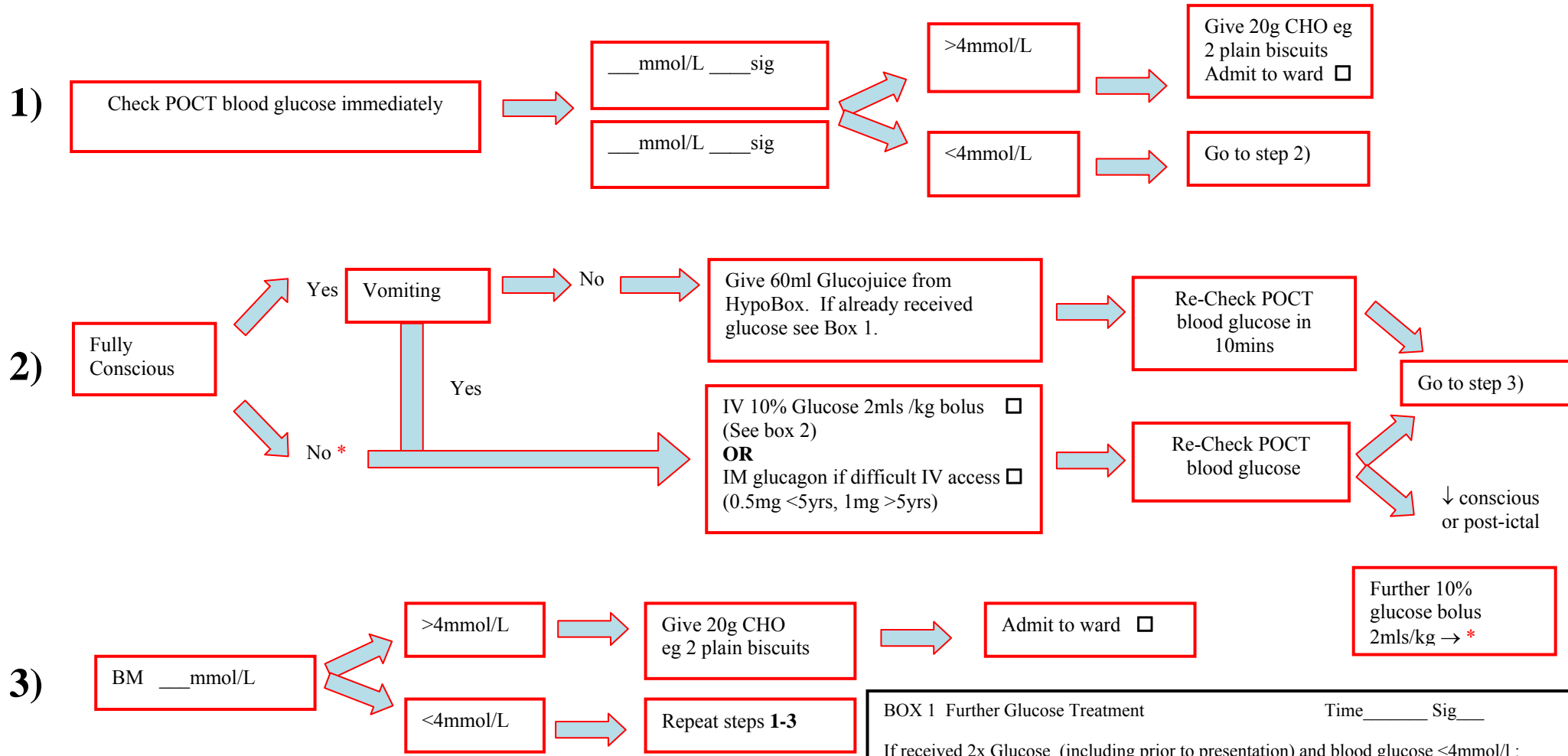
**Inform Consultant On Call, who will liaise with the Ward and the Diabetes Nurse Specialist.(Available Mon to Fri extension 26580)**

- Last insulin injection  
Type \_\_\_\_\_  
Dose \_\_\_\_\_ units  
Time \_\_\_\_\_

- Last food since injection  
Food \_\_\_\_\_  
Amount \_\_\_\_\_  
Time \_\_\_\_\_

Affix Patient ID label:  
Patient Name:  
Unit No.:  
D.O.B.: \_\_/\_\_/\_\_

# Hypoglycaemia: A+E Management



\* Persistently impaired consciousness: Neurological obs, Consider need for Mannitol + ITU. Liaise with Dr on call for Diabetes & commence IV fluids (see P18) at maintenance fluid rate

BOX 1 Further Glucose Treatment		Time _____	Sig _____
If received 2x Glucose (including prior to presentation) and blood glucose <4mmol/l :			
1) Give IV 10% glucose bolus (2mls/kg)	<input type="checkbox"/>	4) Continue maintenance IV fluids (P18)	<input type="checkbox"/>
2) Re-check POCT BG in 10 mins	<input type="checkbox"/>	5) Discuss with Diabetes Dr and ADMIT	<input type="checkbox"/>
3) Rpt IV bolus until BG >4mmol/L	<input type="checkbox"/>		

## AIMS OF SICK DAY MANAGEMENT

The primary aims are:

- to switch off ketogenesis
  - ensure sufficient substrate is available
  - achieve normoglycaemia
  - treat the current illness
- } requires insulin
- There is a 24 hour requirement for insulin
  - Sufficient substrate (food, oral fluids or IV fluids containing CHO) is required in order to maintain blood glucose. Ketonaemia associated with gastrointestinal illness and hypoglycaemia usually reflect inadequate energy supply rather than insulin deficiency
  - Insulin requirements may vary according to the type of illness.
    - Febrile patients generally have an increased insulin requirement (25-50%)
    - Patients with vomiting and diarrhoea with no ketonaemia may have reduced insulin requirements (10-30%). This includes both fast acting and background insulin
    - Patients on a fixed mix of insulin (e.g. Humulin M3) should have their insulin prescribed as fast acting (e.g. Humulin S) and background (Humulin I) insulins. (30% of the Humulin M3 dose is equivalent to Humulin S and 70% is equivalent to Humulin I)
  - Altered insulin doses may be required for up to one week after the intercurrent illness

## AIMS OF HYPOGLYCAEMIA MANAGEMENT

The primary aims are:

- identify cause (if not related to intercurrent illness)
  - ensure sufficient substrate is available
  - achieve normoglycaemia (and prevent further hypoglycaemia)
- There is a 24 hour requirement for insulin

## Management of the current illness

- Use 'Sick Day Insulin dose ' guide below. Calculate TDD [total daily dose of insulin] by adding all the usual insulin doses over the day. Use an 'average' total daily dose for individuals on basal bolus regimen with CHO counting and dose adjustment.
- The Sick Day dose is given in addition to the usual (Dose 1) fast acting insulin.
- Long acting insulin is still required.
- Expect Blood ketone levels to fall within 2 hours after additional insulin given.

### Calculation of ADDITIONAL fast acting insulin required for Sick Day management

(Use Novorapid / Humalog 4 hourly OR Humulin S 4-6 hourly)

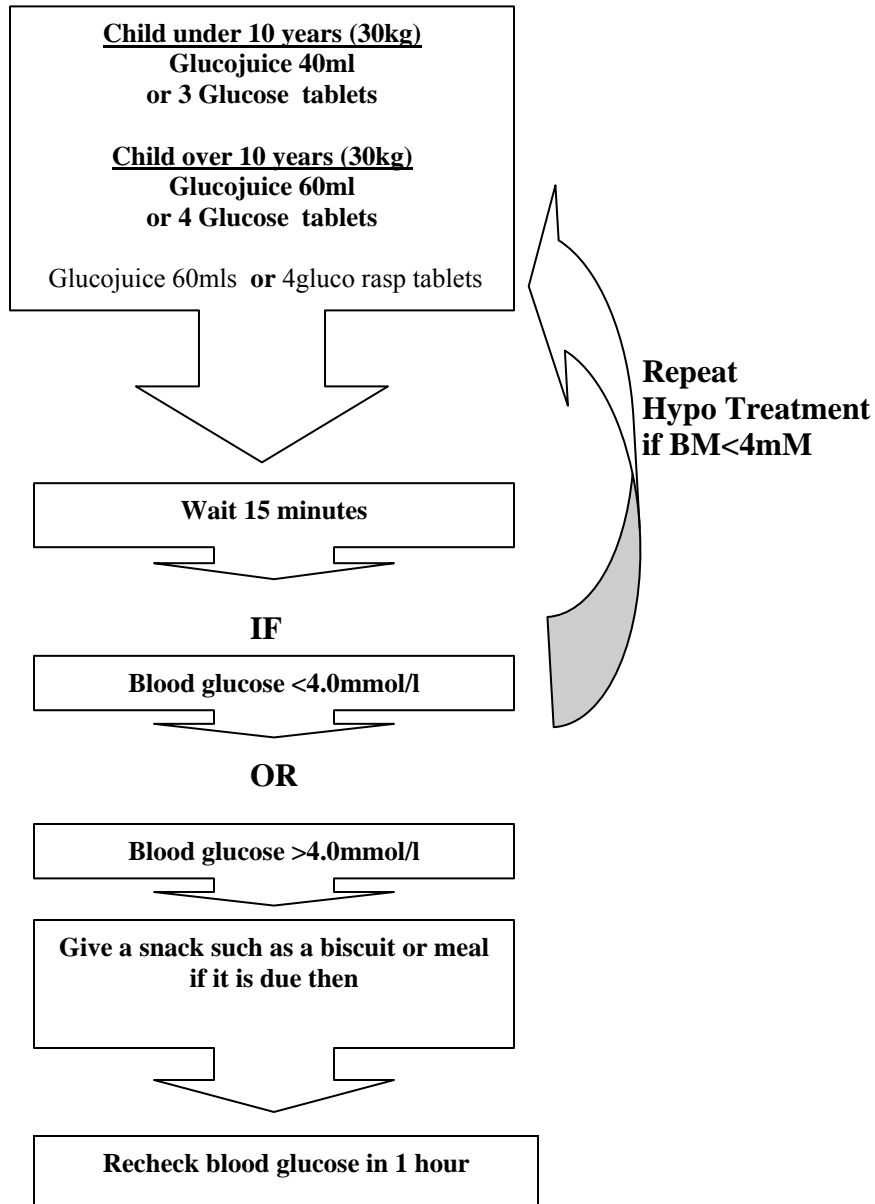
Ketones		Blood Glucose			
Blood (check 4-6 hourly)	Urine (if no blood test available)	Less than 4mmol/l Treat hypo (P18)	4-9.9mmol/l	10-15mmol/l	More than 15mmol/l
<b>Less than 1.0</b>	Negative or trace	No extra insulin	No extra insulin	No extra insulin but correct at next meal (Dose 2)	No extra insulin but correct at next meal (Dose 3)
<b>1.0 – 1.4</b>	Small	Starvation ketones. Give CHO containing food/drink to replenish energy stores		Give a 10% increase in the TDD	
<b>1.5 – 2.9</b>	Moderate - large	Re-check blood glucose and ketones. Extra CHO and fluid required. May require IV glucose if patient cannot eat or drink.	Give a 10% increase in the TDD. Extra CHO + fluids are required		Give a 20% increase in the TDD
<b>3.0 and higher *</b>	Large		Give a 20% increase in the TDD (repeat blood ketones in 2 hours and review patient)		

\* there is an immediate risk of **ketoacidosis** if the blood ketone level is > 3mmol/L

<ul style="list-style-type: none"> <li>• Last insulin injection Type _____ Dose _____ units Time _____</li> </ul>	<ul style="list-style-type: none"> <li>• Last food since injection Food _____ Amount _____ Time _____</li> </ul>
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**3) TREATING A MILD TO MODERATE “HYPO” (PATIENT CONSCIOUS AND ABLE TO SWALLOW)  
HYPOGLYCAEMIA IS BLOOD GLUCOSE LESS THAN 4MMOL/L**



**NOTE:**

- 1.Children who are using an insulin pump DON'T require a snack once blood sugar >4mM**
- 2. If you have treated for hypoglycaemia x3 continuously and blood glucose remains below 4mM child will need iv dextrose bolus/ Iv fluids**
- 3.Do not give a correction at next meal if this will be less than 2 hours since hypo.  
Recheck blood glucose in an hour**
- 4.If patient has their own specific management plan for treating a hypo or uses Glucotabs© or anything other than above please record below for nursing staff to follow in ward.**
- 5.If not tolerating oral fluids, give IV 10% Glucose 2mls /kg bolus**

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PARENTERAL INFUSION PRESCRIPTION

BODY WEIGHT	FLUID REQUIREMENT PER DAY (ml/kg)	
1 <sup>st</sup> 10kg	100	
2 <sup>nd</sup> 10kg	50	
Subsequent kg	20	
<b>Total per day</b>		
<b>Rate = (Total per day ÷ 24)</b>		_____mls/hr

		Initial IV Fluid (if required)
Following hypoglycaemia chart	<input type="checkbox"/>	10% Glucose/ 0.45% Sodium Chloride
<b>OR</b> Blood Glucose 4-10 mmol/l	<input type="checkbox"/>	
Blood Glucose >10 mmol/l	<input type="checkbox"/>	5% Glucose/ 0.45% Sodium Chloride

**Management of IV Fluids:**

Consider weaning IV fluids if blood glucose is  $\geq 10$ mmol/L **AND** blood ketones are  $<1.0$ mmol/L

- o reduce the rate of infusion if the patient can tolerate oral CHO (including CHO containing fluids) intake
- o reduce the glucose concentration if on 10% glucose and child not tolerating oral intake

**Remember:**

- Ask the child what they normally eat.
- Give portion size appropriate to age and usual intake. Document amount of CHO taken.
- Ensure adequate CHO at each meal and snack – do not allow child to feel hungry.
- Parents may bring in diet juice for their child.
- Sugar free yoghurt and fresh fruit are available from the Catering Department.

**Snacks (between meal times and supper)**

Basal bolus

0-15g mid-morning, mid-afternoon

0-20g at supper

(If more CHO taken, additional

Novorapid/Humalog may be required)

Other regimen

20-25g mid-morning, mid-afternoon

20-25g at supper

(If using Novorapid/Humalog for preceding

meal then snack is as per basal bolus)

**24 HOUR INSULIN PRESCRIPTION CHART 07<sup>00</sup> / / UNTIL 07<sup>00</sup> / /**

**CIRCLE ALL INSULIN DOSES GIVEN**

<b>Affix Patient ID Label:</b>	<b>CURRENT INSULIN REGIMEN:</b> <ul style="list-style-type: none"> <li>• With/Before Breakfast:</li> <li>• With/Before Lunch:</li> <li>• With/Before Tea:</li> <li>• With/Before Bed:</li> </ul>	<b>INSULIN PRESCRIBING:</b> <b>Fast Acting:</b> DOSE 1 (expected dose) when BG 4-9.9mmol/L      Novorapid DOSE 2 when BG 10-14.9mmol/L      or Humalog DOSE 3 when BG 15mmol/L or higher      or Humulin S <b>Background:</b> Humulin I or Basal analogue: Levemir/Lantus
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BEFORE giving insulin inform Dr on call if blood ketones >1.5mmol/L child hypoglycaemic (BG <4mmol/L either at time insulin due or within 2 hours previously)

**BASAL BOLUS**

Time of BG + Result	Ketones	Insulin Prescribed	Dose + Sig	Signed
With/Before Breakfast Time: _____ Result: _____ Post Meal _____		Dose 1 _____ Dose 2 _____ Dose 3 _____	_____ units _____ _____ units _____ _____ units _____	Time: _____ Site _____ Sig _____
Background		Dose _____	_____ units _____	Time: _____ Site _____ Sig _____
With/Before Lunch Time: _____ Result: _____ Post Meal _____		Dose 1 _____ Dose 2 _____ Dose 3 _____	_____ units _____ _____ units _____ _____ units _____	Time: _____ Site _____ Sig _____
With/Before Tea Time: _____ Result: _____ Post Meal _____		Dose 1 _____ Dose 2 _____ Dose 3 _____	_____ units _____ _____ units _____ _____ units _____	Time: _____ Site _____ Sig _____
Background		Dose _____	_____ units _____	Time: _____ Site _____ Sig _____
With/Before Supper Time: _____ Result: _____ Post Meal _____		Dose 1 _____ Dose 2 _____ Dose 3 _____	_____ units _____ _____ units _____ _____ units _____	Time: _____ Site _____ Sig _____
Other Times Time Result _____ Time Result _____		Insulin _____ Insulin _____	_____ units _____ _____ units _____	Sig Site _____ Sig Site _____

**OTHER REGIMEN**

Time of BG + Result	Ketones	Insulin Prescribed	Dose + Sig	Signed
With/Before Breakfast Time: _____ Result: _____		Dose 1 _____ Dose 2 _____ Dose 3 _____ Plus Background _____ Or Pre-mixed _____	_____ units _____ _____ units _____ _____ units _____ _____ units _____ _____ units _____	Time: _____ Site _____ Sig _____
With/Before Lunch Time: _____ Result: _____		Dose 1 _____ Dose 2 _____ Dose 3 _____	_____ units _____ _____ units _____ _____ units _____	Time: _____ Site _____ Sig _____
With/Before Tea Time: _____ Result: _____		Dose 1 _____ Dose 2 _____ Dose 3 _____ Background _____ Or Pre-mixed _____	_____ units _____ _____ units _____ _____ units _____ _____ units _____ _____ units _____	Time: _____ Site _____ Sig _____
With/Before Bed Time: _____ Result: _____		Fast acting Dose 3 only _____  Background _____	_____ units _____  _____ units _____	Sig _____
Other Times Time Result _____ Time Result _____		Insulin _____ Insulin _____	_____ units _____ _____ units _____	Sig Site _____ Sig Site _____

ADDITIONAL BG MONITORING	Time							
	BG							
	Ketone							

**DAILY RECORD OF MEDICAL REVIEW**

- Check for ketones regularly.
- Aim to maintain BG values 5-10 mmol/l AND negative ketonuria

Date of discharge \_\_\_\_\_

Next clinic appointment \_\_\_\_\_

**INSULIN REGIMEN ON DISCHARGE:**

**BASAL BOLUS**

**OTHER REGIMEN**

	Insulin:CHO ratio	Correction factor	BG target
Breakfast			
Lunch			
Tea			
Supper			

**Basal**    Once daily     OR    Twice daily

	Dose	Time
Morning		
Evening		

	Insulin and dose	Target CHO for meal (g)
<b>Breakfast</b>	Dose 1 _____ units Dose 2 _____ units Dose 3 _____ units Plus Background _____ units Or Pre-mixed _____ units	
<b>Lunch</b>	Dose 1 _____ units Dose 2 _____ units Dose 3 _____ units	
<b>Tea</b>	Dose _____ units Dose 2 _____ units Dose 3 _____ units Background _____ units Or Pre-mixed _____ units	
<b>Supper</b>	Fast acting Dose 3 only _____ units _____ units	

**Units of insulin/Kg/day** \_\_\_\_\_

**Planned contact with DNS**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Additional Comments**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_