

**Paediatric diabetes Clinic - Full Clinical Guideline – Joint Derby & Burton**

Reference no.: CH CLIN D04/April 22/v006

**1. Introduction**

Guidance for the care of children and young people with diabetes mellitus at the paediatric diabetes clinic appointments

**2. Aim and Purpose**

To inform the paediatric diabetes MDT and the outpatient clinic staff of the assessment, investigations and follow up required at each clinic appointment (routine and annual review).

**3. Definitions, Keywords**

Type 1 diabetes mellitus, type diabetes mellitus

**4. Main body of Guidelines**

**1. Routine clinic appointment including transition appointments Derby site  
 (Minimum 4 a year - including annual review appointment)**

	Type 1 diabetes	Type 2 diabetes
<b>Assessment</b>	Height  Weight	Height  Weight  BP
<b>Investigations</b>	Point of care HbA1c	Point of care HbA1c
<b>Additional investigations at first appointment</b>	If not done on admission Coeliac, TFT	If not done on admission Lipids, LFTs Urinary albumin  Refer for retinal screening  Symptom screen for sleep apnoea If symptoms refer for sleep study to confirm
<b>Essential professionals to see</b>	Doctor	Doctor
<b>Optional professionals</b>	PDSN  Dietitian  Psychologist	PDSN  Dietitian  Psychologist

	Youth worker	Youth worker
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**2. Transition clinic appointment (Burton site only) (Minimum 4 a year - including annual review appointments prior to transfer to Adult Service)**

	Type 1 diabetes	Type 2 diabetes
<b>Assessment</b>	Height Weight BP Urine	Height Weight BP Urine
<b>Investigations</b>	Point of care HbA1c	Point of care HbA1c
<b>Additional investigations at first appointment</b>	If not done on admission Coeliac, TFT	If not done on admission Lipids, LFTs Urinary albumin  Refer for retinal screening  Symptom screen for sleep apnoea If symptoms refer for sleep study to confirm
<b>Additional assessments</b>	injection site inspection,	Foot examination, injection site inspection if appropriate,
<b>Essential professionals to see</b>	Paediatrician Adult Diabetologist PDSN Adult DSN Dietitian Psychologist Youth worker	Paediatrician Adult Diabetologist PDSN Adult DSN Dietitian Psychologist Youth worker

## 3. Annual review clinic appointment (appointment nearest to birthday)

	<b>Type 1 diabetes</b>	<b>Type 2 diabetes</b>
<b>Assessment Measuring room</b>	Height Weight BP (12 years plus)	Height Weight BP
<b>Investigations all</b>	Point of care HbA1c	Point of care HbA1c
	Venous blood sample for 1. HbA1c 2. TFTs	Venous blood sample for 1.HbA1c 2.TFTs 3.LFTs 4.Lipids 5. U+E
		Urine sample for urinary albumin
<b>Additional investigations 12 years plus</b>	Venous blood sample for U+E	
	Urine sample for urinary albumin	
<b>Additional investigations if known coeliac or previous abnormal result</b>	Coeliac serology, FBC, ferritin, Vitamin D, B12, folate, LFT	Coeliac serology, FBC, ferritin Vitamin D, B12, folate, LFT
<b>Essential professionals to see</b>	Doctor Dietitian Psychologist	Doctor Dietitian Psychologist
<b>Optional professionals</b>	PDSN Youth worker	PDSN Youth worker
<b>Additional assessments</b>	Foot examination (12years+), injection site inspection, Psychological assessment (PedsQL – RDH) (PI-EDS for under 16's & HADS for over 16's – QHB)	Foot examination, injection site inspection if appropriate, Psychological assessment (PedsQL – RDH) (PI-EDS for under 16's & HADS for over 16's – QHB)
<b>Other</b>	Check have had annual retinopathy screen (12 years plus)  Book annual review appointment with PDSN Educational Refresher – eg Sick day Rules/Hypo Management etc	Check have had annual retinopathy screen  Book annual review appointment with PDSN  Screen for sleep apnoea If symptoms refer for sleep study to confirm

## 4. Targets and device settings

<p style="text-align: center;"><u>HbA1c</u></p> <p>Established = 48mmol/mol  3 months = 48-53mmol/mol  6 months = 48mmol/mol  Local intervention starts = &gt;58mmol/mol</p>	<p style="text-align: center;"><u>Glucose targets</u></p> <p>Day (pre-meal) = 4-6.9mmol/l  Day (post meal) = 5-9.9mmol/l  Pre bed/night = 5-8mmol/l  Driving = &gt;5mmol/l</p>
<p style="text-align: center;"><u>Free Style Libre</u></p> <p>Percentage sensor wear = 100%  No. scans per day = 8  Pump high/low alert = 11 / 5mmol/l  MDI high/low alert = 14 / 5mmol/l  Consider switching alarm off in day</p> <p>Average sensor glucose = 7mmol/l  TIR / TIT = <math>\geq 70\%</math>  Time hypo = <math>\leq 5\%</math>  Coefficient of V = <math>\leq 36\%</math>  Standard deviation = 1/3 average blood sugar</p>	<p style="text-align: center;"><u>Pump</u></p> <p>BG testing O/N for new pump = 11pm, 3am, 7am  All CGM/FGS alerts to be switched on  Glucose targets = 8-8mmol/l</p> <p>780G= starting target 5.5mmol/l  Consider AIT = 3hrs</p> <p>Omnipod day targets = 5-5.5mmol/l  Night targets = 6-6mmol/l</p> <p>Medtronic day targets = 4.5-5.5mmol/l  Night targets = 5-6mmol/l</p>
<p style="text-align: center;"><u>Dexcom</u></p> <p>Pump high/low alert = 11 / 5 mmol/l  MDI high/low alert = 14 / 5 mmol/l</p> <p>Average sensor glucose = 7mmol/l  TIR / TIT = <math>\geq 70\%</math>  Time hypo = <math>\leq 5\%</math>  Coefficient of V = <math>\leq 36\%</math>  Standard deviation = 1/3 average blood sugar</p>	<p style="text-align: center;"><b>Illness: 'Sick day rules'</b></p> <p>-Check for ketones whenever you are ill  -Ketones &lt;0.6mmols/L give usual correction dose  -Ketones 0.6-1.5mmols/L give 10% of TDD as additional fast acting insulin  -Ketones &gt;1.5mmols/L give 20% of TDD as additional fast acting insulin.</p> <p>After all correction doses, Blood Glucose &amp; Blood Ketones to be re-checked in 2 hours.</p>
<p style="text-align: center;"><u>Exercise</u></p> <p>Pre exercise = &gt;7mmol/l  During = 6-8mmol/l  Check ketones if &gt;11 mmol/l with pump, &gt;14 mmol/l MDI.  Do not exercise if Ketones <math>\geq 0.6</math></p>	<p style="text-align: center;"><u>Corrections between meals</u></p> <p>Assess need for correction 2- 3hrs after last fast acting insulin dose  Gap between meals – minimum 2hrs but aim for 3hrs  Bedtime = must check 2hrs after correction</p>

**5. HbA1c intervention pathways following consultation.**

Assume all on CGM. If not - offer

<b>HbA1c mmol/mol Avg Glucose</b>	<b>Time in Range</b>	<b>To look for</b>	<b>Action from clinic</b>
<b>&lt;53 &lt;7 mmol/l</b>	70%  <b>Maintain</b>	Hypoglycaemic time in range to be <5%	<ul style="list-style-type: none"> <li>• Expert patient</li> <li>• Family to monitor TIR and average glucose and adjust accordingly</li> </ul> <b>Avoid Hypoglycaemia</b>
<b>53-58 9 mmol/l</b>	60-70%  <b>Improve</b>	<ul style="list-style-type: none"> <li>-Need More insulin</li> <li>-Need to 'sugar surf more'</li> <li>Eg-Monitor blood glucose 2-3 hrs after evening meal and give correction (pump or MDI)</li> </ul>	<ul style="list-style-type: none"> <li>• Consider pump if eligible</li> <li>• Possible Diasend review at 6 weeks or offer suggestions in clinic for family to make changes in between clinics</li> <li>• Encourage sugar surfing- - corrections - monitor TIR and average blood glucose</li> <li>• Can the family access the technology at home?</li> </ul> <b>Technology Review TIR More Insulin</b>
<b>59-69 11mmol/l</b>	40-60%  <b>Action</b>	<ul style="list-style-type: none"> <li>-Need More insulin</li> <li>-Need to 'sugar surf more'</li> <li>Eg- Monitor blood glucose 2-3 hrs after evening meal and give correction (pump or MDI)</li> <li>-Snacking between meals</li> <li>-Inaccurate carb counting</li> <li>-Missing insulin at school?</li> <li>-Suboptimal management of exercise</li> </ul>	<ul style="list-style-type: none"> <li>• Consider pump if eligible</li> <li>• Diasend/F2F review as 'one off' but encourage independence</li> <li>• Face to face Education refresher Eg-sugar surfing, Carb counting &amp; exercise</li> <li>• Have they done an exercise diary before?</li> <li>• Can the family access the technology at home?</li> <li>• Explore school issues – more education for staff?</li> <li>• Involve youth worker</li> </ul> <b>Education – Dietetic &amp; School Psychosocial support</b>



## 6. Interpreting investigations

### **Microalbuminuria:**

- Every child with Type 2 diabetes mellitus (T2DM) of any age, and each child over 12 years with type 1 diabetes mellitus (T1DM) should be encouraged to bring the first urine sample of the day to their annual review clinic appointment. If this is not available a random clinic urine should be sent to the laboratory to check for micro-albuminuria (urinary albumin on Lorenzo – RDH or Version 6 – QHB in Annual Review Order Set – Albumin Creatinine Ratio)
- If this random urine has an albumin:creatinine ratio of more than 3.5 mg/mmol, but below 30mg/mmol,(At QHB If Urinary Albumin/Creatinine Ratio greater than 3.0 mg/mmol but below 30 mg/mmol) then three early morning urine samples should be sent from home to confirm micro-albuminuria before starting further investigation or therapy. Paediatric consultant to order on Lorenzo and ask admin support to contact family to arrange. At QHB order forms, bottles and explanation letters are sent to families.
- Investigate further if the initial albumin:creatinine ratio is 30mg/mmol or more (proteinuria).
- If on repeat, one of these early morning specimens has an albumin:creatinine ratio of >3.5 mg/mmol, (At QHB If Urinary Albumin/Creatinine Ratio greater than 3.0 mg/mmol) then this should be repeated at least twice over the next 3 months and the patient encouraged to improve glycaemic control.
- If persistently raised ACR over 3-6 months, the paediatric diabetes consultant should discuss with the local paediatrician with an interest in paediatric nephrology for consideration of further investigations and starting an angiotensin converting enzyme inhibitor (ACEI). For those with Type 2 diabetes, focus also on reduction of risk factors eg obesity, smoking and hypertension
- Check that blood pressure remains normal. If raised consider 24 hour BP monitoring to confirm if hypertension
- Any child who has confirmed micro-albuminuria on early morning specimens should continue to give early morning instead of random urine specimens on each clinic visit.

### **Thyroid Function Tests:**

- Check at the time of annual review for all patients with T1DM and T2DM. Start treatment with thyroxine if the thyroid stimulating hormone (TSH) level goes above 10mU/l.

### **Coeliac Screen:**

Check tissue transglutaminase antibodies (coeliac serology on Lorenzo – RDH or QHB V6 Coeliac Serology) at diagnosis.

Have a low threshold for repeating coeliac serology if the child or young person is symptomatic or there is concern about growth at other times.

If the coeliac serology is raised at diagnosis, annual review or because of symptoms, repeat along with endomysial antibodies, FBC and ferritin.

If on repeat, the coeliac serology is 10 x the upper limit of normal at RDH, then a diagnosis of coeliac disease can be made without the need for biopsy. Refer to Dr Evennett (consultant with an interest in coeliac disease) for one off appointment. Refer to dietitian to commence gluten free diet

If on repeat, the coeliac serology is less than 10 times the upper limit of normal discuss with Dr Evennett and parents as to best course of action. Depending on whether symptomatic or asymptomatic, options include monitoring, biopsy to confirm diagnosis or gluten free diet without biopsy

At QHB if the **coeliac serology** remains elevated on repeat a referral will be made to Dr Muogbo for further management.

### **Liver function tests in T2DM**

Screen for non alcoholic fatty liver disease (NAFLD) at diagnosis then yearly. Undertake investigation if ALT is twice the upper limit of normal. NAFLD should be treated with improved glycaemia, weight reduction and treatment of obstructive sleep apnoea.

### **Lipids:**

Every child with type 2 diabetes, regardless of age, should have their lipid profile checked at diagnosis, then when initial glycaemic control has been achieved or after 3 months of treatment. Thereafter it should be checked yearly at annual review.

High low density lipoprotein (LDL) cholesterol is defined as  $\geq 2.6$ mmol/l. If this is present, patients should see the dietitian to discuss dietary changes and increased exercise, as well as taking measures to improve diabetes control.

A repeat lipid profile should be performed at 6 months following dietary management and weight managements. If lifestyle interventions do not lower LDL cholesterol to  $<4.1$  mmol/l, or  $<3.4$  mmol/l) with one or more cardiovascular risk factors (FH of hypercholesterolaemia or early cardiovascular disease, or if FH unknown), statins should be considered in children  $>10$ years. (See Reference 1)

### **Blood pressure (BP):**

Every child with T2DM should have their BP measured at every clinic appointment.

Each child over 12 years with T1DM should have their BP measured yearly at annual review.

Any patient who has persistent micro-albuminuria, or is on treatment with statins or ACEI, should have their blood pressure measured at each clinic visit.



Hypertension is defined as systolic or diastolic equal or greater than the 95<sup>th</sup> percentile for gender, age on 3 separate occasions. If any concern about then arrange for Arrange for 24 hr BP monitoring to confirm and exclude transient, stress related high BP,

Once a diagnosis of hypertension is made initial treatment should focus on weight reduction if obese, exercise and a low salt diet. Consider angiotensin converting enzyme inhibitors.

## **7. References (including any links to NICE Guidance etc.)**

1. A practical approach to management of Type 2 diabetes in children and young people, ACDC 2022
2. ISPAD Clinical Practice Consensus Guidelines 2018 Compendium. Microvascular and macrovascular complications in children and adolescents
3. NICE Guideline NG18, 2015. Diabetes (type 1 and type 2) in children and young people: diagnosis and management
4. NICE Guideline NG20 2015. Coeliac disease: recognition, assessment and management.
5. ACDC/BSPED - Management of Type 1 Diabetes Mellitus during Illness in Children and Young People under 18 years (Sick Day Rules) Version 5 March 2021

**8. Documentation Controls** (these go at the end of the document but before any appendices)

<b>Reference Number</b> CH CLIN D04	<b>Version:</b> V006		<b>Status</b> Final	
Version / Amendment History	Version	Date	Author	Reason
	V006	April 2022	Dr J Smith	New Joint guideline for Derby and Burton Updated according to national guidance and new local pathways
<b>Intended Recipients:</b> paediatric diabetes teams at Derbyshire Children's Hospital and queens'; Hospital Burton				
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<b>Contact for Review</b>			Dr J Smith	