National Policy ☐ National Procedure ☐ National Protocol ☐ National Guideline ☐
National Clinical Guideline ☒

HSE National Clinical Guideline
Management of Paediatric Type 2 diabetes

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PUBLICATION INFORMATION [4]
Topic:
Management of Paediatric Type 2 diabetes
National Group:
National Clinical Programme for Paediatrics and Neonatology Paediatric Diabetes Working Group
Short summary:
The aim of this guideline is to provide clear and standardised guidelines for all staff in the identification, management and follow-up of children and young people with type 2 diabetes
Description:
The purpose of this document is to provide clear guidelines in the identification, management and follow-up of type 2 diabetes in children and young people

[3] Records details when a document is reviewed, even if no changes are made.

[4] Records the document information required for publication on the HSE National Central Repository.

Contents

1.0 Aim

To provide an evidence-based guideline for the identification, management and follow-up of the child with suspected or confirmed type 2 diabetes (T2D).

2.0 Purpose & Scope

- The purpose of this guideline is to improve the management of paediatric patients with newly diagnosed T2D
- **This document is to guide the management of well children**
- While uncommon in adults with T2D, diabetic ketoacidosis (DKA) is not uncommon as a mode of presentation of T2D in a paediatric population
- If a child presents with the following **treat as DKA**

  ✓Acidosis - pH < 7.3 OR Std Bicarbonate < 18mmol/L

  ✓Hyperglycaemia - plasma glucose > 11 mmol/L, glycosuria

  ✓Ketosis (> 3 mmol/L) OR ketonuria (moderate/large)

  ✓>5% dehydration

  ✓± vomiting

  ✓± drowsy

- These guidelines are intended for healthcare professionals, particularly those in training, who are working in HSE-funded paediatric and neonatal services
- They are designed to guide clinical judgement but not replace it. In individual cases a healthcare professional may, after careful consideration, decide not to follow a guideline if it is deemed to be in the best interests of the child or adolescent.

3.0 Background & Introduction

Despite the fact that T2D is increasing in children and adolescents in Ireland, cases of new-onset diabetes remain predominantly type 1 diabetes. Consequently anyone with symptoms of diabetes need to be evaluated urgently either through a Paediatric Emergency Department or other locally agreed pathway.

The pathophysiology of T2D includes both insulin resistance and impaired insulin secretion. Insulin resistance naturally increases around puberty and the majority of type 2 diabetes in the paediatric population therefore occur during adolescence. The presence of a combination of risk factors might suggest that a case of new-onset diabetes is more likely to be T2D.

4.0 Glossary

ACE	Angiotensin converting enzyme
ACR	Albumin-to-creatinine ratio
AMH	Anti-mullerian hormone
ARB	Angiotensin receptor blocker
BMI	Body mass index
BP	Blood pressure
CGM	Continuous glucose monitoring
DKA	Diabetic ketoacidosis
eGFR	estimated Glomerular filtration rate
GLP-1	Glucagon-like peptide-1
HHS	Hyperglycaemic hyperosmolar state
LDL-C	Low-density lipoprotein cholesterol
MAFLD	Metabolic Associated Fatty Liver Disease
OGTT	Oral Glucose Tolerance Test
OSA	Obstructive sleep apnoea
PCOS	Polycystic Ovarian Syndrome
SGLT-2	Sodium-glucose co-transporter 2
T2D	Type 2 diabetes

5.0 Diagnosis of and screening for type 2 diabetes

5.1. Clinical presentation

- Osmotic symptoms (polyuria, polydipsia, enuresis +/- weight loss)
- Diabetic ketoacidosis (DKA) or Hyperglycaemic Hyperosmolar state (HHS)

5.2. Screening

Targeted screening to identify cases of T2D in children and adolescents should be considered

1) After age 10 or the onset of puberty WITH
2) Body mass index (BMI) greater than the 90th percentile AND
3) In the presence of one or more of the following risk factors
    - Family history of T2D in a first (parent, sibling) or second (aunt, uncle, grandparent) degree relative
    - Mother had pregestational T2D or gestational diabetes in the applicable pregnancy
    - High-risk ethnic group (e.g. Black, East or South Asian, Middle-Eastern, Latin American, Pacific Islander or various first-nation populations)
    - Clinical signs of or conditions associated with increased insulin resistance (acanthosis nigricans, dyslipidaemia, MAFLD, hypertension, PCOS)
    - Small for gestational age or large for gestational age at birth
    - Use of atypical antipsychotic agents associated with rapid weight gain

Screening before age 10 and at a BMI lower than the 90th centile can be considered in certain high-risk groups in the presence of multiple risk factors

Screening tests

- Fasting or random plasma glucose
- HbA1c
- Oral glucose tolerance test (OGTT)

If screening is negative, it should be repeated every 2-3 years

Earlier (yearly) screening may be indicated with deteriorating BMI or cardiometabolic profile OR if previous screen indicated prediabetes (section 5.3).

5.3. Diagnosis of prediabetes

One or more of the following

Test	**Laboratory value**
Fasting plasma glucose (FPG) (indicates impaired fasting glucose)	6.1 to 6.9 mmol/L
2-hour plasma glucose (indicates impaired glucose tolerance)	7.8 to 11.1 mmol/L after a 1.75g/kg (max 75g) glucose load on OGTT
HbA1c	42 o 47 mmol/mol

5.4. Diagnosis of diabetes

Symptoms of hyperglycaemia *PLUS* one of the below supportive laboratory parameters OR two laboratory parameters* in the absence of symptoms

Test	**Laboratory value**
Fasting plasma glucose	≥ 7 mmol/L
2-hour plasma glucose	≥ 11.1 mmol/L after a 1.75g/kg (max 75g) glucose load on OGTT
Random plasma glucose	≥ 11.1 mmol/L
HbA1c	≥ 48 mmol/mol

* this can include a single parameter measured on two separate occasions

Factors favouring the presence of T2D

- BMI > 90th centile
- Evidence of insulin resistance
- Associated metabolic comorbidities (dyslipidaemia, MAFLD, hypertension, PCOS)
- Family history of T2D
- Negative pancreatic autoantibodies**

** Up to 12% of patients with a clinical phenotype of T2D have islet autoimmunity which predicts earlier insulin requirement. Conversely, some patients with T1D may be obese and not have islet autoimmunity

6.0 Management

6.1. Diabetes education

Focus on lifestyle modification, medication use and self-monitoring of blood glucose as applicable

6.2. Lifestyle modification

- Education regarding healthy eating and weight reduction
- Increase in physical activity and reduction in sedentary behaviours
- Optimising sleep routines
- Mitigation of risky behaviours

6.3. Glucose monitoring

Is advised in the following

- Patients requiring insulin
- Symptoms of hyperglycaemia or hypoglycaemia
- During intercurrent illness
- Suboptimal glycaemic control
- Changes in treatment regimen

6.4. Glycaemic targets

- HbA1c should be monitored 3 monthly & target is 48 mmol/mol (6.5%)
- FPG targets 4-6 mmol/L pre-meal and 4-8 mmol/L post-meal
- CGM (if used) targets are identical to those with T1D

6.5. Pharmacological management

6.5.1 Initial therapy

- If initial HbA1c < 69mmol/mol (8.5%), metformin is the treatment of choice, in addition to lifestyle changes
- If initial HbA1c ≥ 69mmol/mol (8.5%), and ketosis or acidosis absent, basal insulin in a starting dose of 0.25 to 0.5 units/kg is used in addition to metformin
- If acidosis, DKA or HHS is present, both basal and bolus insulin should be used initially following initial treatment with IV insulin

6.5.2 Subsequent therapy

6.5.2.1 HbA1c < 48 mmol/mol (6.5%)

- Continue metformin
- Wean insulin (if applicable)
- If on multiple medications, consider weaning or discontinuing

6.5.2.2 HbA1c ≥ 48 mmol/mol (6.5%)

- Review therapy adherence and maximise metformin (up to 2g daily)
- Add GLP-1 receptor agonist or SGLT-2 inhibitor*

  *Counsel patients regarding risk of ketosis (euglycaemic DKA) and candidiasis
- Consider adding basal insulin or increasing dose (to maximum 1.5 units/kg) if already on insulin and HbA1c > 69 mmol/mol (8.5%)
- Add bolus insulin if targets not met despite combination therapy

6.5.3 Specific considerations for additional therapies

- Elevated HbA1c: GLP-1 receptor agonist or SGLT-2 inhibitor. Add basal insulin if HbA1c ≥ 69mmol/mol (8.5%)
- Weight management: Consider GLP-1 receptor agonist or SGLT-2 inhibitor (note studies in youth with T2D have not demonstrated significant BMI lowering)
- Severe insulin resistance: Consider pioglitazone (efficacy in adults)
- Needle phobia: SGLT-2 inhibitors
- Difficulty swallowing tablets: Combination metformin/SGLT-2 inhibitor therapy
- Cardiovascular complications: GLP-1 receptor agonists
- Cardiovascular and renal complications: SGLT-2 inhibitors
- MAFLD: Pioglitazone or GLP-1 receptor agonists

6.6. **Screening & Management of co-morbidities and complications (Appendix 4)**

6.6.1 Hypertension

- Blood pressure should be measured at every clinic visit
- In those < 13 years, BP based on age, sex and height centiles
- In those ≥13 years, simplified BP measurement values used
- For those reaching treatment thresholds (Appendix 2), ACE inhibitors or Angiotensin receptor blockers (ARB) are the treatment of choice
- Discussion with nephrology or Adult Endocrinology colleagues can be helpful when treatment is considered

- ACE inhibitors are teratogenic so appropriate counselling of female patients is paramount

6.6.2 Dyslipidaemia

- Lipids should be checked annually from diagnosis (initially within 3 months or following glycaemic stabilisation) (Appendix 3)
- Initial screening can be non-fasting
- If initial LDL-C values are above target (2.6 mmol/L), the initial focus is HbA1c optimisation, diet and physical activity counselling
- If after 3-6 months, LDL-C targets are still not met statin therapy should be initiated regardless of HbA1c
- If initial triglyceride values are above target (1.7 mmol/L), initial approaches include HbA1c optimisation, diet and physical activity counselling
- If fasting triglyceride values are > 4.6 mmol/L, treatment with a fibrate should be considered due to the increased risk of pancreatitis
- Combination therapy with a statin and a fibrate is not recommended
- Statins and fibrates are teratogenic so appropriate counselling of female patients is paramount

6.6.3 Nephropathy

- May be present at the time of diagnosis
- Urine albumin-to-creatinine ration (ACR) should be performed annually from diagnosis
- Estimated glomerular filtration rate (eGFR) should be calculated at diagnosis and monitored in those with deteriorating renal function

- If albuminuria is detected, treatment with an ACE inhibitor or ARB is indicated and an SGLT-2 inhibitor can be considered
- Repeat urine ACR 6 months after ACE/ARB initiation to ensure normalisation of ACR
- If very significant albuminuria (>30mg/mmol), hypertension and deteriorating eGFR are present, causes unrelated to diabetes should be considered and nephrology opinion sought

6.6.4 Metabolic dysfunction associated fatty liver disease (MAFLD)

- Liver function (AST, ALT) should be checked at diagnosis and annually thereafter (sooner if abnormal)
- If values > 3 times the upper limit of normal are present for more than 6 months, other causes of liver dysfunction should be considered and referral to a paediatric gastroenterologist initiated

6.6.5 Sleep and obstructive sleep apnoea

- Symptoms of obstructive sleep apnoea (OSA) should be checked at diagnosis and annually thereafter (sooner if excessive interval weight gain)
- Screening questions include snoring, apnoea, sleep quality, morning headaches, daytime somnolence, nocturia and enuresis
- If symptoms are present, specialist referral and a sleep study are required

6.6.6 Polycystic ovarian syndrome (PCOS)

- A menstrual history should be checked at diagnosis in girls and annually thereafter
- PCOS is diagnosed when there is menstrual irregularity (oligomenorrhea or amenorrhea) and the presence of clinical or

biochemical evidence of hyperandrogenism, following exclusion of other causes

- Ultrasound or anti-mullerian hormone (AMH) measurement are not recommended
- Management includes lifestyle changes, combined oral contraceptives (provided no contraindications) and metformin, if they are not already taking.

6.6.7 Retinopathy

- Screen for retinopathy at the time of diagnosis and annually thereafter (if 12 or older, this is via Diabetic Retinascreen)

6.6.8 Neuropathy (peripheral and cardiac autonomic neuropathy)

- Foot examination (including sensation, vibration, light touch and ankle jerks) should be conducted at diagnosis and annually thereafter
- Adolescents should be educated in appropriate foot care
- Cardiac autonomic neuropathy may manifest as resting tachycardia, lack of heart rate variability or postural hypotension (systolic BP drop of 20mmHg or diastolic BP drop of 10mmHg within 3 minutes of standing)

6.6.9 Mental health

- Screen for symptoms of anxiety, depression or diabetes distress using validated questionnaires
- Where mental health concerns are identified, refer to the appropriate mental health practitioner (psychology or psychiatry) for further evaluation

7.0 Implementation, revision and audit

7.1. Distribution to the CEO/ General Manager for dissemination through line management in all acute hospitals

7.2. Implementation through Senior Management Teams of each acute hospital

7.3. Distribution to other interested parties and professional bodies

7.4. The NCPPN Diabetes Working group has agreed that this guideline will be reviewed on a **3** yearly basis.

7.5. Regular audit of implementation and impact of this guideline through outcome and process measures is recommended to support continuous quality improvement

7.6. It is the responsibility of each unit providing care for children with diabetes and intercurrent illness to audit the unit practice regularly in order to ensure that care in being provided in line with guidelines and that any deviations are clinically justified.

7.7. The audit process should be coordinated in each paediatric unit under local paediatric clinical governance and should be taken from a multidisciplinary perspective where appropriate

7.8. Where the audit identifies areas for practice improvement, it is the responsibility of each individual unit to implement changes and re-audit to support continuous quality improvement.

8.0 References

1. Shah AS, Barrientos-Pérez M, Chang N, Fu JF, Hannon TS, Kelsey M, Peña AS, Pinhas-Hamiel O, Urakami T, Wicklow B, Wong J, Mahmud FH. ISPAD Clinical Practice Consensus Guidelines 2024: Type 2 Diabetes in Children and Adolescents. *Horm Res Paediatr*. 2024;97(6):555-583.

2. Lynam K, O'Grady MJ. Increasing Prevalence of Pediatric Type 2 Diabetes in the Republic of Ireland: A National Cross-Sectional Study. Pediatr Diabetes. 2025 Sep 11;2025:8892271.

9.0 Qualifying statement

1. These guidelines have been prepared to promote and facilitate standardisation and consistency of practice
2. Clinical material offered in this guideline does not replace or remove clinical judgement or the professional care and duty necessary for each child
3. Clinical care carried out in accordance with this guideline should be provided within the context of locally available resources and expertise
4. This Guideline does not address all elements of standard practice and assumes that individual clinicians are responsible for:
    - Discussing care with the child, parents/guardians and in an environment that is appropriate and which enables respectful confidential discussion.
    - Advising children, parents/guardians of their choices and ensure informed consent is obtained.
    - Meeting all legislative requirements and maintaining standards of professional conduct.
    - Applying standard precautions and additional precautions, as necessary, when delivering care.
    - Documenting all care in accordance with local and mandatory requirements.

10.0 Appendices

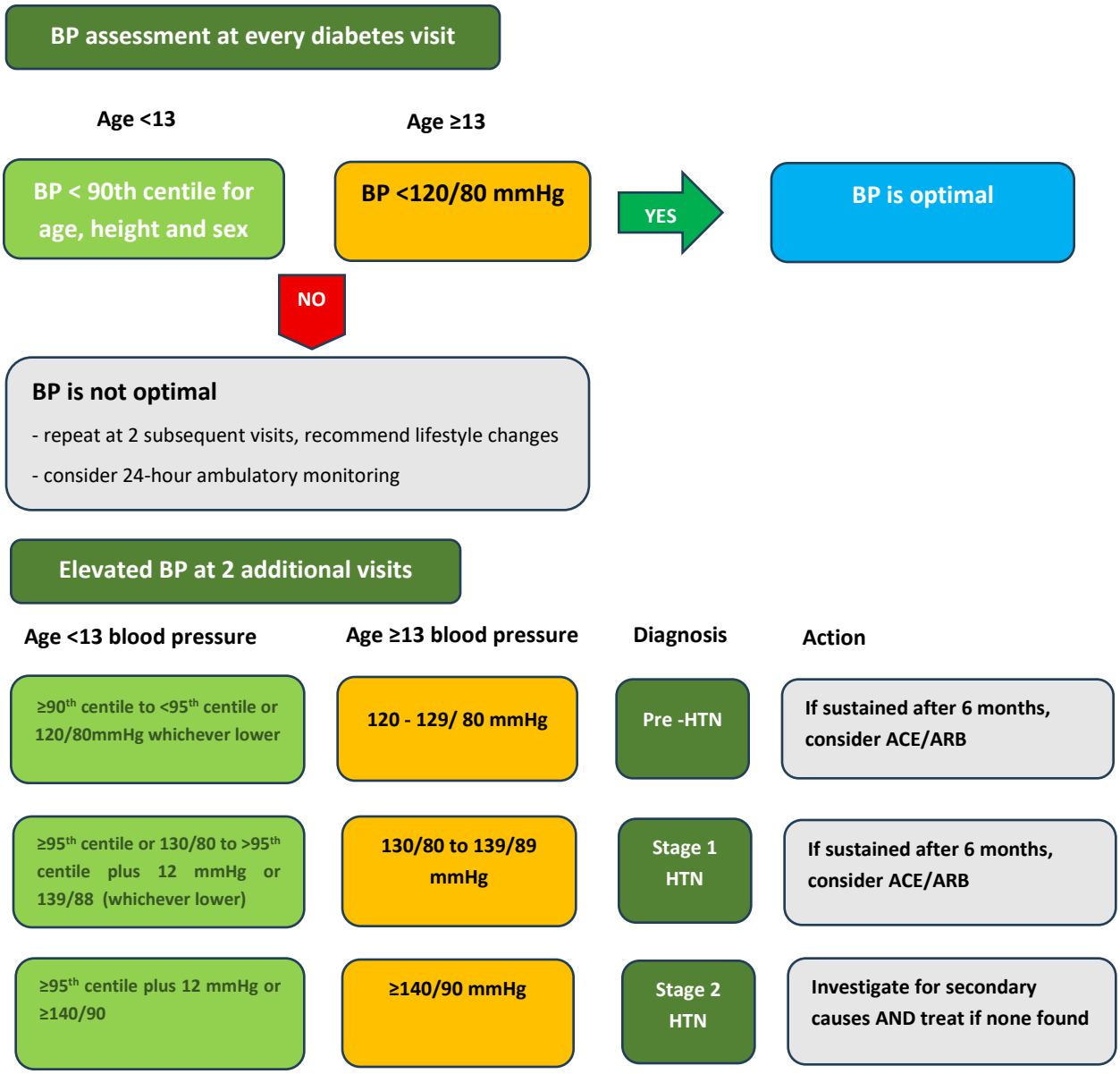
Appendix 1: Membership of Development Group and Approval Process

This guideline has been developed by the National Clinical Programme for Paediatric and Neonatology Diabetes Working Group. The members of this group include medical, nursing and dietetic representatives from paediatric diabetes services. The Diabetes Working Group also wish to thank those who provided input and feedback on draft versions of this guideline throughout development, and those who provided valuable input during the consultation process and revision of the guideline.

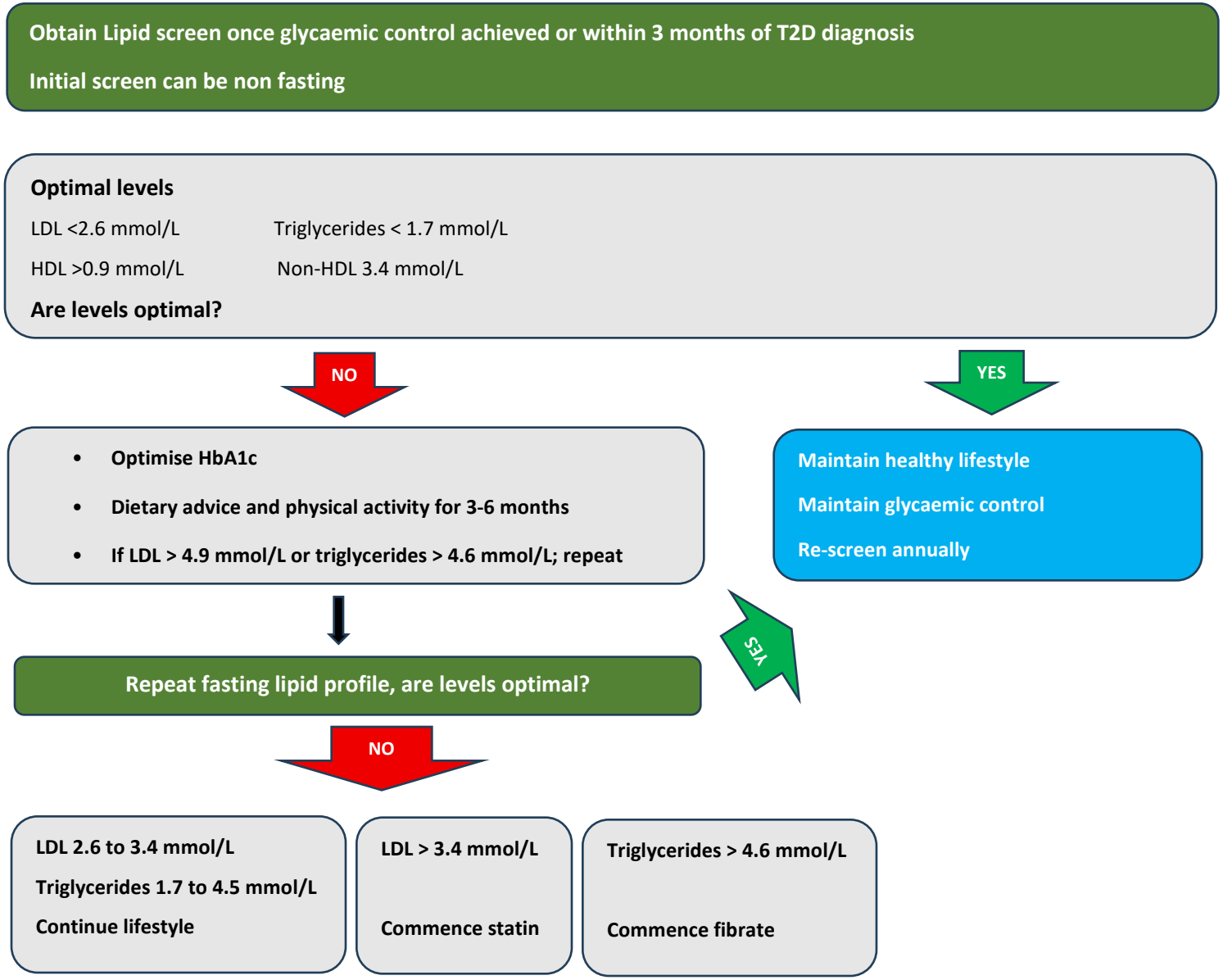
Membership of National Paediatric Diabetes Working group	
Name	**Role and position**
Professor Michael O'Grady	National Clinical Lead Paediatric Diabetes, Consultant Paediatric Endocrinologist
Professor Colin Hawkes	Consultant Paediatric Endocrinologist
Professor Nuala Murphy	Consultant Paediatric Endocrinologist
Ms. Aisling Egan	Advanced Nurse Practitioner, Paediatric Diabetes
Dr Kate Gajewska	Health Promotion and Research Manager, Diabetes Ireland
Ms. Laura O'Shea	Senior Paediatric Diabetes Dietitian
Dr Orla Neylon	Consultant Paediatric Endocrinologist
Dr Eleanor Moran	Senior Paediatric Psychologist
Ms. Claire Maye	Advanced Nurse Practitioner, Paediatric Diabetes
Ms Jacqueline de Lacy	Programme Manager National Clinical Programme for Paediatrics and Neonatology and Paediatric Diabetes

Guideline Approval Process		
Paediatric Diabetes Working Group	November	2025
Paediatric Clinical Advisory Group, Faculty of Paediatrics, RCPI	December	2025
National Clinical Advisory Group Lead (NCAGL), HSE	February	2026

Appendix 2: Blood pressure monitoring and management



Appendix 3: Dyslipidaemia screening and management



Appendix 4: Summary of comorbidity / complication screening

Comorbidity / Complication	Interval for screening	Screening test
Hypertension	Every visit from diagnosis	BP measurement compared to centiles
Dyslipidaemia	Yearly starting at diabetes onset (once optimal glycaemic control or within 3 months)	Lipid profile (can be non-fasting for screening)
Nephropathy	Yearly starting at diabetes onset	Urine ACR, eGFR
MAFLD	Yearly starting at diabetes onset	Liver function tests
Obstructive sleep apnoea	Yearly starting at diabetes onset	Ask re: sleep quality, snoring, apnoea, morning headaches or daytime somnolence
Polycystic ovary syndrome	Yearly starting at diabetes onset (unless menstrual irregularity)	Ask about menstrual irregularity and examine for evidence of hyperandrogenism (clinical or biochemical)
Retinopathy	Yearly starting at diabetes onset	Ophthalmology locally or if >12 Diabetic RetinaScreen
Neuropathy	Yearly starting at diabetes onset	Symptoms of cramps, numbness, pain or paraesthesia and examination of vibration, light touch and ankle jerks
Mental Health	Yearly starting at diabetes onset	Anxiety, depression and disordered eating