

Diagnosis of Diabetes Mellitus in Children and Young People

Referral of children and young people with possible Type 1 Diabetes

Type 1 diabetes is the most common metabolic disorder in childhood¹. Incidence has increased internationally by 3-4% per annum and is reportedly highest in young children, though the peak age of presentation is from 10-14 years of age². The most recent data show that, globally, **the incidence of Type 1 diabetes in Scotland is second only to that of Finland**, at 40 per 100 000 per year under the age of 15 years^{3,4}.

We greatly appreciate the vital role our Primary Care colleagues have always played in early diagnosis of Type 1 diabetes in the young. Over 95% of patients under 18 years of age presenting with diabetes will have the auto-immune, Type 1 form of the condition, with potentially rapid progress to ketoacidosis. **Timely recognition and referral of an infant, child, or adolescent with typical symptoms of diabetes significantly reduces risk of serious morbidity or mortality.**

Over 100 new patients are diagnosed here at the GGC Children's and Young People's Diabetes Service (CYPDS) each year, and over a third of patients are admitted with potentially life-threatening diabetic ketoacidosis. This rate has recently increased to 40% of all diagnoses.

Early diagnosis improves morbidity and mortality.

Combined with increased incidence, the rise in number of new patients presenting in **life-threatening Diabetic Ketoacidosis (DKA) remains of significant concern**. Children, adolescents, and young adults in DKA are at greater risk of disability or death from shock, renal failure, and cerebral oedema. The number of children under 5 years of age diagnosed at the CYPDS with Type 1 diabetes has increased, as has the number of Intensive Care admissions.

Early diagnosis of Type 1 diabetes reduces morbidity and mortality, and was the basis for the national "Think, Test, Telephone" campaign several years ago. Our Primary Care colleagues' awareness of the condition and its presenting features is excellent. Having recognised the typical symptoms in a child or young person, **immediate glucose testing and same day referral** (if required) are mandatory in this particular age group⁵.

"Think, Test, Telephone"

For those under 15 years of age, Scotland now has the equal second highest incidence of Type 1 diabetes in the world. Presentations in ketoacidosis have remained stubbornly high, and even increased over the last few years.

¹ International Diabetes Federation. IDF Diabetes Atlas, 2021. <https://diabetesatlas.org/atlas/tenth-edition/>

² Maahs D, West N, Lawrence J, Mayer-Davis E. Epidemiology of Type 1 Diabetes. *End. Met. Clin North Am.* 2010.09. v39 n3 p481-497 10.1016/j.ecl.2010.05.011

³ Thomson I, Anderson N, Bath L, Kiff S, Patterson C, Philip S, Waugh N, Wild S. Type 1 diabetes incidence in Scotland between 2006 and 2019. *Diab. Med.* 2023 40: e1 1-10. (<https://doi.org/10.1111/dme.15069>)

⁴ Compared to Finland's incidence of 60.9 per 100 000 per year under the age of 15 years.

⁵ Preferably by point-of-care blood test, but urine sample for glycosuria testing is usually readily obtained.

We realise our Primary Care colleagues are hard pressed, and appreciate that, in a busy surgery where viral illness in infants, children and adolescents is very often seen, it can be very challenging to differentiate the routine from the uncommon diagnosis of diabetes. Despite these difficulties, though, the great majority of referrals for suspected Type 1 Diabetes have been made on the day of first presentation.

Delayed referrals do occur, however, particularly when investigations more suitable for Type 2 diabetes patients are mistakenly used for the young. **Referral to a clinic or requesting typical Type 2 investigations, such as fasting glucose, HbA1c or Oral Glucose Tolerance tests are not appropriate** in a child or young person when the possibility of diabetes is considered.

As well as providing details for the Paediatric Medical Triage Line, we also attach the **“Think, Test, Telephone” leaflet**. This contains an outline of features and recommended course of action for any suspected of having Type 1 Diabetes. The document’s recommendations are summarised here:

Think... of the possible diagnosis of Type 1 diabetes in the young.

1. Consider Type 1 Diabetes in any infant, child or young person presenting with these symptoms (the “4 Ts”): Thirst, Tiredness, Thinner and Toileting more often. Thrush also occurs much more frequently, and secondary nocturnal enuresis correlates strongly with diabetes.
2. Younger children may be found to have had heavier nappies.
3. Type 1 diabetes should be considered in any child with new-onset bedwetting.

Test... Capillary Blood Glucose as part of the consultation.

1. A finger-prick Blood Glucose is recommended as it provides immediate diagnostic information.
2. Do not request a returned urine specimen, Fasting Blood Glucose, HbA1c or an Oral Glucose Tolerance Test. (A urinalysis for glycosuria and ketonuria may be useful if collected and the result reviewed at the time the patient is first seen).
3. A urine or blood ketone test is useful but should *not* delay referral if the diagnosis is suspected.

Telephone... immediately if your patient’s Blood Glucose is 11 mmol/l or more.

1. Call immediately if your patient’s Blood Glucose is 11 mmol/l or more.
2. Call 999 for an ambulance if ketoacidosis suspected (e.g., deep or rapid breathing rate, sweet smelling breath, abdominal pain, nausea, vomiting, severe dehydration, shock, drowsiness).
3. Call immediately to discuss if diabetes is suspected but Blood Glucose under 11 mmol/l.

Some final considerations

If fasted for any length of time (e.g., overnight or if fasted before blood testing) young children with early Type 1 diabetes may have either a normal or only slightly raised Blood Glucose. If well enough, a finger-prick glucose from a child after carbohydrate may better identify higher results. Specialist service review on the same day is essential if blood glucose or history suggests Type 1 Diabetes.

One unexpected cause of presentation delay has been reception staff who, perhaps unaware of the urgency to review a young patient with increased thirst, polydipsia, polyuria, nocturia, secondary nocturnal enuresis or oral or perineal thrush, defer making an appointment to see Practice clinical

staff for days or even weeks. Informing all practice staff of the importance of rapid review of young patients exhibiting such symptoms will help early diagnosis. Other typical symptoms of weight loss and lethargy are non-specific, but a brief enquiry regarding osmotic symptoms may prove helpful.

Attached to this document are both the original “Think, Test, Telephone” information booklet and information for contacting the Royal Hospital for Children GP Triage Line. There is also a link to the GGC “Diabetes Mellitus, Diagnosis” Clinical Guidelines. Hopefully this information will prove helpful.

Thank you again for your support, both as you consider this issue further and for your efforts in assisting us in our care of children and young people with diabetes.

Yours sincerely,

The GGC Children’s & Young People’s Diabetes Service.

http://www.ggc-youngdiabetes.org/for_nhs_staff (New Presentations and Suspected Diagnoses)

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