

# Child With Suspected Type 2 Diabetes

Suggestive history and physical findings	Initial laboratory and/or radiologic work-up can include:	When to refer	Items useful for consultation	Additional information
<p><b><u>Symptoms:</u></b> Polyuria, nocturia, enuresis, increased thirst, Fatigue Increased appetite, unexpected and unplanned weight loss</p> <p><b><u>Past history:</u></b> Longstanding weight gain or obesity but possible recent weight loss</p> <p><b><u>Family history:</u></b> History of diabetes</p> <p><b><u>Physical signs:</u></b> Vital signs: normotensive/hypertensive. General: Overweight or obese Skin: acanthosis nigricans,</p> <p><b><u>Differential Diagnosis</u></b></p>	<p><b><u>Blood tests:</u></b></p> <ul style="list-style-type: none"> <li>• Random blood glucose</li> </ul> <p><b><u>Urine tests:</u></b></p> <ul style="list-style-type: none"> <li>• Urine glucose and ketones</li> </ul> <p><b><u>Other tests to consider after consultation with Pediatric Endocrinologist:</u></b></p> <ul style="list-style-type: none"> <li>• Fasting blood glucose</li> <li>• CMP</li> <li>• Hemoglobin A1c</li> <li>• Complete blood count</li> <li>• Oral glucose tolerance test</li> <li>• c-peptide</li> <li>• Diabetes antibodies: islet cell, IA-2, insulin, GAD-65, ZnT8</li> </ul>	<p><b><u>Urgent:</u></b> All cases of diabetes defined as fasting blood glucose &gt; 126 mg/dl, random blood glucose &gt; 200 mg/dl or 2 hour post prandial glucose &gt; 200 mg/dl after glucose load of 1 gm/kg, or HbA1c &gt; 6.5% should be referred to a pediatric diabetes center or a pediatric endocrinologist.</p> <p><b><u>Emergent:</u></b> <b><u>If child is:</u></b> -Ill appearing -has ketones in urine -has mental status changes, They should be referred to emergency department for management and possible admission</p> <p><b><u>Find a Pediatric Endocrinologist</u></b></p>	<p>Previous growth data/growth charts</p> <p>Pertinent medical records</p> <p>Recent laboratory and radiologic studies</p>	<p><b><u>Additional Information</u></b></p> <p><b><u>Type 2 Diabetes: A Guide for Families</u></b></p> <p><b><u>References</u></b></p>

## Differential diagnosis for diabetes

- Type 1 diabetes (T1DM)
- Type 2 diabetes (T2DM)
- Chemical/medication induced diabetes
- Stress induced hyperglycemia
- Monogenic Onset Diabetes of Young/Maturity onset diabetes of Young (MODY)

## Additional Information:

### Laboratory Abnormalities:

- Diabetes is defined as fasting blood glucose  $\geq 126$  mg/dl, 2 hour post prandial glucose  $\geq 200$  mg/dl after glucose load of 1 gm/ kg (maximum dose: 75 gm), HbA1c  $\geq 6.5\%$  or random blood glucose  $\geq 200$  mg/dl in patient with classic symptoms of hyperglycemia.
  - In the absence of unequivocal hyperglycemia, result should be repeated.
- Simultaneous c-peptide level is elevated.
- Undetectable Pancreatic autoantibodies: islet cell antibodies (ICA), GAD-65, insulin antibodies, IA2A and ZnT8.
  - Most commercial laboratories may have the assays to test for some/ most of the autoantibodies accurately.
  - **Should be done after discussion with the endocrinologist.**
- Electrolyte abnormalities: pseudo-hyponatremia (secondary to blood glucose elevation), metabolic acidosis, elevated blood urea nitrogen and creatinine (secondary to dehydration), liver function abnormality (secondary to Non-alcoholic steato-hepatitis (NASH)).
- Children with Type 2 diabetes can present in DKA, and are also more likely to present with Hyperglycemic hyperosmolar state (HHS), both of which are medical emergencies.

Diabetes care involves close supervision, intensive education and frequent monitoring. It involves:

- Oral medications:
  - Biguanides (Metformin) – only oral diabetic medication approved for use in children 10 years and older.
- Injectable medications
  - Insulin: rapid acting analogs (Lispro, Aspart, Glulisine), long acting insulin (Human NPH), and basal insulin analogues (Glargine, Detemir)
  - Liraglutide (glucagon-like peptide 1 receptor agonist). Approved in children 10 years and older if there is no past medical or family history of medullary thyroid cancer or multiple endocrine neoplasia type 2.

- Glycemic control is monitored with self-monitoring of blood glucose (SMBG) and quarterly hemoglobin A1c.
- Patients and their care-givers should receive diabetes self-management education which includes medical nutrition therapy, SMBG, medication administration, life style changes to encourage weight loss, need for monitoring of chronic complications, management of lipid abnormalities, and hypertension.

Treatment for comorbidities if present

- Hyperlipidemia: Lifestyle modification, statins as needed based on LDL level and level of risk factors.
- NASH: Life style modification, metformin and thiazolidinediones
- Sleep apnea: Tonsillectomy and adenoidectomy and use of CPAP device
- Hypertension: Lifestyle modifications, DASH diet and antihypertensive medication as needed.
- Menstrual irregularity/polycystic ovarian syndrome: Metformin, Oral contraceptive pills.

#### **Suggested References and Additional Reading:**

- American Diabetes Association. Standards of medical care in diabetes-2021 abridged for primary care providers. Clinical Diabetes: a publication of the American Diabetes Association. 2021;39(1):14-43.
- American Diabetes Association. Children and adolescents: Standards of medical care in diabetes-2021. Diabetes Care 2021;44(suppl 1):S180-S199.

Authors: Indrajit Majumdar and Teresa Quattrin

*Copyright © 2021 Pediatric Endocrine Society. Patient Education Committee*

