

Prevention of diabetic ketoacidosis in children and adolescents.

What is Diabetic Ketoacidosis (DKA)?



DKA is a medical emergency that requires treatment and monitoring for multiple metabolic abnormalities and vigilance for complications. DKA is the leading cause of death and permanent disability in children and adolescents with new onset diabetes; (5)

Earlier diagnosis and prevention can prevent life-threatening DKA!

- 39% of children and adolescents with new onset diabetes who present in DKA had seen a physician in the preceding week. (4)
- **Children <3 years of age are often misdiagnosed at presentation** (e.g. UTI, URTI, diarrhea/gastroenteritis, otitis media) resulting in a delayed diagnosis of type 1 diabetes; this group is at the highest risk of developing DKA.(3,4)
- Overweight children can develop type 1 diabetes, as can children of all ages and ethnic backgrounds. (2)

Presence of DKA at diagnosis of type 1 diabetes in children and adolescents(4)		
Preschool children<3 years	7-10 years	15-18 years
40%	19%	12%

Learn to recognize the early symptoms of diabetes and DKA in a child or adolescent.
Utilizing S.T.A.T. action can prevent life-threatening diabetic ketoacidosis.

DIABETES	DKA
Symptom recognition <ul style="list-style-type: none"> • polyuria • polydipsia • nocturia • weight loss • lethargy 	Symptom recognition <ul style="list-style-type: none"> • symptoms of hyperglycemia • dehydration • nausea • vomiting • abdominal pain • decreased level of consciousness • Kussmaul respiration (deep,laboured breathing) • acetone-odoured breath
Test blood/urine for glucose now	Test blood/urine for ketones now
Arrange referral to a pediatric diabetes specialist/centre immediately	Arrange referral to emergency department immediately
Treat with insulin today	Treat according to pediatric specific protocols

**DKA should be suspected whenever patients have blood glucose levels higher than 14 and present with symptoms of hyperglycemia.*

Treating DKA in Children and Adolescents

Although the diagnosis and treatment of DKA in adults and in children share general principles, there are significant differences in their application, largely related to the increased risk of life-threatening cerebral edema with DKA in children and adolescents. (5)

DKA can develop suddenly and progress rapidly in children with new onset diabetes. . Suspicion of diabetes in a child or adolescent requires an immediate confirmation of the diagnosis and urgent transfer of care to a pediatric diabetes education centers.

DKA in children and adolescents should be treated according to pediatric-specific protocols. If appropriate expertise/facilities are not available locally, there should be immediate consultation with a centre with expertise in pediatric diabetes.

Who is at Risk of DKA?

DKA is more common in children and adolescents with type 1 diabetes but can occur in about 10% of adolescents with type 2 diabetes. (2)

Children and adolescents previously diagnosed with diabetes mellitus are also at risk for DKA. Risk factors include:

- pattern of insulin omission
- poor metabolic control
- previous episode of DKA
- inappropriate levels of responsibility of a child or adolescent for insulin management
- family conflict, substance abuse or mental health disorders
- inadequate knowledge about illness management
- eating disorders
- trauma

**DKA can develop rapidly in those using insulin pump therapy if there is inadequate frequency of BG checks and/or site changes, because the duration of insulin action is typically less than 4 hours.*

WHY is recognition of DKA so important?

Life-threatening cerebral edema occurs in up to 3% of episodes of DKA in childhood, resulting in significant morbidity (up to 35%) and mortality (24%).(1) Although the cause of cerebral edema is not known it can be prevented by avoiding DKA.

DKA is always preceded by hyperglycemic-related symptoms which often go misinterpreted or misdiagnosed by caregivers or healthcare providers. DKA can be prevented by identifying hyperglycemia-related symptoms and starting insulin before DKA develops.



90% of children and adolescents who develop type 1 diabetes do not have a family history of type 1 diabetes.

Parents and caregivers should be educated about the early symptoms of diabetes:

- Increased urination
- Incontinence in a previously toilet trained child
- Increased thirst
- Weight loss
- Fatigue

As DKA is the leading cause of morbidity and mortality in children with diabetes, strategies are required to prevent the development of DKA:

- Suspicion of diabetes in a child should lead to immediate confirmation of the diagnosis and initiation of treatment to reduce the likelihood of diabetic ketoacidosis (DKA). (5)
- A child or adolescent who presents with symptoms of hyperglycemia, any amount of glycosuria and/or elevation of blood glucose requires an immediate same day assessment to confirm the diagnosis of diabetes and to rule out possible DKA.
- Children and adolescents should be referred for diabetes education, ongoing care and psychosocial support to a diabetes team with pediatric expertise.
- Comprehensive education and support services as well as 24-hour telephone services should be available for families of children with diabetes.

Resources and References:

*Canadian Diabetes Association 2013 Clinical Practice Guidelines chapters of interest: Type 1 Diabetes in Children and Adolescents
Hyperglycemic Emergencies in Adults
Available at: www.guidelines.diabetes.ca*

Additional resources to support parents and caregivers of children with type 1 diabetes can be found at www.diabetes.ca.

Thank you to those who helped with content and revision:

Margaret Lawson, MD MSc FRCP (original author of this resource)
Denis Daneman MB BCh, Donna Hagerty RN CDE,
Karen McDermid BSP CDE, Tino Montopoli BScPhm CDE,
Leigh Anne Newhook MD, Jeff Packer MSW and Brian Seeley MSW,
and members of CDA Diabetes Educator Sector Pediatric Interest Group

References:

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Across the country, the Canadian Diabetes Association is leading the fight against diabetes by helping people with diabetes live healthy lives while we work to find a cure. Our community-based network of supporters help us provide education and services to people living with diabetes, advocate for our cause, break ground towards a cure and translate research into practical applications.

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