



PAEDIATRIC ACUTE CARE GUIDELINE

Diabetic Ketoacidosis

Scope (Staff):	All Emergency Department Clinicians
Scope (Area):	Emergency Department

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<http://kidshealthwa.com/about/disclaimer/>

Diabetic Ketoacidosis

Background

The biochemical definition of Diabetes Ketoacidosis (DKA)

- Blood glucose level (BGL) > 11mmol/L
- Venous pH < 7.3 or bicarbonate < 15 mmol/L
- Ketonaemia (>2mmol/L) and ketonuria

Rarely DKA may present with near normal glucose levels “euglycaemic ketoacidosis”

Assessment

Is the patient shocked/haemodynamically unstable?

- Reduced peripheral pulse volume
- Tachycardia +/- hypotension
- Altered GCS or coma
 - Assess ABCs and fluid resuscitate (see [below management](#) and [Serious Illness Guideline](#))
 - Contact ED, PICU and endocrinology consultants

Symptoms & Signs of Diabetic Ketoacidosis

Symptoms	Signs	Biochemistry prior to arrival
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• Polyuria • Polydipsia • Weight loss • Abdominal pain • Weakness • Nausea & Vomiting • Confusion	• Dehydration • Deep sighing respiration (Kussmaul) • Smell of ketones	• Elevated BGL ($> 11\text{mmol/L}$) • Acidaemia ($\text{pH} < 7.3$) • Ketones in urine ($>2+$) or blood ($>2\text{mmol/L}$)
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- Confirm the diagnosis and determine cause (e.g. infection, insulin omission in known diabetics)
- Assess clinical severity of dehydration

Investigations

- Blood glucose level
- Blood gas (venous is sufficient)
- Blood ketones
- EUC

Management

- The priorities of management are fluids first, then insulin

Shocked or Haemodynamically Unstable Patients

- Airway: Assess and manage
- Breathing: 100% O_2
- Circulation: 2 x intravenous cannulas
 - Give IV 0.9% saline 10mL/kg bolus
 - Reassess response; consider the need to repeat boluses to a maximum of 20mL/kg
 - Discuss with Emergency or PICU Consultant if more fluid is thought to be required
 - Contact PICU and Endocrinology teams regarding PICU admission
 - When haemodynamically stable change fluid rate to maintenance + deficit as per [DKA fluid calculator](#)

Haemodynamically Stable Patients

- Contact the Endocrinology team
- Commence maintenance + deficit fluids as per [DKA fluid calculator](#)
 - Do not use $> 5\%$ dehydration in calculations
 - Add potassium to maintenance + deficit fluids if:
 - Patient has passed urine
 - Potassium level (venous) is $< 5\text{mmol/L}$ as per [DKA fluid calculator](#)
 - Recheck potassium level 2 hours post commencement insulin infusion then every 2-4 hours as clinically indicated
- Commence Insulin as per [DKA fluid calculator](#)
 - $\text{pH} > 7.2$
 - or patients being treated outside PMH (tertiary paediatric hospital): subcutaneous insulin
 - $\text{pH} < 7.2$ or patient unwell: intravenous insulin infusion and PICU admission

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Further management

- Monitor for signs of **raised intracranial pressure** (headache, altered GCS, bradycardia, hypertension) – if present, urgently contact PICU and ED consultant
 - Treat with **20% mannitol** IV 0.5-1g/kg (2.5-5mls/kg) over 20 mins or **3% hypertonic saline** (3ml/kg) slow push and reduce fluid rate by one third
- Monitor blood glucose and ketones hourly while on insulin infusion
- Check electrolytes 2-4 hourly as clinically indicated

Nursing

Observations and Monitoring

- Baseline observations heart rate, respiratory rate, SpO₂, BP, capillary refill and neurological observations
- At least hourly observations should be recorded whilst in the Emergency Department. Any significant changes should be reported immediately to the medical team.
 - Anticipate and monitor for early signs of clinical **cerebral oedema** (e.g. headaches (are often one of the earliest symptoms), deteriorating conscious level, falling heart rate, rising blood pressure)
 - Risk factors for **cerebral oedema** are: low pH, elevated serum urea and low CO₂ at presentation
- Continuous cardiac monitoring (for potassium related abnormalities)
- Weight on arrival
- Hourly fluid input/output
- Baseline and hourly BGL and blood ketones
 - Keep a sampling line patent using a non-glucose containing fluid
- Two hourly blood gas
- All urine samples are to be tested for glucose and ketones

Insulin infusion

- Flushing the line with solution prior to commencing the insulin infusion as per the DKA fluid calculator prevents insulin from binding to the tubing.

Tags

abdominal pain, bgl, bsl, dehydration, diabetes, diabetic, DKA, fluctuating conscious level, glucose, headache, hyperglycemia, IDDM, ketoacidosis, ketonaemia, ketonuria, ketosis, polydipsia, polyuria, weight loss

References

1. WA Health, Child and Adolescent Health Service. PMH Department of Endocrinology and Diabetes. Management of Diabetic Ketoacidosis (DKA). Not yet published.
2. 2. Goldberg A, Kedves A, Walter K, Groszmann A, Belous A, Inzucchi SE. "Waste not want not": Determining the optimal priming volume for intravenous insulin infusions. Diabetes Technol Ther. 2006 Oct;8(5):598-601

External Consultation

Fiona Frazer (Endocrine Consultant) and PMH Endocrine Team: March 2015

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