

High blood glucose in type 1 diabetes (hyperglycaemia) insulin pump

Blood glucose levels can sometimes go out of your target range. High blood glucose (hyperglycaemia) must be investigated. Taking action to improve your blood glucose levels will reduce your risk of diabetic ketoacidosis.

What causes high blood glucose?

- > problems with the insulin pump, infusion set, connections and/or cannula (eg kinks, empty reservoirs, air bubbles)
- > missing meal related insulin doses or not enough meal related insulin
- > miss match of carbohydrate intake and meal related insulin dose
- > decrease in physical activity
- > increase in weight
- > stress, illness, infection or surgery
- > some medications (eg prednisolone).

What is the risk of high blood glucose or ketones?

High blood glucose is when your blood glucose is greater than your target level. Occasional higher readings are expected and should not cause long term problems.

Ketones are made when you burn fat as an alternative energy source (to glucose) and you don't have enough insulin. Ketones can happen in both high and in target blood glucose.

Diabetic ketoacidosis or DKA is a serious medical emergency and can be life threatening if not treated promptly.

DKA occurs more quickly in insulin pump therapy (compared to multiple daily injection therapy) because only rapid acting insulin is used. There is no background long acting insulin.

Should I test my blood glucose and ketones more often?

Symptoms of high blood glucose may include thirst, tiredness, lack of energy, passing lots of urine (eg especially at night), weight loss or blurred vision. Some symptoms can be mistaken or overlooked.

Home blood glucose and ketone monitoring will identify high blood glucose and presence of ketones.

- > Check your blood glucose level more often to see if the higher reading is a one off or not.
- > Monitor your blood glucose at least 4 times a day (eg before meals and at bedtime).
- > Check your blood ketone if you are feeling unwell or if your blood glucose is greater than 15.0mmol/L.



- > If your blood ketones are greater than 0.6mmol/L, please refer to your **sick day action plan**.
- > Recheck your blood ketones if nausea or vomiting persist.

Physical activity is often an effective way to lower your blood glucose. However, if you have ketones, physical activity is not recommended as it can drive your blood glucose even higher.

Should I continue my usual insulin?

People with type 1 diabetes require insulin for survival. Basal insulin rates should never be stopped. Meal related insulin may need to be reduced if your food and fluid intake is reduced eg nausea, vomiting, gastroenteritis or increased if blood glucose and/or ketones are high.

Some diabetes medications (eg Metformin) may need to be held. Please refer to your **sick day action plan**.

Can I use extra insulin?

Adjustments to your meal related insulin dose/s or an extra dose (eg called a 'correctional' dose) can help control high blood glucose and ketones and prevent DKA.

Please refer to your **sick day action plan** for your correctional dose/s of insulin during:

- > unexpected illness
- > as part of a treatment plan (eg when another medical condition causes your blood glucose to rise for an expected period of time (eg asthma requiring prednisolone, on renal dialysis days).

What should I eat and drink?

Keeping up your usual food and fluid intake will reduce the risk of hypoglycaemia and maintain energy requirements. ½ to 1 cup of fluid (125-250ml) every hour to avoid dehydration. If you are nauseated and unable to eat, have:

Blood Glucose	Type of Fluids
Less than 15.0mmol/L	Carbohydrate containing fluids (eg soft drink, juice, ordinary jelly)
Greater than 15.0mmol/L	Carbohydrate-free fluids (eg diet drinks, diet jelly, diet ice blocks)

When should I seek help?

Starting your **sick day action plan** early is recommended if you:

- > are a child, are pregnant or are elderly
- > have another medical condition/s
- > live in a rural or remote area some distance from medical support.

Contact your doctor if:

- > your blood glucose does not improve despite two correctional insulin doses
- > blood ketones remain present or continue to increase despite two correctional insulin doses.

Go to your nearest hospital if:

- > blood ketones more than 1.5mmol/L.
- > you are unable to eat or drink or you have been vomiting for more than 2-4 hours
- > symptoms such as drowsiness, confusion, disorientation, heavy breathing, dehydration or severe abdominal pain
- > blood glucose stays below 4.0mmol/L and you cannot get it up
- > too unwell to stay home.

My Sick Day Action Plan

Commence immediately if you are feeling unwell OR if your blood glucose is greater than 15.0mmol/L for more than 8-12hours OR your blood ketones are greater than 0.6mmol/L.		Medical Record No: _____ Name: _____ Date of Birth: ____/____/_____
Doctor: _____ CDE: _____	Ph: _____ Ph: _____	Health Direct (24hr health advice line) Ph: 1800 022 222
My blood glucose target range is:	Fasting: _____ Pre meal: _____	Before bed: _____ Overnight: _____
Blood glucose (BG) monitoring instructions*	Monitor BG at least 4-6 times a day (eg before meals, 2hours after meals and at bedtime). Monitor BG at any time if low blood glucose (hypo) is suspected and at 02:00hrs if overnight is suspected. Check BG 1-2hours after correctional insulin dose/s.	
Blood ketone monitoring instructions*	Monitor blood ketones daily. If blood ketones greater than 0.6mmol/L, suspect insulin delivery problem until proven otherwise. Check blood ketones 1-2hours after correctional insulin dose/s.	
Usual insulin pump rate instructions* <i>Insulin:Carbohydrate Ratio/s:</i> _____	Basal insulin setting should never be stopped. Meal related insulin may need to be reduced if your food and fluid intake is reduced.	
Usual diabetes medications instruction*	Continue usual Metformin or hold _____	
Correctional insulin instruction* <i>Insulin Sensitivity Factor (ISF):</i> _____ unit lowers BG by _____ mmol/L. <i>Active Insulin time</i> ____ hours.	Administer immediately but no closer than 2hours to the last dose (eg at main meal time) Limited to 2 correctional doses. Use insulin pump to administer correction dose if blood ketones are less than 0.6mmol/L or use insulin injection if blood ketone greater than 0.6mmol/L. Change insulin pump consumables and site.	
Temporary basal rate instructions*	If unwell (no nausea and vomiting) and BG is greater than 5.5mmol/L, consider increase in basal rate by 10-20% for 2hours. If unwell AND nausea of vomiting AND BG is less than 5.5mmol/L, consider decrease in basal rate by 10-20% for 4hours.	
Foods and fluid instruction	If unable to eat, have ½ to 1 cup of fluid (125-250ml) every hour to avoid dehydration. If BG less than 15.0mmol/L, have carbohydrate containing fluids If BG greater than 15.0mmol/L, have carbohydrate-free fluids.	
Hypo action plan	Updated: _____ Not applicable: _____	
When to visit your nearest hospital	<ul style="list-style-type: none"> > BG greater than 15.0mmol/L despite 2 correctional insulin doses. > Blood ketones greater than 1.5mmol/L. > Symptoms of drowsiness, confusion, breathing difficulties or severe abdominal pain. Vomiting persists for more than 4hours. > Hypoglycaemia or if the BG cannot be kept above 4.0mmol/L. > Unable to self-care and support person unable to assist. 	
Dated:	CDE Name:	Sign:

*ADEA 2016 Clinical guiding principles for sick day management of adults with type 1 and type 2 diabetes

For timely management of any illness, a Sick Day Management Kit at home and when travelling is recommended.

<p>Home Kit</p>	<ul style="list-style-type: none"> > List of all medication/s > Vaccination history > A copy of this Sick Day Action Plan > A copy of the ADEA (2014) Sick Day Management Guidelines for Adults with type 1 diabetes Consumer Resource available at https://www.adea.com.au/wp-content/uploads/2015/12/sick-day-booklet-type-1-single-page-final.pdf > Telephone numbers to call eg Support People, General Practitioner, local Diabetes Service/Hospital, Credentialed Diabetes Educator, and Endocrinologist. <p>Extra</p> <ul style="list-style-type: none"> > Food and Fluid (both carbohydrate containing and carbohydrate free) > Finger pricker lancets > Lancet device and batteries for blood glucose meter > Blood glucose monitoring strips > Blood ketone monitoring strips > Sharps container > Hypo treatment including carbohydrate containing snacks > Glucagon Hypo Kit > Rapid acting insulin > Insulin Pump Infusion Sets, reservoirs and batteries > Insulin pens and needles or insulin syringes > Alcohol swabs > Thermometer.
<p>Travel Kit</p> <p><i>Contents should be discussed with your General Practitioner or Endocrinologist as prescriptions for certain medications will be required.</i></p>	<ul style="list-style-type: none"> > Antiemetics > Antidiarrhoea agents > Paracetamol > Broad-spectrum antibiotics > Oral Rehydration Solution (ORS) > Betadine™ > Basic wound dressing product. <p>Further advice on emergency treatment when travelling can be obtained from the Smart Traveller website: www.smartraveller.gov.au</p>

Where can I go for more information?

Diabetes Australia

www.diabetesaustralia.com.au

National Diabetes Services Scheme

www.ndss.com.au

Australian Diabetes Educators Association

www.adea.com.au

Department of Health

www.health.gov.au

For more information

Diabetes Service

Rural Support Service

PO Box 287, Rundle Mall

ADELAIDE SA 5000

Telephone: (08) 8226 7168

www.chsa-diabetes.org.au

