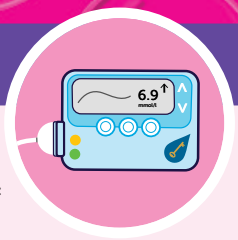
Sick day rules: insulin pump therapy

What happens when you are unwell?

During illness the body releases hormones which cause glucose to be released into the blood stream and increases the blood glucose level. These hormones also make the insulin less effective (insulin resistance).

This high blood glucose level, in combination with the illness, can lead to dehydration. If the body does not receive enough insulin and fluid it will start producing an alternative energy source known as ketones. This can then lead to diabetic ketoacidosis (DKA).

RULE NUMBER 1:



Never stop taking your insulin, even if you are not eating (you may need to adjust the amount of insulin). If you have a sensor augmented pump, consider switching to manual mode. You may need to switch to insulin pen therapy.

RULE NUMBER 2:

Keep checking your blood glucose and ketone levels every 2 hours.

RULE NUMBER 3:

Consider giving additional correction (and/or set a temporary basal rate) in response to blood glucose and ketones **every 2 hours**, if blood glucose is above normal range. See ketone response chart below. If using a sensor augmented pump, ensure you respond to alerts.

RULE NUMBER 4:

Drink lots of sugar free drinks to keep well-hydrated. If you cannot eat, replace meals and snacks with quick acting carbohydrate (sugary drinks or usual hypo remedy). It is recommended to give at least 10g of carbohydrate hourly.

RULE NUMBER 5:

Perform pump checks. Please turn over for pump check guide.

RULE NUMBER 6:

Contact the MKUH diabetes team for advice if blood glucose is greater than 14mmol/l and ketones 0.6mmol/l or higher, or if blood glucose and ketones are not falling.

KETONES GREATER THAN 3MMOL/L SHOULD NOT BE MANAGED AT HOME. SEEK URGENT MEDICAL ADVICE IF YOUR CHILD IS VOMITING.

Ketone response chart

Normal ketones (below 0.6mmol/l)	Moderate ketones (0.6-1.4mmol/l)	High ketones (1.5mmol/l or above)
Perform pump checks. Give normal correction if confident pump checks passed.	Give normal correction plus an extra 10% with insulin pen. Perform pump checks	Give correction dose plus an extra 20% with insulin pen. Perform pump checks

TOP TIPS

- If ketones are present when blood glucose is low or within normal range, these are called 'starvation ketones' and respond to eating or drinking some carbohydrate
- Always recheck blood glucose and blood ketones after an insulin correction. Further corrections may be needed
- CGM and flash monitoring can be useful for looking at trends but during sick day management, finger prick blood glucose should be used

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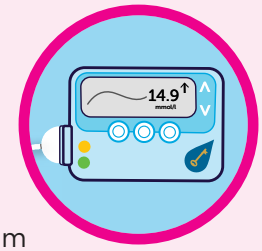
Pump checks

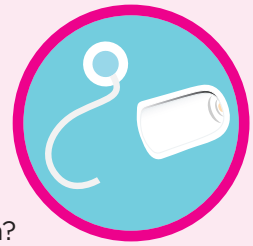
If your blood glucose rises above 14mmol/l you will need to check your pump and equipment:

Check the pump



- Review pump status to ensure the pump is on and running
- Check for any alarm messages
- Check that the basal program is running as you have set it
- Check bolus history to ensure the last bolus was delivered
- Ensure the pump's clock is set correctly and the battery charge is in a safe zone
- Check the pump for any visible damage

Check tubing and infusion site for:



- Insulin leakage (sniff for the smell of insulin)
- Signs of infection - is there any redness, pain, irritation, itchiness or burning sensation?
- Signs of over use - is the site lumpy or hard?
- Crimped, kinked or blocked tubing
- Large bubbles or blood in the tubing
- Good connection between the infusion set, pump and cannula

Check the insulin

- Is it cloudy, clumped or crystallised?
- Has the insulin been stored correctly (temperature extremes affect how insulin works)
- Does the reservoir/cartridge contain enough insulin?

TOP TIP

- **Remember insulin has a 28 day shelf life at room temperature**

Calculating extra insulin

Use the worked example below to practise calculating the extra insulin you would need if ketones are raised and you need to switch to pen therapy.

Ffion's blood glucose is HI* and ketones are **2.0 mmol/l**
Her usual correction ratio is **1:5**. She corrects her blood glucose to **5mmol/l**

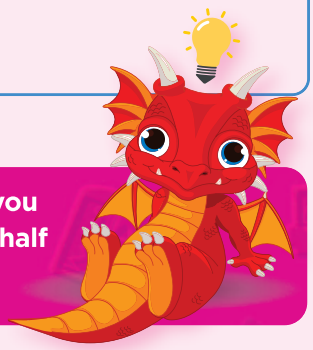
Ketone range:	High **(1.5 mmols or above)**
Action required	Normal correction + 20%
Total insulin needed	5 units + additional 20% 20% of 5 = 1
Total dose required	**6 units**

Blood glucose HI and ketones **2.5mmol/l**

Usual correction ratio	**1 unit:** ____ **mmol/l**
Ketone range	Normal/moderate/high
Action required	Normal correction/correction + 10%/correction + 20%
Total insulin needed	____ units + additional ____ % ____ % of ____ = ____
Total dose required	____ units

TOP TIPS

- ***If your meter reads HI, this usually means your blood glucose is greater than 30mmol/l**
- **When calculating extra insulin you should round up to the nearest half unit**



Reference: Adapted from ISPAD Clinical Practice Consensus Guidelines 2018: Sick day management in children and adolescents with diabetes