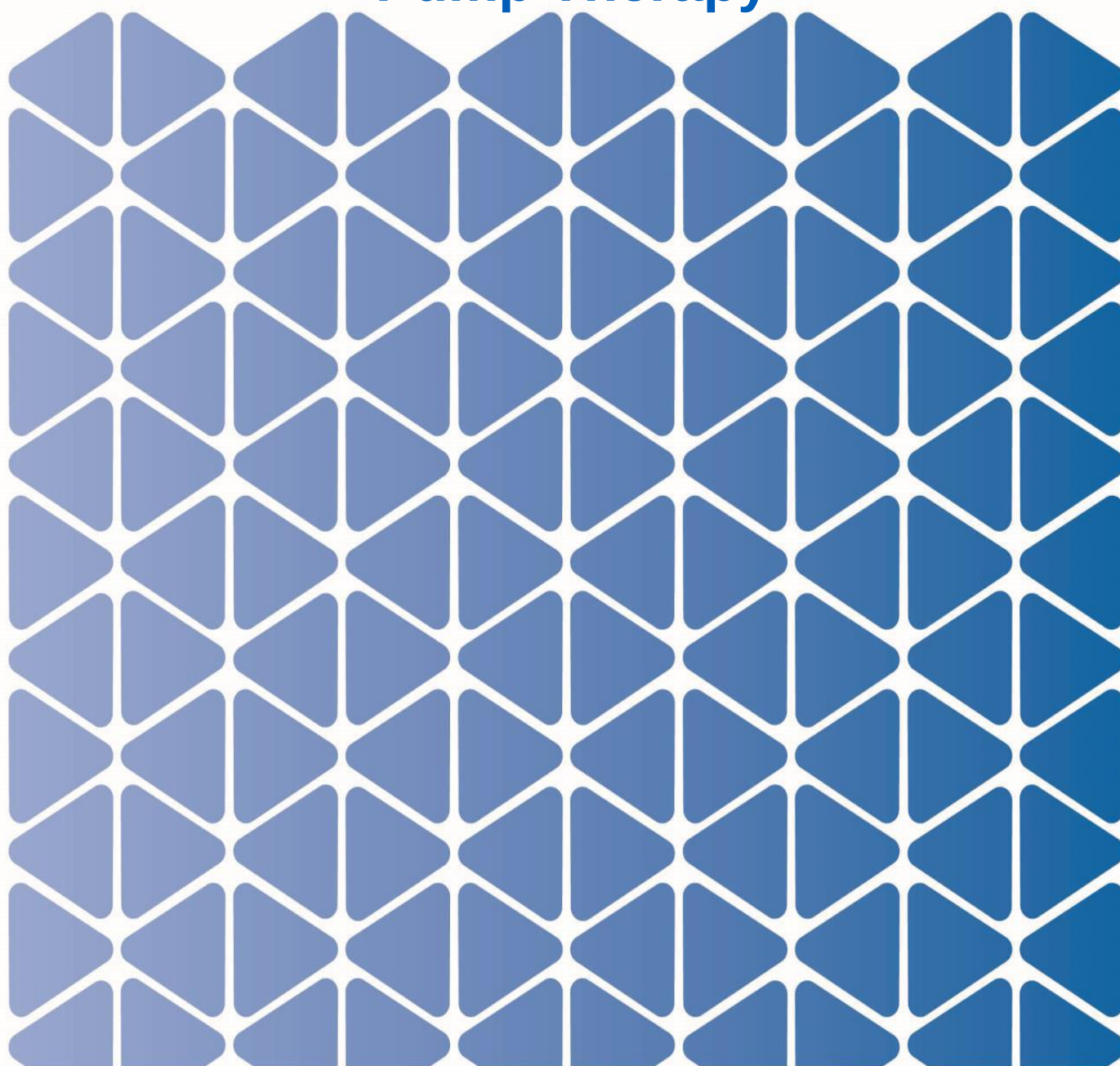


PATIENT INFORMATION**PAEDIATRIC DIABETES –
Illness and Diabetes using Insulin
Pump Therapy**

Illness and Diabetes using Insulin Pump Therapy

Any illness can upset the control of your diabetes however, having Type 1 diabetes does not mean that you are going to be unwell more often than other young people without diabetes. Your blood glucose level may rise without there being any change in the carbohydrate food that you eat, or in the usual amount of insulin that you take. In some young people illness may cause the blood glucose level to go down, particularly with diarrhoea and vomiting. When you are on an insulin pump, you only use fast acting insulin and there is a risk that you can become ill more quickly than someone using insulin injections.

Diabetic Ketoacidosis (DKA)

DKA is a serious complication of diabetes. It results from having less insulin than is required causing a large build-up of ketones in the blood. This can make you seriously ill and can be life-threatening if not treated promptly. During illness the risk of DKA is increased. The following advice is aimed at helping you manage illness safely and preventing DKA.

Sick Day Rules

- **Do not stop taking your insulin:** the cells in your body still need insulin to work properly, even if you cannot eat your normal food or you are being sick. If your blood glucose levels are low, you may require less insulin than normal. If your blood glucose levels are high, you will need extra insulin. When using an insulin pump, insulin may need to be given by a pen device so always make sure you have insulin in this form as a backup. **Follow the management plan on PAGE 3**
- **Do not delay seeking advice:** if you are unsure, **immediately** contact your Diabetes nurse or, if out-of-hours, **Riverbank Ward (telephone number 01905 760588)** if you have a problem.
- **Monitor blood glucose levels frequently:** you may need to increase checking/testing your glucose level to 2 hourly during a period of illness to stay safe, even at night.
- **Rest:** if you have ketones present, activity can make them worse.
- **Encourage fluids:** ketones and high blood glucose levels can make you thirsty and at risk of dehydration. Try to drink your usual sized glass of no added sugar fluid every hour.
- **Test for ketones:** using your blood ketone monitor. You need to check for ketones, especially if your blood glucose level is 14 mmol/l or above.
- **Maintain some intake of carbohydrate containing foods:** if you do not eat/drink carbohydrate you may get starvation ketones with a blood glucose level that is in the normal range.
- **Consider changing your pump/cannula:** sometimes trouble with your infusion set can cause a blockage meaning that the insulin can't get through which causes the high blood glucose level.

What if I don't feel like eating?

- Try carbohydrate alternatives such as milk, milkshakes, yoghurt, custard, ice cream, sugar containing ice lollies, fruit juice, fruit smoothies, ordinary cola or other sugary cold drink, honey, jam or soup.
- Give a bolus of insulin for any carbohydrate you have unless you are hypo. If a hypo occurs treat as usual and see the note below.
- If you really cannot eat, then aim for 10g carbohydrate eg: 90ml Lucozade Energy, 3 dextrose tablets, or two teaspoons of sugar in a drink every 45 minutes during the day.
- If you are not tolerating food by the evening, then you or your parents need to monitor your blood glucose levels 2 hourly overnight. If you are unsure, immediately contact your diabetes team or Riverbank Ward if out-of-hours.

The plan on PAGE 3 gives you a guide on management depending on your glucose level and if ketones are also present.

Hybrid Closed Loop Systems

If your glucose levels are too high and the closed loop system is not able to bring them down whilst you are in automode, the pump will revert to manual mode. If your pump does not automatically exit automode (the closed loop system), your glucose levels are high and your ketone levels are increasing, you will need to change it to manual mode. Manual mode is where the pump will run based on programmed basal rates – you still need to give insulin boluses for carbohydrates and correction doses. As well as the plan on page 3, if you are using a closed loop system please see **the plan on PAGE 4**.

Hypoglycaemia when you are unwell

You must never stop taking your insulin. If you have a closed loop system you could put your pump into exercise/activity mode so your pump will aim for a higher glucose level. If you do not have a closed loop system, you may need to set a temporary basal rate of 20-50% less insulin than normal for 4-6 hours or until you are able to eat normally.

Other tips

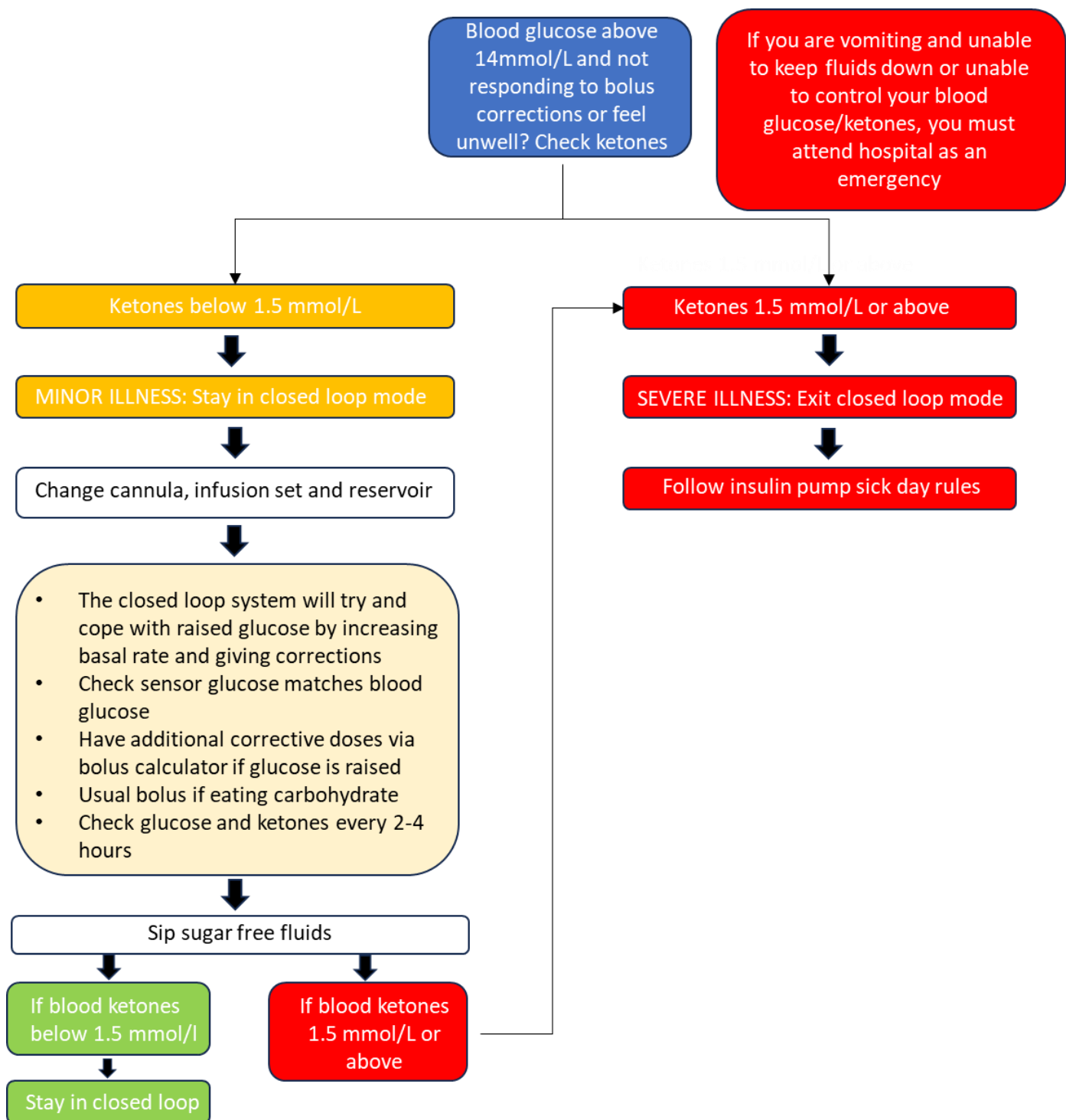
- Seek advice from your GP if you feel there may be an infection causing the illness which may need further treatment.
- Use Paracetamol for treatment of a high temperature or discomfort

GUIDE TO MANAGEMENT OF GLUCOSE LEVELS WITH OR WITHOUT KETONES WHEN UNWELL & ON AN INSULIN PUMP

Blood Glucose	Less than 0.6mmol/l ketones	0.6 – 1.4mmol/l ketones	1.5mmol/l ketones & above
4-5.5mmol/l <i>Top tip: Starvation ketones can occur with a normal blood glucose if not eating enough</i>	Encourage normal food or carbohydrate alternative with insulin bolus BY PUMP as per normal ratios. Encourage sugar free fluids hourly. If experiencing recurrent hypos, set a decreased temporary basal rate for 4-6 hours (20-50% less than usual) and review further if necessary. Seek advice if any vomiting persists or there is difficulty maintaining blood glucose above 4mmol/l.	Encourage normal food or carbohydrate alternative with insulin bolus BY PUMP as per normal ratios using bolus calculator on the pump. Encourage sugar free fluids hourly. Re-check glucose & ketones after 2 hours. Repeat steps above if unchanged. If remains unchanged after 4 hours, seek advice.	Encourage normal food or carbohydrate alternative as mentioned with insulin bolus BY PUMP as per normal ratios using bolus calculator on the pump. Encourage sugar free fluids hourly. Re-check glucose & ketones after 2 hours. If remains unchanged after 4 hours, seek advice.
5.5-10mmol/l <i>Top tip: Starvation ketones can occur with a normal blood glucose if not eating enough</i>	Encourage normal food or carbohydrate alternative with insulin bolus BY PUMP as per normal ratios. Encourage sugar free fluids hourly. Re-check glucose & ketones after 2 hours. Repeat steps above, if unchanged. If still remains unchanged after 4 hours seek advice.	Normal food or carbohydrate alternative as mentioned with insulin bolus BY PUMP as per normal ratios & correction. Encourage sugar free fluids hourly. Re-check glucose & ketones 2 hours. Repeat steps above again. If no improvement after 4 hours seek advice.	Normal food or carbohydrate alternative with insulin bolus BY PUMP as per normal ratios & correction. Encourage sugar free fluids hourly. Re-check glucose & ketones after 2 hours. If no improvement – consider changing the cannula. Seek advice.
10-14mmol/l <i>Top tip: If ketones present make sure you rest until they have gone.</i>	Normal food or carbohydrate alternative with insulin bolus BY PUMP as per normal ratios & sensitivity using bolus calculator on the pump. Encourage sugar free fluids hourly. Re check blood glucose and ketones after 2 hours. Repeat steps above if unchanged. If remains unchanged after 4 hours seek advice.	Normal food or carbohydrate alternative with insulin bolus BY PUMP as per normal ratios & correction. Encourage sugar free fluids hourly. Re-check glucose & ketones in 2 hours. If no improvement, take a correction dose of insulin as per normal ratio & sensitivity BY INJECTION immediately. Change infusion set. Put an increased temporary basal rate in place for 2 hours at 150% if on Medtronic, +50% if on Omnipod (switch to manual mode). Re check blood glucose and ketones after 2 hours. If no improvement – seek advice.	Take a correction dose of insulin as per normal ratio & sensitivity BY INJECTION immediately. Change infusion set. Put on an increased temporary basal rate for 4 hours at 200% if on Medtronic, +95% if on Omnipod (switch to manual mode). Encourage sugar free fluids hourly. Re check blood glucose and ketones after 2 hours. If no improvement seek urgent medical advice.
Above 14mmol/l <i>Top tip: Never ignore any pump alarms, always check them out and deal with them immediately</i>	Trouble shoot and resolve any problem with the reservoir, infusion set, site, pump and insulin. Insulin bolus as per normal ratios & sensitivity BY PUMP using bolus calculator on the pump. Encourage sugar free fluids hourly. Re check blood glucose and ketones after 2 hours. If no improvement in glucose/ ketones after 2 hours consider changing infusion set, seek advice.	Take a correction dose of insulin as per normal ratio & sensitivity BY INJECTION immediately. Change infusion set. Put an increased temporary basal rate on for 2 hours at 200% if on Medtronic, +95% if on Omnipod (switch to manual mode). Encourage sugar free fluids hourly. Re-check blood glucose and ketones after 2 hours. If no improvement seek urgent medical advice.	Take a correction dose of insulin as per normal ratio & sensitivity BY INJECTION immediately. Change infusion set. Put on an increased temporary basal rate for 4 hours at 200% if on Medtronic, +95% if on Omnipod (switch to manual mode). Encourage sugar free fluids hourly. Re check blood glucose and ketones after 2 hours. If no improvement seek urgent medical advice. If ketones have improved but still present, repeat correction dose as INJECTION and recheck after a further 2 hours

IF BG ABOVE 14 MMOL/L AND KETONES 3 MMOL/L OR HIGHER – HIGH RISK OF DKA – SEEK URGENT MEDICAL ADVICE

Flow chart for Hybrid Closed Loop Systems



Re-enter closed loop when:

- your blood glucose/sensor glucose levels are stable
- your ketone levels are in the normal range (<0.6 mmol/l)
- temporary basal rates are no longer required
- it has been more than 4 hours since the last correction dose via a pen

Frequently asked questions

Why are my glucose levels high?

Common reasons for glucose levels to be high are:

- Illness
- Stress
- Taking less insulin or missing insulin
- Eating too much

What will happen if my glucose levels remain high?

If left untreated, high blood glucose levels can make you feel unwell, dehydrated and may result in DKA (Diabetic Ketoacidosis)

What are the symptoms of DKA?

- Increased thirst
- Passing more urine
- Feeling sick or vomiting
- Feeling tired
- Dryness in mouth and lips
- Drowsiness
- Breathing fast
- Breath smelling of acetone or pear drops
- Severe tummy pain

How do I know it is DKA and not a tummy bug?

With DKA both your blood glucose and ketone levels will be quite high. With a tummy bug your blood glucose will be normal or low and your blood ketones will be negative or minimally raised. So monitoring ketones at home will help to determine whether it is DKA or an infection.

What are ketones?

Ketones are produced in the liver when there is a lack of insulin and your body cannot use glucose to provide energy. Your body breaks down fat for energy instead and ketones are produced as part of this process.

What are other causes of raised ketones?

Ketones are also produced during starvation (fasting) or strenuous exercise. In both these situations the blood glucose is low/normal and not raised.

Contact your Diabetes nurse or, if out of hours, Riverbank Ward immediately if:

- Vomiting persists.
- Blood glucose levels continue to rise and/or
- Blood ketones persist after using management plan on **PAGE 3**, the young person is becoming exhausted, confused, is breathing fast, has tummy pain or is dehydrated.
- Difficulty maintaining blood glucose levels above 4 mmol/l.

- You are concerned.

If your symptoms or condition worsens, or if you are concerned about anything, please call your GP, 111, or 999.

Patient Experience

We know that being admitted to hospital can be a difficult and unsettling time for you and your loved ones. If you have any questions or concerns, please do speak with a member of staff on the ward or in the relevant department who will do their best to answer your questions and reassure you.

Feedback

Feedback is really important and useful to us – it can tell us where we are working well and where improvements can be made. There are lots of ways you can share your experience with us including completing our Friends and Family Test – cards are available and can be posted on all wards, departments and clinics at our hospitals. We value your comments and feedback and thank you for taking the time to share this with us.

Patient Advice and Liaison Service (PALS)

If you have any concerns or questions about your care, we advise you to talk with the nurse in charge or the department manager in the first instance as they are best placed to answer any questions or resolve concerns quickly. If the relevant member of staff is unable to help resolve your concern, you can contact the PALS Team. We offer informal help, advice or support about any aspect of hospital services & experiences.

Our PALS team will liaise with the various departments in our hospitals on your behalf, if you feel unable to do so, to resolve your problems and where appropriate refer to outside help.

If you are still unhappy you can contact the Complaints Department, who can investigate your concerns. You can make a complaint orally, electronically or in writing and we can advise and guide you through the complaints procedure.

How to contact PALS:

Telephone Patient Services: 0300 123 1732 or via email at: wah-tr.PALS@nhs.net

Opening times:

The PALS telephone lines are open Monday to Friday from 8.30am to 4.00pm. Please be aware that you may need to leave a voicemail message, but we aim to return your call within one working day.

If you are unable to understand this leaflet, please communicate with a member of staff.