Sick day rules for patients on an insulin pump: how to manage type 1 diabetes if you become unwell with coronavirus

If you become unwell with coronavirus and require advice specifically for coronavirus, please refer to the following websites:

- JDRF [https://www.jdrf.org/coronavirus/](https://www.jdrf.org/coronavirus/)

If you are unable to follow sick day rules or need further help, please telephone your local diabetes team.

Please note: to follow this advice, it is important you know your most recent weight in kilograms or your total daily dose of insulin so that you can give the correct insulin dose to correct ketones. It would be useful to do know the 10% and 20% of the TDD beforehand so that you know what to do if you become unwell.

**Supplies you need access to at all times (as part of your kit box if you have one):**

Please ensure you have access to the following at all times, not just when you are unwell.

- 1-month supply of all insulin cartridges
- Ensure you have access to alternative means of insulin delivery – pens or syringes. You should have access to long acting and quick acting insulin to use in case of pump failure
- Blood glucose meter with 1-month supply of test sticks/strips and lancets – check the sticks/strips/lancets have not expired
- If you use continuous or flash glucose monitoring systems (Dexcom/Freestyle Libre) ensure you have access to back up blood glucose meter and test strips
- Ketone test kits – either urine or blood – check the ketone test strips have not expired

If you need to access supplies or prescriptions, please contact the local community pharmacist you usually go to for your prescriptions via telephone or virtually (where you can do so). Additional measures have been put in place to ensure delivery of prescriptions for high risk groups who need to self-isolate.
1. If you become unwell

- If you develop Coronavirus symptoms or any other illness it is likely to affect your blood sugars
- While you are unwell it is VERY likely you will need to take more insulin
- Even if you are vomiting you must NEVER stop taking your insulin
- Monitor your urine or blood for ketones every 2 hours
- Monitor blood sugar levels every 2 hours
- Drink at least ½ cup (100mls) of water every hour, but you can also drink any other sugar free drinks
- Please do not fast. Try to eat some food which contains carbohydrates e.g. yoghurt, toast, ice cream and cereal
- If you are worried about other symptoms not related to your diabetes, please seek medical advice from NHS 111 in the first instance
- You will need face to face medical attention if you are continuously vomiting for more than 4-6hrs or if your ketone levels in blood or urine are not reducing despite following sick day rules

2. Management of unexplained hyperglycaemia

- Check blood glucose in two hours – if no change or glucose is higher, take correction dose of rapid acting insulin with a pen and check for ketones
- Change infusion set and reservoir (start new pod if using Omnipod® pump)
- Check glucose and ketones in two hours and take a correction bolus via pump if required, check for ketones if glucose still over 13mmol/L
- Follow sick day rules if ketones are present
- Do not go to sleep:
  - with unexplained hyperglycaemia which has not resolved
  - or, within two hours of a new set change

3. In the event of insulin pump failure

- The emergency basal insulin dose via pens / syringes would be the same as your total daily basal insulin on the pump (e.g. total basal insulin 20 units on pump – if using Levemir start injections 10 units in the morning & 10 units in the evening, if using Lantus, start 20 units once a day injections)
- Your insulin carbohydrate ratio (for meals) and insulin sensitivity factor (for corrections) would be the same as on the pump
- In the event of pump failure and not being able to access long acting insulin you should check your glucose levels and give an injection of quick acting insulin every 3 hour
- If you suspect the pump is not administering insulin (pump failure), you should revert back to insulin injections with pens / syringe
4. Insulin pump sick day rules

Feel unwell and using an insulin pump?
Test blood glucose and ketones

NO KETONES
(Negative or trace on urine test; less than 1.5mmol/L on blood test)
MINOR ILLNESS

Sip sugar-free fluids (at least 100ml/hour)
Test blood glucose and ketones every 2-4 hours

KETONES PRESENT
(More than a trace in urine test; more than 1.5mmol/L on blood test)
Blood glucose raised (usually above 13 mmol/L)
SEVERE ILLNESS

Test blood glucose and ketones every 2 hours
Calculate total daily dose (TDD) from previous day

- Usual insulin to carbohydrate ratio if eating.
- Use corrective boluses if blood glucose is raised, even if you are not eating.
- When unwell you may find you need larger bolus doses to reduce blood glucose – override the bolus adviser.
- If glucose levels are persistently above target, consider an increase of 10% - 20% (or even more if required) in basal rate by using an increased temporary basal.

if Ketones ++ on urine test 1.5-3mmol/L on blood test
Give 10% of TDD as bolus insulin every 2 hours plus usual insulin to carbohydrate ratio if eating and increase basal rate by 30%. Override the bolus adviser.

if Ketones +++ to ++++ over 3mmol/L on blood test
Give 20% of TDD as bolus insulin every 2 hours, plus usual insulin to carbohydrate ratio if eating and increase basal by 50% or more. Override the bolus adviser.

If you still have ketones go back to the start and repeat the process.

When no ketones are present
1. Eat/drink 10-20grams of carbohydrate. Use Carbs and Cals book or app to help with this. https://www.carbsandcals.com/app/app
2. Take usual meal time insulin
3. Take usual basal (long acting) insulin

If your ketones are still present after 4-6 hours and or you continue to vomit, are unable to keep fluids down, or unable to control your blood glucose or ketones you must go to the hospital as an emergency. You must never stop or suspend your pump.

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5. Calculating your total daily dose (TDD)

- If you need to calculate how much total daily dose of insulin you need to follow the sick day rules, see EXAMPLE calculations below. Each individual’s total daily dose of insulin and calculations will be different, the example is a guide only.

**Example 1 - if you do know your daily dose**

Total of all quick acting (mealtime) insulin = 26 units
Total of all background (long acting) insulin = 24 units
Total daily dose = 26 + 24 = 50 units
10% of total daily dose = 50 ÷ 10 = 5 units
20% of total daily dose = 50 ÷ 5 = 10 units

**Example 2 If you cannot calculate your daily dose please use the following chart based on your weight in kilograms**

<table>
<thead>
<tr>
<th>Body Weight</th>
<th>Ketone level (mmol/L)</th>
<th>10% of total daily dose</th>
<th>20% of total daily dose</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Blood ketone 1-2.9</td>
<td>Blood ketone 3.0 +</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Urine ketone + to ++</td>
<td>Urine ketone +++ to ++++</td>
</tr>
<tr>
<td>40(Kg)</td>
<td>4 units</td>
<td>8 units</td>
<td></td>
</tr>
<tr>
<td>50(Kg)</td>
<td>5 units</td>
<td>10 units</td>
<td></td>
</tr>
<tr>
<td>60(Kg)</td>
<td>6 units</td>
<td>12 units</td>
<td></td>
</tr>
<tr>
<td>70(Kg)</td>
<td>7 units</td>
<td>14 units</td>
<td></td>
</tr>
<tr>
<td>80(Kg)</td>
<td>8 units</td>
<td>16 units</td>
<td></td>
</tr>
<tr>
<td>90(Kg)</td>
<td>9 units</td>
<td>18 units</td>
<td></td>
</tr>
<tr>
<td>100+(Kg)</td>
<td>10 units</td>
<td>20 units</td>
<td></td>
</tr>
</tbody>
</table>

**AND IF blood glucose below 5.5 mmol/L** - sip sugary drink/glucose regularly
6. Medications

If you are on any of the following medication you need to stop them when you are sick. Restart when you are well (normally after 24 to 48 hours of eating and drinking normally). When you restart your medicine, just take them as normal.

ACE inhibitors – these medicines are used for heart conditions, high blood pressure and for kidney protection. If you are dehydrated, these medicines can stop your kidneys working properly.
  o **Examples**: names ending in ‘pril’ such as ramipril, lisinopril, perindopril

ARBs - these medicines are used for heart conditions, high blood pressure and for kidney protection. If you are dehydrated, these medicines can stop your kidneys working properly.
  o **Examples**: names ending in ‘sartan’ such as candesartan, irbesartan, losartan, valsartan

Diuretics – these medicines are used for excess fluid and high blood pressure and are sometimes called ‘water pills’. These medicines can make dehydration more likely.
  o **Examples** include bendroflumethiazide, furosemide, indapamide, bumetanide.
  o If you are taking more than two tablets a day of either bumetanide or furosemide, please seek medical advice before stopping

Metformin – this is a medicine for diabetes. Dehydration can make it more likely that you will develop a serious side effect called lactic acidosis

GLP-1 analogues – these are medicines for diabetes. Dehydration can make it more likely that you will develop a serious side effect.
  o **Examples** are exenatide, dulaglutide, liraglutide, lixisenatide and semaglutide

NSAIDs – these are anti-inflammatory pain killers. If you are dehydrated, these medicines can stop your kidneys working properly.
  o **Examples** include ibuprofen, naproxen

SGLT2 inhibitors – these are medicines for diabetes. Dehydration can make it more likely that you will develop a serious side effect called ketoacidosis.
  o **Examples**: names ending with ‘flozin’ such as canagliflozin, dapagliflozin, empagliflozin and ertugliflozin