DIABETES

Diabetes Research & Wellness Foundation

Diabetes management when you are ill

By:
Dr Mayank Patel
Consultant in Diabetes
University Hospital Southampton

Paula Johnston
Diabetes Specialist Nurse
University Hospital
Southampton

Staying well until a cure is found...

Achieving good general health and managing diabetes

Managing diabetes as well as possible is important to help reduce the risk of becoming unwell. This leaflet contains essential information on:

- blood glucose levels during periods of illness
- a suggested sick day kit to have at home
- suggested general advice for when feeling unwell
- medication (tablets and insulin) management during periods of illness
- diabetes and hospital procedures or operations
- when to seek medical advice.

Thank you for taking the time to read this leaflet, keeping it in a safe place and sharing with friends or family (perhaps as photos by phone). Following the recommendations presented could help reduce the risk of developing a diabetes emergency state, such as diabetic ketoacidosis (DKA).

Please note: The general guidance and information in this leaflet is aimed at adults living with diabetes and those close to them. It does not replace information or a care plan that may have already been provided by your healthcare teams.

Blood glucose levels during periods of illness

The physical stress of illness (e.g. flu, chest infection or a stomach upset) can result in more glucose being deposited into the blood, as well as the body becoming more resistant to the effects of produced or administered insulin. Both can result in blood glucose levels (BGLs) being higher than usual (even if ***not*** eating). Left ignored, persistent high BGLs *(see page 5 for symptoms of high BGLs)* could prolong the duration or increase severity of the illness. This could increase dehydration and/or result in a more serious diabetes-related situation, such as DKA or hyperosmolar hyperglycaemic state (HHS), which both require urgent hospital-based treatment *(see page 5).*

In hospital, insulin is sometimes used temporarily to help address out-of-range BGLs, and this can contribute to a more rapid recovery from illness. Certain treatments, e.g. steroids, can also increase BGLs, which could require further additional treatment.

Being familiar with ***"sick day guidance"***, the recommended actions to take when unwell with diabetes, can significantly help to reduce the impact of illness. People should maintain contact with their family, friends and carers when unwell.

A suggested sick day emergency kit for home

Be prepared for illness by ensuring that appropriate items, equipment and information are always available, which could reduce the need for hospital admission.

Suggested "minimum" home sick day kit to help when unwell

Ask your GP or diabetes team for clarification if needed.

Medications:

- Over-the-counter painkillers and at least two weeks' supply of regular medications.

Food items:

- Liquid or "light" carbohydrate (sugar) based foods that are more easily digestible when unwell, e.g. fruit juice cartons, yoghurt, ice cream, milk, thick soups, non-diet sugary drinks, glucose tablets or sweets.

Insulin related (if applicable):

- Working insulin pens and "in date" insulin cartridges or vials, needles, glucose, and ketone monitoring equipment (always for type 1 diabetes, often for type 3c diabetes – caused by other medical conditions affecting the pancreas), insulin pump supplies, up-to-date note of the average total daily insulin doses (in units) and precise guidance on insulin dose adjustment *(see page 6)*.

General information:

- Contact numbers for local healthcare teams (GP, pharmacist, diabetes team, etc.), up-to-date medications list (including current insulin names and doses in case hospital admission needed).

Suggested general advice for when feeling unwell

(regardless of type of diabetes)

Rest: Avoid strenuous activity as this can increase glucose levels.

Hydrate: Vomiting, diarrhoea and/or fevers can cause dehydration which, if severe, can cause kidney damage. Aim to drink at least 100ml/hour of sugar-free liquids **(Figure 1)**. Avoid alcohol as it can worsen dehydration by causing increased urination.

Eat: Consume liquid or light carbohydrates (at least 50 grams/24 hours) if unable to eat regular meals, to keep providing glucose for energy **(Figure 2)**. A shortage of available glucose can result in the body utilising body fat instead for energy, which can result in the production of acidic **ketones**, particularly in type 1 or type 3c diabetes, that can make people feel more unwell and increase the risk of DKA developing.

Monitor blood glucose levels *and* blood/urine ketone levels if advised to by healthcare team. *Raised glucose and ketone levels should always be addressed urgently, regardless of illness severity.*

Recognise low blood glucose levels: Reduced intake associated with diarrhoea and/or vomiting could also reduce glucose absorption and risk low glucose level episodes (hypoglycaemia, or "hypos"). Common symptoms include shaking, sweating, dizziness, hunger and confusion. Urgent medical help should be sought if BGLs remain persistently low and are associated with drowsiness, as emergency use of an injectable glucose-raising treatment (glucagon) could be indicated.

Medication (tablets and insulin) management during periods of illness

Suspend certain types of medications *(see below)* when unwell with a dehydrating illness (e.g. diarrhoea and/or vomiting), to reduce the risk of kidney damage and blood becoming acidic. They should only be restarted when fully recovered and eating and drinking *normally for 48 hours*. Always seek advice (e.g. from a pharmacist) if unsure.

Suspend medications when unwell and at risk of dehydration

Medications:

- **SGLT-2 inhibitors** (e.g. canagliflozin, dapagliflozin, empagliflozin) can increase blood ketones and cause DKA with *close to normal* blood glucose levels if continued in illness and/or consuming less than 50g carbohydrates/day
- **metformin**
- **water tablets** ("diuretics", e.g. frusemide, bumetanide)
- **blood pressure tablets** (if names end in "–pril", e.g. ramipril; -azide, e.g. bendroflumethiazide; -sartan, e.g. losartan)
- **certain over-the-counter painkillers** (non-steroidal anti-inflammatory drugs (NSAIDs) – e.g. diclofenac, ibuprofen)
- **non-insulin injections** (daily or weekly, names end in "tide", e.g. dulaglutide, semaglutide).

Note: Sulfonylurea tablets for diabetes (names end in "ide", e.g. gliclazide) *could increase the risk of hypos* if carbohydrate intake is lower than usual and should be suspended until recovered from illness. If able to maintain minimum recommended carbohydrate intake, they can be continued, but seek advice if unsure or if experiencing symptoms of high glucose *(see page 5)*, or if blood glucose readings persistently above 14mmol/L when unwell.

Insulin guidance

For those who use insulin to manage their diabetes, dose adjustment and blood glucose monitoring advice is summarised on ***page 6***. ***Insulin should never be stopped when unwell***, though dose adjustments may be necessary **(Figure 3)**. The body often needs more insulin in acute illness, even if not eating properly. Those with type 1 diabetes who use personal insulin pumps should have specific sick day guidance provided to them by their specialist diabetes team.

Figure 1 **Drink at least 100ml/hr sugar-free liquids when unwell.**

Figure 2 **Consume at least 50 grams liquid/light carbohydrates per day to help prevent ketone production in illness. Read food labels for information on carbohydrate content.**

Figure 3 **Never stop insulin, though dose adjustments might be necessary.**

When unwell, regardless of diabetes type:

Rest

Consume at least 50g carbohydrates/24 hours

Drink at least 100ml/hour sugar-free liquids

Monitor glucose and ketone levels if advised

Follow medication management advice where applicable

Seek medical advice at any point if concerned

Symptoms of high blood glucose levels

- Increased thirst and persistent dry mouth
- Increased tiredness and lethargy
- Increased urination (frequency and amount)
- Blurred vision
- Nausea and/or vomiting.

Diabetes emergencies

Diabetic ketoacidosis (DKA): suggested by symptoms of high blood glucose and shortness of breath, stomach pains, leg cramps and a "pear drop" smell on the breath.

Hyperosmolar hyperglycaemic state (HHS): also suggested by symptoms of high blood glucose and several days of blood glucose readings (if available) above 30mmol/L and worsening confusion or drowsiness.

Diabetes and hospital procedures or operations

Medical staff should be informed if a person has diabetes along with their dietary preferences, as there are specific hospital guidelines to be followed, which could include the need to reduce doses or suspend certain diabetes treatments beforehand. Sometimes, fasting and/or use of intravenous insulin drips are required in the days before, during and after an operation or procedure, to help keep BGLs stable.

It is worth individuals bringing their preferred "hypo" snacks with them when admitted, their usual insulin-related equipment (insulin pens, glucose sensors, pump supplies, etc. if applicable) as well as an up-to-date list of current medications and doses. Keeping well hydrated on the days immediately before and after, as well as avoiding alcohol until fully recovered is also advised. These actions will also help glucose levels to stabilise more quickly over the following few days, contributing to a quicker recovery.

Type 1 and type 3c diabetes guidance on insulin dose adjustment* when unwell to help address elevated blood glucose levels (BGLs) and ketone levels

Ketone test result significance and recommended action (always ensure correct testing strips are used)

Ketone test result	Blood ketones < 0.6mmol/L = normal Urine ketones: undetectable	Blood ketones 0.6-1.5mmol/L Urine ketones: trace	Blood ketones 1.6-2.9mmol/L Urine ketones: +1 or +2	Blood ketones 3mmol/L or higher Urine ketones: +3 or more
	Retest ketones in 4 hours	**Increased risk of DKA** Increase fluid intake Increase insulin – **See Box 1 below** Retest blood glucose and ketones in 2 hours	**Further increased risk of DKA** Increase fluid intake Retest blood glucose and ketones in 2 hours Increase insulin – **See Box 2 below** Seek medical advice if concerned	**Significant increased risk of DKA** Increase fluid intake Retest blood glucose and ketones in 2 hours Increase insulin – **See Box 3 below** Emergency medical review advised
Entering ketone zone				

Type 2 diabetes – insulin dose adjustment guidance

If blood glucose levels (BGLs) are above 12mmol, increase usual insulin doses as below:

! BGL 12-17mmol/L
Add 2 units to each insulin dose

!! BGL 17.1-22mmol/L
Add 4 units to each insulin dose

!!! BGL above 22.1mmol/L
Add 6 units to each insulin dose

Consider doubling recommended insulin dose adjustments if total daily dose insulin exceeds 50 units and continue to test BGLs every four to six hours (day and night) until illness resolves. Reduce doses by 10% in the event of hypos.

Box 1: If BGLs above 12mmol/L and blood ketones under 1.5mmol/L or urine ketones TRACE, increase insulin doses as below:

Glucose (mmol/L)	Insulin dose
12-17 mmol/L	Add 2 units to each dose
17.1-22 mmol/L	Add 4 units to each dose
Above 22.1 mmol/L	Add 6 units to each dose

Continue 4-6 hourly glucose and ketone testing (day and night)

Box 2: If BGLs above 12mmol/L and blood ketones 1.6 to 2.9mmol/L or urine ketones +1 or +2

Give an additional 10% of total daily dose (TDD) insulin as rapid or mixed insulin every 2 hours as below and repeat until glucose and ketone levels fall.

TDD (units)	Additional rapid-acting or mixed insulin to give every 2 hours
Up to 14	1
15-24	2
25-34	3
35-44	4
45-54	5

Box 3: If BGLs above 12mmol/L and blood ketones 3mmol/L or more or urine ketones +3 or +4

Give an additional 20% of total daily dose (TDD) insulin as rapid or mixed insulin every 2 hours as below and repeat until glucose and ketone levels fall.

TDD (units)	Additional rapid-acting or mixed insulin to give every 2 hours
Up to 14	2
15-24	4
25-34	6
35-44	8
45-54	10

In the ketone zone

Seek advice if on higher insulin doses and/or vomiting (or if unsure on how to adjust), continue to test glucose and ketones every 2 hours (day and night).

Leaving the ketone zone

Reduce insulin doses based on BGLs and ketone levels when illness is resolving

Never stop insulin, even if not eating

* Information for type 1 or type 3c diabetes adapted with permission from TREND-UK ***Diabetes: What to do when you are ill leaflet*** series.
Type 3c diabetes is caused by alternative pancreatic problems and often insulin treated.

When to seek medical advice

Contact your usual healthcare provider (e.g. GP surgery) or diabetes team, call NHS **111** helpline or attend the emergency department (e.g. outside of normal working hours) if you are unwell and are:

- unsure of what to do
- unable to keep food and liquids down for at least four hours
- experiencing continuous diarrhoea and vomiting, with or without fever
- unable to raise BGLs with sugary foods or drinks, associated with drowsiness
- experiencing persistent measured blood glucose readings above 14mmol/L *and/or* worsening symptoms of high BGLs *(see page 5)*, despite additional insulin doses where applicable
- known to have **type 1 diabetes or type 3c diabetes (on insulin)**, with BGLs above 14mmol/L (despite additional insulin dosing) *and* blood ketone readings persistently above 1.5mmol/L or urine ketone readings of +2 or more, as both strongly suggest an increased risk of DKA developing
- increasingly drowsy, short of breath, experiencing stomach pains (all could suggest a diabetes emergency state, e.g. DKA, HHS)
- concerned about a possible foot infection (red, hot and/or swollen foot).

Useful national contact details* should additional help be needed for non-life-threatening situations:

England, Scotland, Wales and Northern Ireland: call **111**, or visit: **www.nhs.uk**

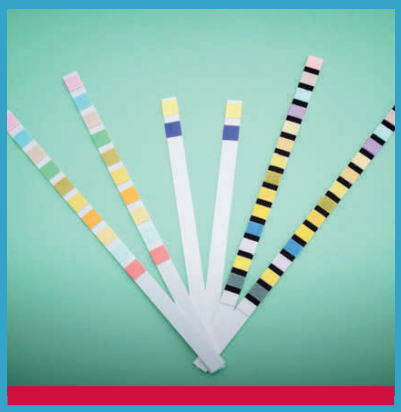
*correct contact information at time of this guidance going to press

More information

For DRWF diabetes awareness bracelets and check-up cards visit:
www.drwf.org.uk/living-with-diabetes/diabetes-awareness-necklaces-and-check-up-cards/

Read the DRWF diabetes information leaflet ***What is diabetes?*** at:
www.drwf.org.uk/understanding-diabetes/information-leaflets/

Request a DRWF Diabetes Travel Checklist at:
www.drwf.org.uk/living-with-diabetes/travelling-with-diabetes/diabetes-travel-checklist/



The Diabetes Research & Wellness Foundation works towards educating, informing and reminding you of the best and healthiest choices to make.

If you would like to become part of our Diabetes Wellness community, visit our website for more details.

www.drwf.org.uk

DRWF, Building 1000, Langstone Park, Havant, Hampshire PO9 1SA
Tel: **023 9263 7808**
Email: **enquiries@drwf.org.uk**

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