

Managing care of adults with **diabetes mellitus** when they are unwell

Advice for clinicians

DIABETES

HSE

ROYAL COLLEGE OF PHYSICIANS OF IRELAND

IDNMSA

Clinical Design & Innovation

Office of the Nursing & Midwifery Services Director

INDI DIABETES Irish Nutrition + Dietetic Institute

Advice for clinicians

People with diabetes do not necessarily experience illness more often than those without. However, if diabetes is not managed well during illness it can escalate and result in more serious conditions, such as Diabetic Ketoacidosis (DKA) or Hyperosmolar Hyperglycaemic State (HHS) which will require emergency hospital admission. It is therefore vital that the right advice is given to manage the initial illness.

The aims of managing diabetes during intercurrent illness are to:

- Manage blood glucose levels
- Ensure adequate calorie intake and hydration with fluid replacement
- Test for and manage ketones (if present)
- Recognise when further medical attention is required

Diabetes emergencies:

Signs of Hyperosmolar Hyperglycaemic State

Typically, in type 2 diabetes seen after several days with glucose levels consistently above 30 mmol/L

- Disorientation or confusion
- Polyuria
- Thirst and dry mouth
- Nausea
- In the later stages, the person becomes drowsy and gradually loses consciousness.

HHS is potentially life-threatening and requires urgent admission to hospital.

Signs of Diabetic Ketoacidosis

- Excessive thirst
- Polyuria
- Dehydration
- Shortness of breath and laboured breathing
- Abdominal pain
- Leg cramps
- Nausea and vomiting
- Mental confusion and drowsiness
- Ketones can be detected on the person's breath (pear-drop smell) or in the blood or urine

DKA occurs in type 1 diabetes and can occur in type 2 diabetes at times of severe illness or, rarely in those on SGLT2 inhibitor therapy. **DKA requires urgent hospital admission.**

Blood Ketone Level	Urine Ketone Level	Interpretation
Below 0.6 mmol/L	+1	This is normal for the person with diabetes
0.6 - 1.5 mmol/L	+2	Moderate ketones are present. This may indicate a need for extra insulin doses/ carbohydrate intake and recheck blood glucose and blood ketone levels in 1-2 hours.
> 1.5 mmol/L	+3	Large ketones are present; at risk of DKA. Refer to pages 6 and 7. May need hospital admission.
> 3 mmol/L	+3	Ketoacidosis is posing an immediate threat to health. Refer to pages 6 and 7. May need hospital admission.

General advice for managing diabetes during intercurrent illness	
S (Sugar)	• Blood glucose levels can rise during illness even if the person is not eating • Advise to increase blood glucose monitoring if the person has access to it • Diabetes medications (sulfonylureas and insulin doses) may need to be increased temporarily during illness to manage raised glucose levels
I (Insulin)	• NEVER stop insulin or oral diabetes medications* • Insulin doses usually need to be increased during illness, especially if ketones are present • Specific advice for people on insulin therapy is presented overleaf
C (Carbohydrate)	• Ensure the person maintains hydration and carbohydrate intake • If the person is not able to eat or is vomiting, advise to replace meals with sugary fluids • If blood glucose levels are high, maintain fluid intake with sugar-free fluids • If blood glucose levels are low, encourage regular intake of sugary fluids
K (Ketones)	• In type 1 diabetes, advise to check for ketones every 4–6 hours. If present, check every 2 hours • In type 1 diabetes give extra rapid-acting insulin doses (in addition to regular doses) based on total daily insulin dose if ketones are present – refer to tables on page 6 & 7 • Advise to drink plenty of water to maintain hydration and flush through ketones • Test ketones in type 2 diabetes if on SGLT2 medication even when blood glucose is normal

***Metformin and SGLT2 inhibitors may need to be temporarily stopped if at risk of dehydration** (see SADMAN rules below)

SADMAN rules: There are several classes of drugs that should be temporarily stopped in conditions that could lead to complications	
S SGLT2 inhibitors	If taken during an acute illness that can lead to dehydration, there is an increased risk of developing euglycaemic DKA
A ACE inhibitors	If taken during an acute illness that can lead to dehydration, there is an increased risk of developing AKI due to reduced renal efferent vasoconstriction
D Diuretics	If taken during an acute illness that can lead to dehydration, there is an increased risk of developing AKI
M Metformin	If taken during an acute illness that can lead to dehydration, there is an increased risk of developing lactic acidosis
A ARBs	If taken during an acute illness that can lead to dehydration, there is an increased risk of developing AKI
N NSAIDs	If taken during an acute illness that can lead to dehydration, there is an increased risk of developing AKI due to reduced renal afferent vasodilation

Once the person has recovered and able to eat and drink for 24–48 hours, **these medicines should be restarted.**

Abbreviations

ACE | angiotensin-converting enzyme;

AKI | acute kidney injury;

ARB | angiotensin receptor blocker;

DKA | diabetic ketoacidosis;

HHS | hyperosmolar hyperglycaemic state;

NSAID | non-steroidal anti-inflammatory drug;

SGLT2 | sodium–glucose cotransporter

How to adjust insulin doses safely for **Type 1 diabetes**

Managing insulin doses when blood ketones are **Less than 1.5 mmol/l**

Advise the person to sip sugar-free fluids, at least 100 ml/hr and eat as normal if possible. If the person cannot manage normal meals advise with meal replacement suggestions on page 8.

Food containing carbohydrate, insulin and fluids are required to avoid dehydration and prevent diabetic ketoacidosis

Glucose more than 11mmol/L and /or feeling unwell with either no ketones or blood ketones less than 1.5 mmol/L

Advise patient to test glucose and blood ketones every 4 to 6 hours including during the night

If glucose level is above 11 mmol/L, take additional insulin as below

Glucose Level	**Insulin Dose**
11 to 17 mmol/L	Add **2 extra** units to each dose
17 to 22 mmol/L	Add **4 extra** units to each dose
More than 22 mmol/L	Add **6 extra** units to each dose

Managing insulin doses when blood ketones are **1.5 mmol/l or higher**

Glucose more than 11 mmol/L and/or feeling unwell with blood ketones 1.5 mmol/L or higher.

Advise patient to test their glucose and blood ketone levels every 2 hours including during the night

Advise the person to sip sugar-free fluids, at least 100 ml/hr and eat as normal if possible. If the person cannot manage normal meals advise with meal replacement suggestions on page 8.

Food containing carbohydrate, insulin and fluids are required to avoid dehydration and prevent diabetic ketoacidosis

1.5 to 3mmols/L blood ketone meter (+ to ++ urine ketones)

More than 3 mmol/L on blood ketone meter (+++ to ++++ urine ketones

Total daily insulin dose: **TDD**	Give an additional **10%** of your TDD as rapid acting or mixed insulin every 2 hours	Give an additional **20%** of your TDD as rapid acting insulin or mixed insulin every 2 hours
Up to 14 Unit	1 Unit	2 Units
15 to 24 Units	2 Units	4 Units
25 to 34 Units	3 Units	6 Units
35 to 44 Units	4 Units	8 Units
45 to 54 Units	5 Units	10 Units

Is blood glucose still more than 11 mmol/L and ketones present?

YES | Repeat the process

NO | As the illness resolves insulin can be incrementally adjusted back to normal levels

How to adjust insulin doses safely for **Type 2 diabetes**

Blood Glucose Level	Additional insulin
11.1 to 17 mmols/L	Add **2 extra** units to each dose
17.1.to 22 mmols/L	Add **4 extra** units to each dose
Over 22 mmols/L	Add **6 extra** units to each dose

If the patient is taking more than 50 units per day in total double the adjustments.

If blood glucose levels are dropping down to 4 mmols/L or less reduce the insulin dose by 10% e.g. 20 units daily reduce by 2 units.

Once the illness has resolved the insulin can be incrementally reduced.

Meal replacement suggestions

Advise light and easily digested foods such as:



Fruit juice **100mls**



Milk **200mls**



1 Small yoghurt



1 slice of toast



2 plain biscuits



Bowl of soup

Each is equal to approximately 10grams of carbohydrate

How to treat low blood glucose levels "hypo"

(A blood glucose level less than 4 mmol/L)

Step 1

Advise patient to take one of the following: (15 grams of carbohydrate)

- **5 glucose tablets** or
- **60mls of glucose drink "Lift®"** (available in pharmacies) or
- **A sugary drink:**
  - **170mls Lucozade® Original**
  - **150mls non-diet cola/ juice**

If patient is unable to swalow or unconcious : Administer 1mg Glucagon IM (less effective if second dose required in 24 hrs) or Glucose 20% 100mls IV

Ask the patient to recheck blood glucose **after 15 minutes**

Blood glucose is still **less than 4mmol/L**

Repeat **Step 1**

Blood glucose is **greater than 4mmol/L**

Step 2

Once blood glucose level is greater than 4mmol/L, have a snack:

- **1 slice of toast** or
- **2 plain biscuits** or
- **One piece of medium-sized fruit** or
- **250mls milk** or
- **Next meal if due within 30 minutes**

Ask patient to recheck blood glucose in **20 minutes**

Seek admission if low blood glucose levels persist despite treatment

(i.e. using step 1 x 3 times)

Useful reading and leaflets

Managing your type 1 diabetes | Sick day advice
Managing your type 2 diabetes | Sick day advice

Adapted for use in Ireland by the National Clinical Programme Diabetes Feb 2023 with thanks from the original article;

Author Su Down, Nurse Consultant – Diabetes, Somerset Partnership NHS Foundation Trust, Somerset Citation: Down S (2020) How to advise on sick day rules. Diabetes & Primary Care 22: 47–8

47 Diabetes & Primary Care Vol 22 No 3 2020

Insulin adjustment tables and meal replacement information taken from Type 1 diabetes: what to do when you are ill. TREND UK 2020

https://trenddiabetes.online/wp-content/uploads/2020/03/A5_T1Illness_TREND_FINAL.pdf

Version 1 | Review date 2025