17TH Welsh Conference | PCDO Society

Masterclass 2: Rescuing hyperglycaemia

7 May 2026

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Disclaimer/disclosure

Su Down

•Tutor PG Diabetes Diploma: I-Heed, Warwick University

Now retired but former posts held:

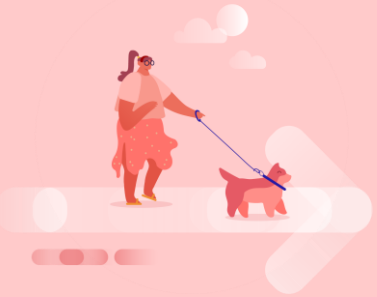
•Diabetes Nurse Consultant, MSc, RGN, NMP. Somerset Foundation Trust

•Editor-in-Chief Journal Diabetes Nursing

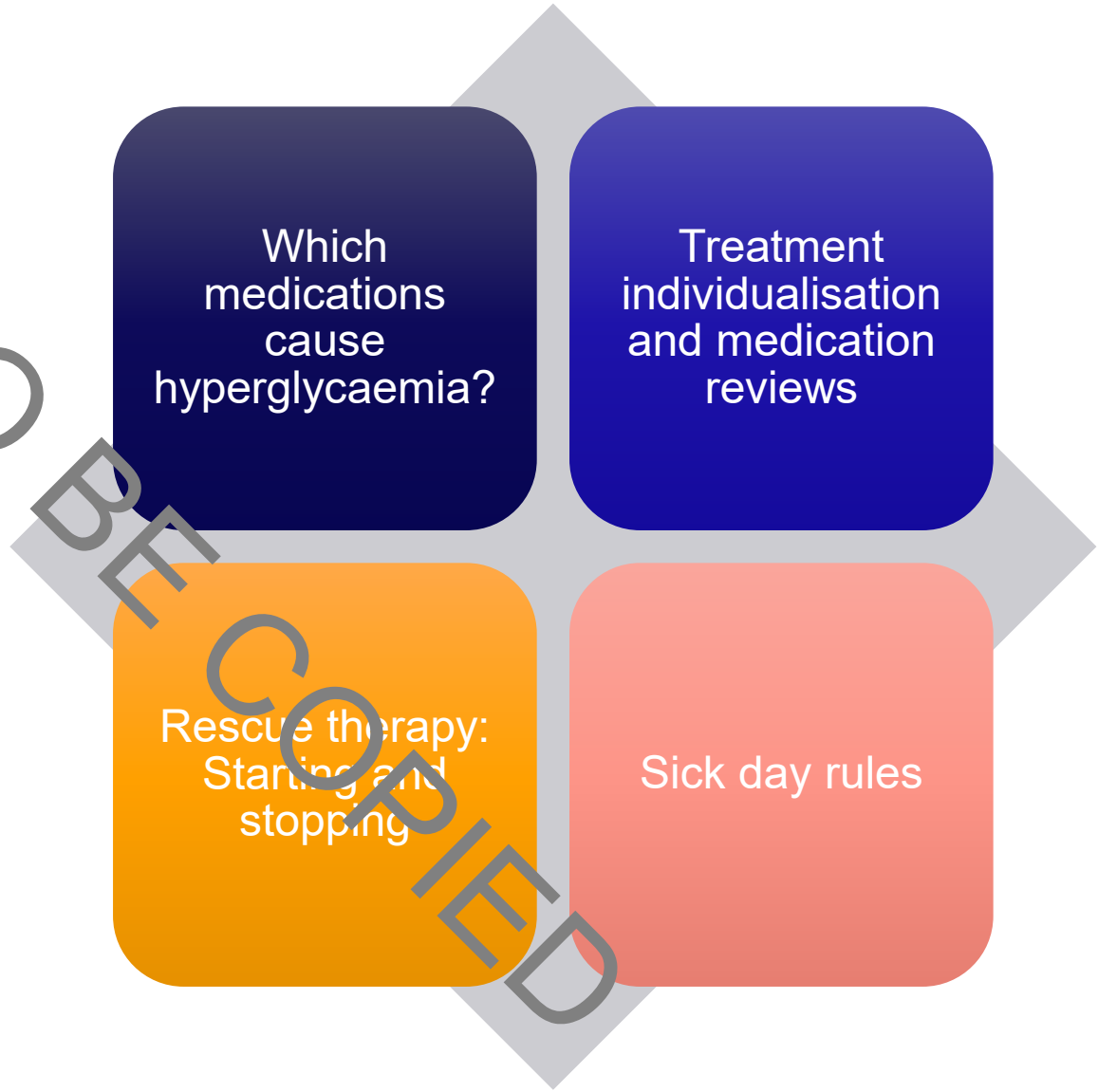
•Committee member Primary Care Diabetes Society

In the last 3 years I have received funding from the following companies for providing educational sessions and documents, and for attending advisory boards:

- Lilly
- Novo Nordisk
- Viatris
- Abbott
- Boehringer Ingelheim
- Dexcom



Contents



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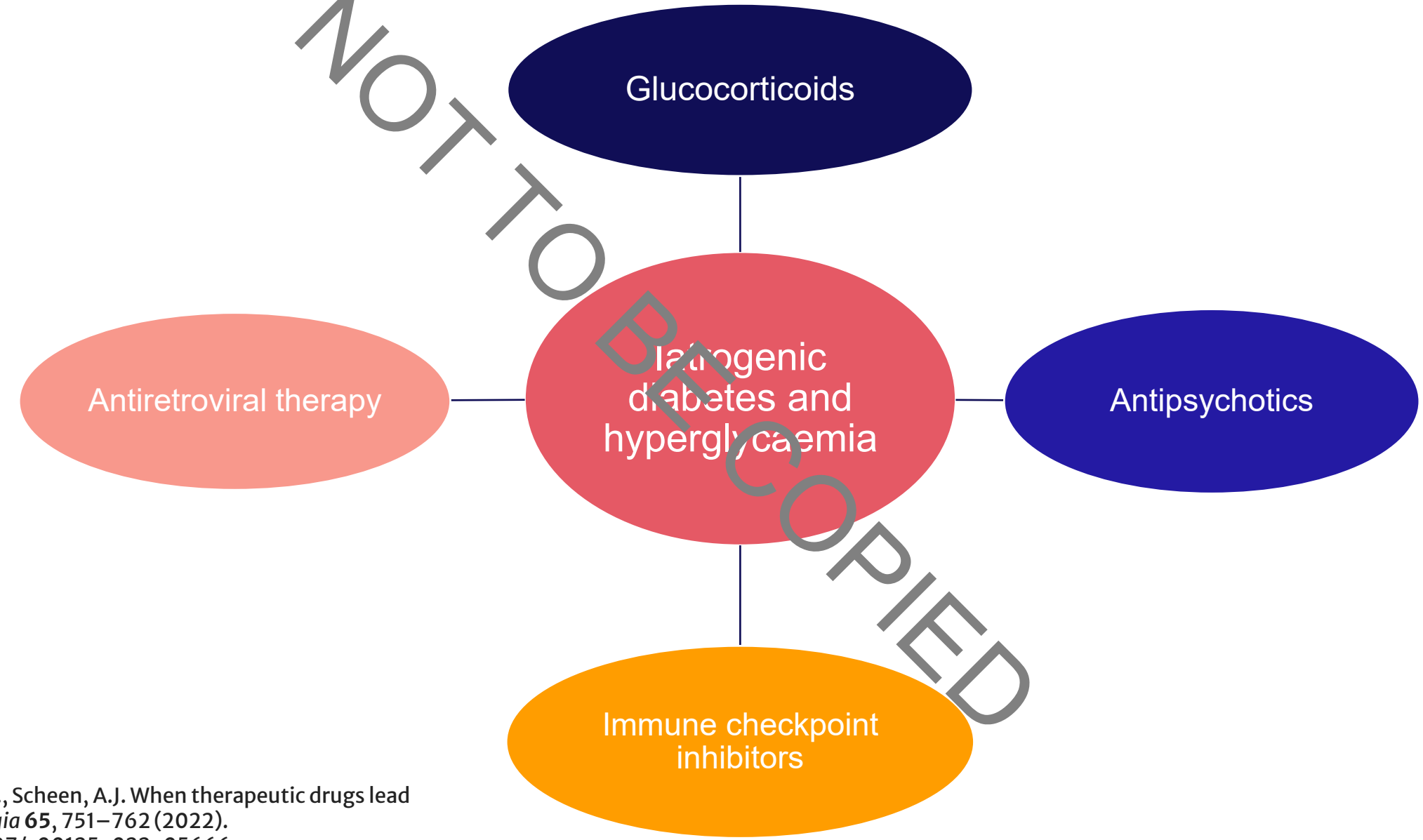
Which medications cause hyperglycaemia?

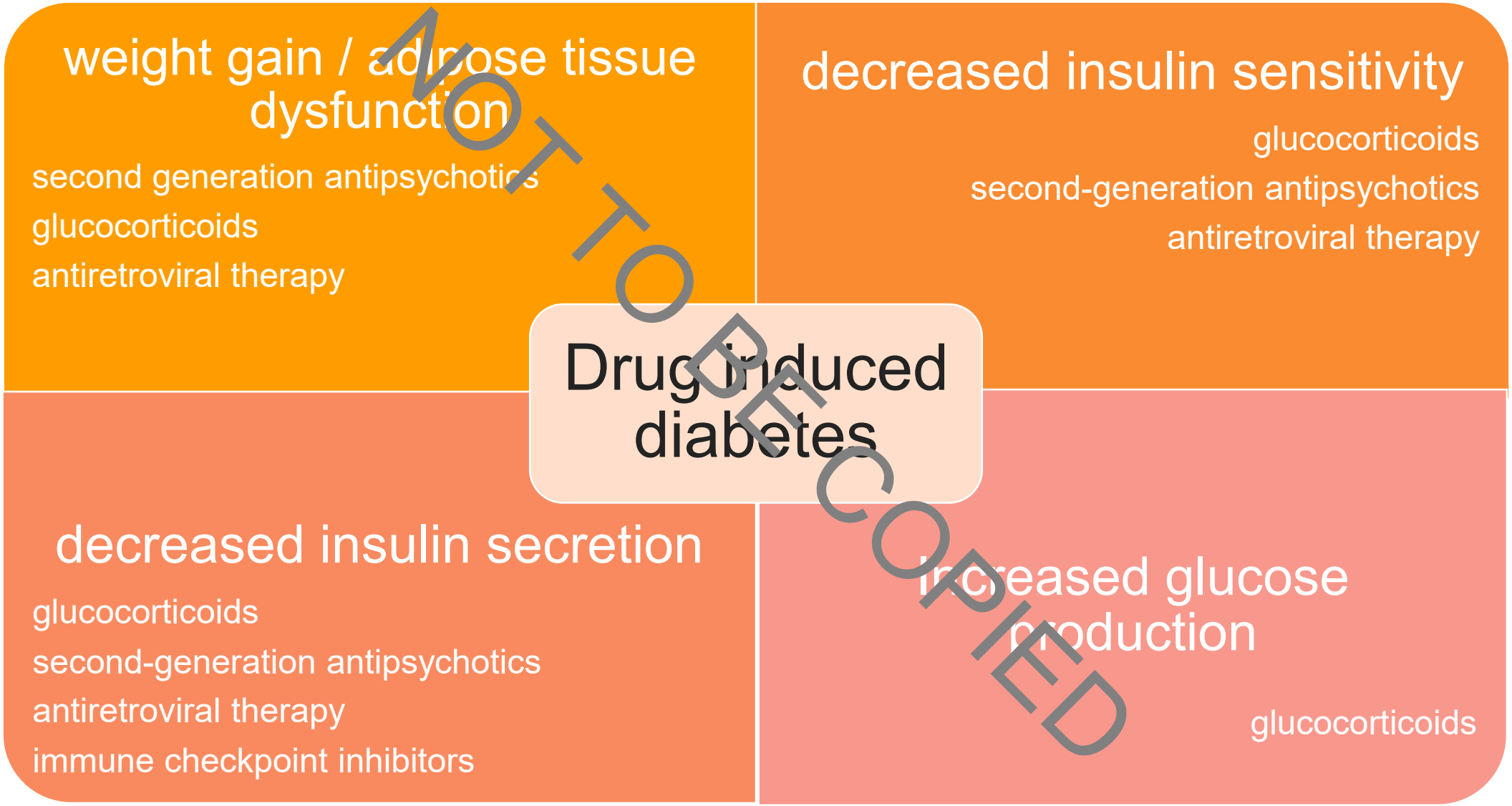
Treatment individualisation and medication reviews

Four main drug groups that lead to hyperglycaemia



Adapted from: Fève, B., Scheen, A.J. When therapeutic drugs lead to diabetes. *Diabetologia* **65**, 751–762 (2022). https://doi.org/10.1007/s00125-022-05666-w

Mechanisms leading to drug-induced hyperglycaemia for four pharmacological classes:



Adapted from: Fève, B., Scheen, A.J. When therapeutic drugs lead to diabetes. *Diabetologia* **65**, 751–762 (2022). https://doi.org/10.1007/s00125-022-05666-w

Diabetes and cancer risk

People with diabetes are at a higher risk for developing several cancers, possibly due to shared risk factors between the two diseases[1]

It is estimated that 20% of people with cancer have concurrent diabetes, with cancer the leading cause of death in people with diabetes[2,3]

Breast cancer, intrahepatic cholangiocarcinoma, colorectal cancer, and endometrial cancer show the greatest increased risk.[4]

1. Giovannucci E, Harlan DM, Archer MC, Bergenstal RM, Gapstur SM, Habel LA, et al. Diabetes and cancer: a consensus report. CA Cancer J Clin. 2010;60(4):207-21
2. UK. D. Diabetes and Cancer. https://www.diabetes.org.uk/diabetes-the-basics/relatedconditions/diabetes-and-cancer. Accessed January 2023.
3. Pearson-Stuttard J, Bennett J, Cheng YJ, Vamos EP, Cross AJ, Ezzati M, et al. Trends in predominant causes of death in individuals with and without diabetes in England from 2001 to 2018: an epidemiological analysis of linked primary care records. The Lancet Diabetes & Endocrinology. 2021;9(3):165-73
4. Pearson-Stuttard J, Bennett J, Cheng YJ, Vamos EP, Cross AJ, Ezzati M, et al. Trends in predominant causes of death in individuals with and without diabetes in England from 2001 to 2018: an epidemiological analysis of linked primary care records. The Lancet Diabetes & Endocrinology. 2021;9(3):165-73.

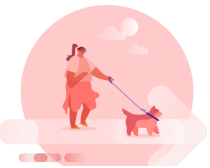
The incidence of diabetes and cancer has increased significantly in recent years

There are many common risk factors for both diabetes and cancer, such as:

- obesity
- sedentary lifestyle
- smoking
- ageing

Although the underlying biological mechanisms have not been totally understood, studies have validated that:

- insulin resistance, hyperinsulinaemia, hyperglycaemia and inflammatory cytokines provide good circumstances for cancer cell proliferation and metastasis.
- hyperglycaemia provides energy for cancer cell growth



Wang M, Yang Y, Liao Z. Diabetes and cancer: Epidemiological and biological links. World J Diabetes. 2020 Jun 15;11(6):227-238. doi: 10.4239/wjd.v11.i6.227. PMID: 32547697; PMCID: PMC7284016

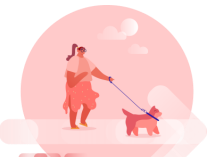
Pancreatic cancer and diabetes

Pancreatic cancer is one of the deadliest malignant diseases, with a 5-year survival rate less than 10%

Greater incidence of pancreatic cancer in those with diabetes

New onset diabetes is also an indicator of pancreatic cancer

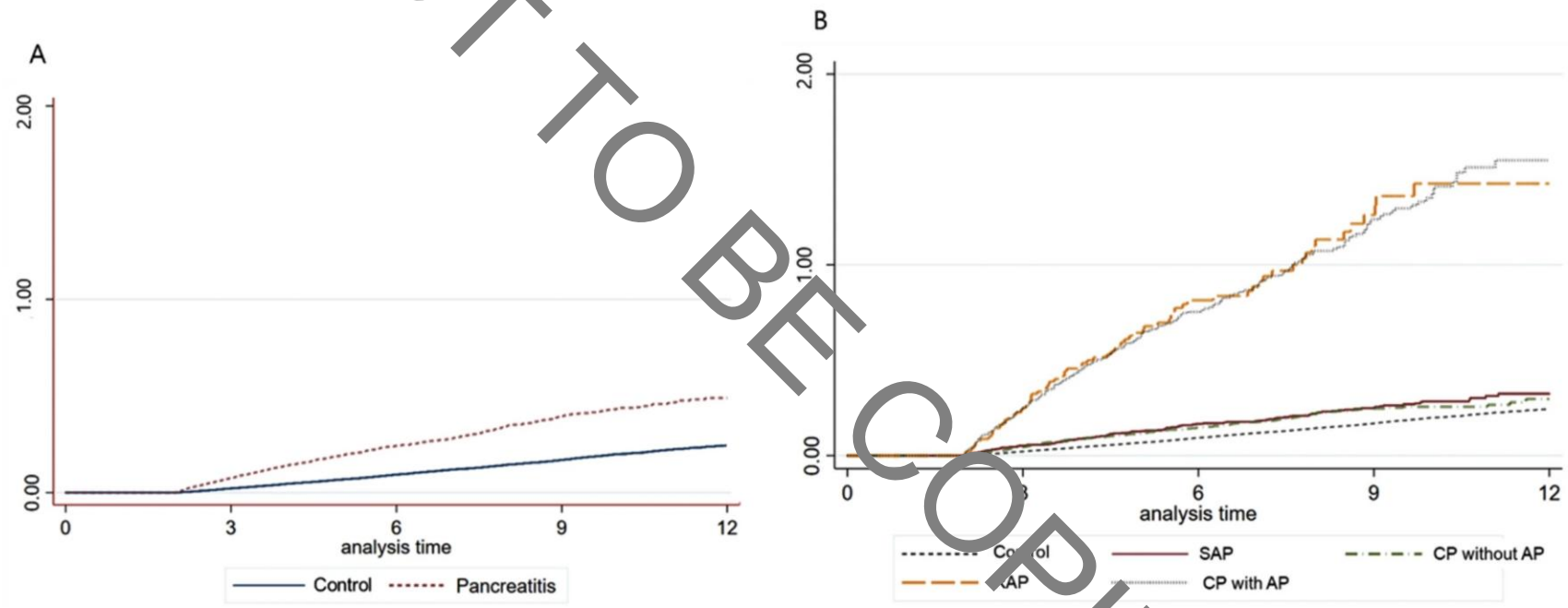
Some evidence to suggest the link between diabetes and pancreatic cancer is bidirectional



Wang M, Yang Y, Liao Z. Diabetes and cancer: Epidemiological and biological links. World J Diabetes. 2020 Jun 15;11(6):227-238. doi: 10.4239/wjd.v11.i6.227. PMID: 32547697; PMCID: PMC7284016

Pancreatic cancer is a known complication of chronic pancreatitis and sometimes manifests with new onset diabetes.

From: Incidence and risk of pancreatic cancer in patients with acute or chronic pancreatitis: a population-based cohort study



Cumulative incidences of pancreatic cancer among patients with pancreatitis followed for more than 2 years and controls. (**A**) Comparison between pancreatitis and control groups. (**B**) Comparison among SAP, RAP, CP with AP, CP without AP and control groups. SAP, single episode of acute pancreatitis; RAP, recurrent acute pancreatitis; AP, acute pancreatitis; CP, chronic pancreatitis.

Park, S.M., Kim, K.B., Han, JH. *et al.* Incidence and risk of pancreatic cancer in patients with acute or chronic pancreatitis: a population-based cohort study. *Sci Rep* **13**, 18930 (2023). https://doi.org/10.1038/s41598-023-45382-y

Effect of Hyperglycaemia on Quality of Life

- Following a diagnosis of cancer PWD often have a reduced adherence to their diabetes medications.
- Symptoms of hyperglycaemia, in addition to cancer-specific and chemotherapy side effects, can be debilitating.
- Cancer and its treatments have been shown to have a negative impact on diabetes self-management behaviours in adults with diabetes who are undergoing chemotherapy.
- This can lead to a potential increased risk for poor glycaemic control during this critical period and therefore hospitalisation and risk of morbidity.
- As a result, individuals are likely to have a lower quality of life, with a higher burden of symptoms, including pain severity and fatigue.

1. Pettit S, Cresta E, Winkley K, Purssell E, Armes J. Glycaemic control in people with type 2 diabetes mellitus during and after cancer treatment: A systematic review and meta-analysis. PloS one. 2017;12(5):e0176941-e.
2. Hershey DS, Tipton J, Given B, Davis E. Perceived impact of cancer treatment on diabetes self management. Diabetes Educ. 2012;38(6):779-90.

Commencing Anti-Cancer Therapy in a person with pre-existing diabetes

1

Managing nausea and vomiting

- likely exacerbation of hyperglycaemia whilst on antiemetic therapy
- PWD receiving emetogenic chemotherapy should be offered NK1 antagonist (aprepitant) with a long acting 5HT3 (ondansetron)
- Consider use of GCs in the first cycle and reduce doses or withdraw based on emetic control and blood glucose management

2

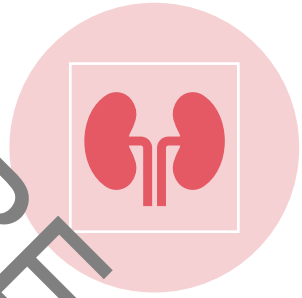
Managing a person with diabetes

- offer blood glucose monitoring or CGM
- undertake regular monitoring when commenced on SACT
- Monitor HbA1c 3 monthly whilst on SACT
- Rapid diabetes medication changes may be required when commencing high dose SACT or GCs

SACT - Systemic Anti Cancer Therapy GCs - Glucocorticoids

Use of glucocorticoids and effect of glucose levels

Steroids reduce the action of insulin by increasing insulin resistance and decreasing production and secretion of insulin



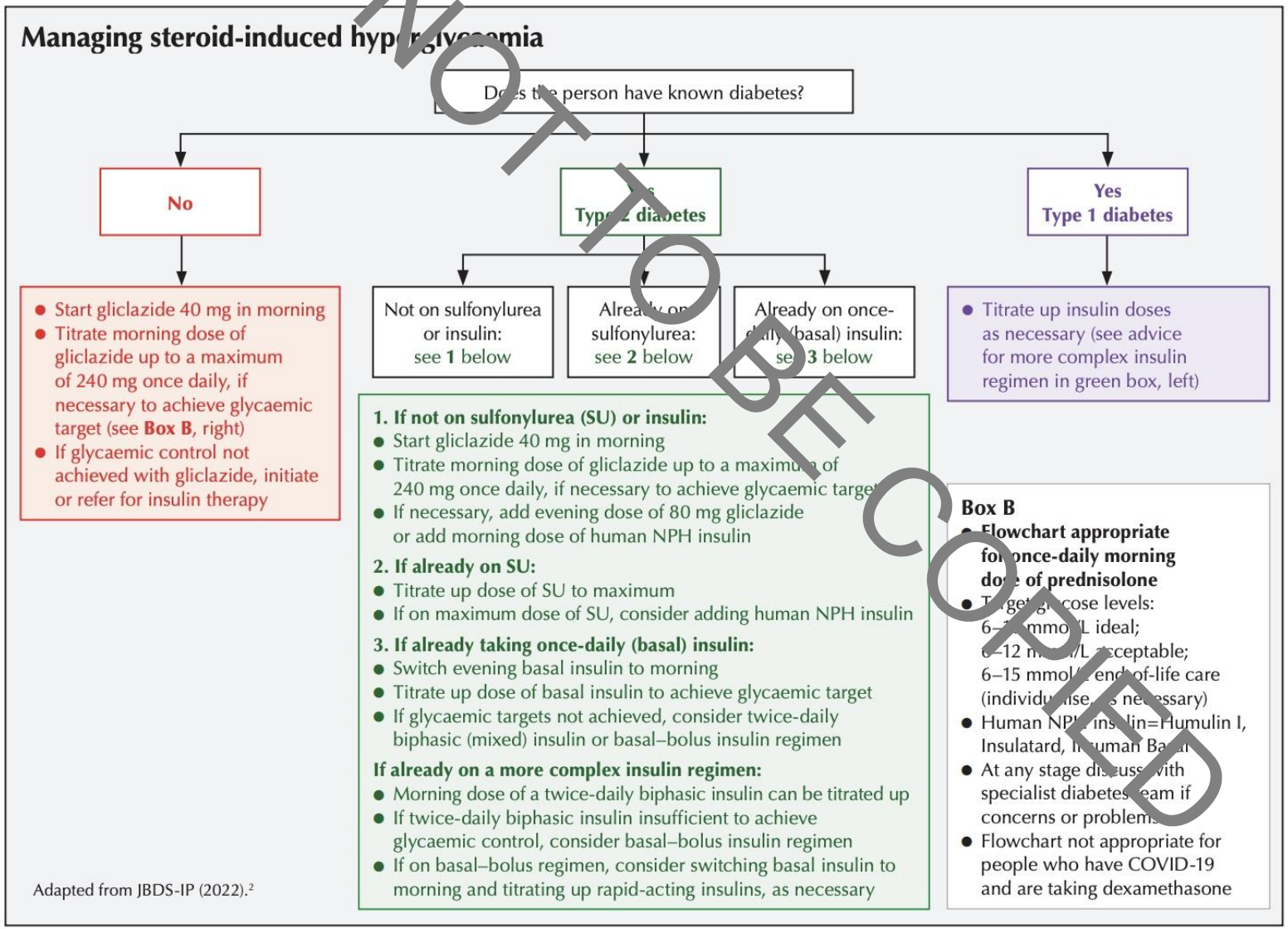
The effects of corticosteroid use on glucose concentration may vary depending on the type of corticosteroid

hyperglycaemia may develop a few hours after prednisolone is taken and may then wear off

more prolonged hyperglycaemia may occur with the use of dexamethasone, which has a longer half-life

https://doi.org/10.1016/j.clinthera.2023.11.013

Managing glucose levels when on steroid therapy



Morris D (2022) How to diagnose and manage steroid-induced diabetes and hyperglycaemia. Diabetes & Primary Care 24: 143–5

tips for steroids

- monitor glucose in those at high risk
- remember to treat the cause ie prevent the natural rise in glucose not respond to the resulting high evening levels
- steroid type will determine if once daily or 24 hour treatment is needed to control glucose
  - Pred morning mainly
  - Dex 24 hour control maybe needed
- regular users of steroids (ie asthma) then treat pattern ensure person has plan for increasing diabetes meds OR a course of SU along with standby course of steroids.

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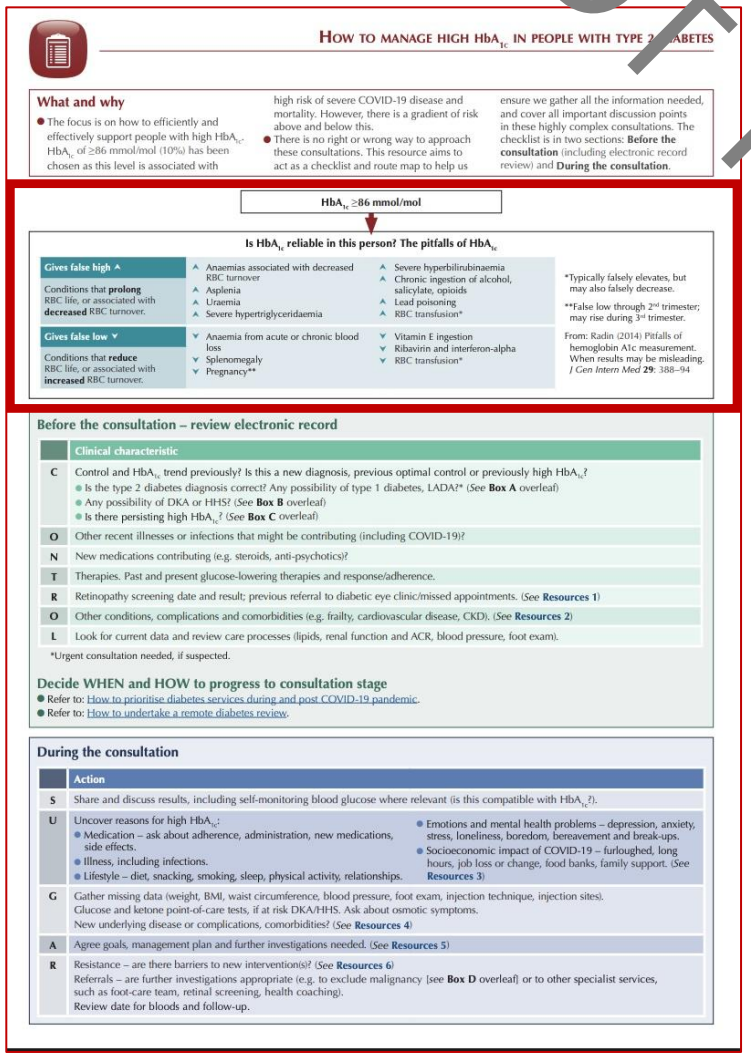
Rescue therapy: Starting and stopping

Not to be confused with…

let's first consider high HbA1c's….



How to manage high HbA_{1c} in people with type 2 diabetes

What and why

- The focus is on how to efficiently and effectively support people with high HbA_{1c}. HbA_{1c} of ≥86 mmol/mol (10%) has been chosen as this level is associated with high risk of severe COVID-19 disease and mortality. However, there is a gradient of risk above and below this.
- There is no right or wrong way to approach these consultations. This resource aims to act as a checklist and route map to help us ensure we gather all the information needed, and cover all important discussion points in these highly complex consultations. The checklist is in two sections: **Before the consultation** (including electronic record review) and **During the consultation**.

HbA_{1c} ≥86 mmol/mol

Is HbA_{1c} reliable in this person? The pitfalls of HbA_{1c}

Gives false high ▲ Conditions that **prolong** RBC life, or associated with **decreased** RBC turnover.	▲ Anaemias associated with decreased RBC turnover ▲ Asplenia ▲ Uraemia ▲ Severe hypertriglyceridaemia	▲ Severe hyperbilirubinaemia ▲ Chronic ingestion of alcohol, salicylate, opioids ▲ Lead poisoning ▲ RBC transfusion*
Gives false low ▼ Conditions that **reduce** RBC life, or associated with **increased** RBC turnover.	▼ Anaemia from acute or chronic blood loss ▼ Splenomegaly ▼ Pregnancy**	▼ Vitamin E ingestion ▼ Ribavirin and interferon-alpha ▼ RBC transfusion*

*Typically falsely elevates, but may also falsely decrease.

**False low through 2nd trimester; may rise during 3rd trimester.

From: Radin (2014) Pitfalls of hemoglobin A1c measurement. When results may be misleading. *J Gen Intern Med* **29**: 388–94

Before the consultation – review electronic record

	Clinical characteristic
C	Control and HbA_{1c} trend previously? Is this a new diagnosis, previous optimal control or previously high HbA_{1c}? ● Is the type 2 diabetes diagnosis correct? Any possibility of type 1 diabetes, LADA?* (*See* **Box A** overleaf) ● Any possibility of DKA or HHS? (*See* **Box B** overleaf) ● Is there persisting high HbA_{1c}? (*See* **Box C** overleaf)
O	Other recent illnesses or infections that might be contributing (including COVID-19)?
N	New medications contributing (e.g. steroids, anti-psychotics)?
T	Therapies. Past and present glucose-lowering therapies and response/adherence.
R	Retinopathy screening date and result; previous referral to diabetic eye clinic/missed appointments. (*See* **Resources 1**)
O	Other conditions, complications and comorbidities (e.g. frailty, cardiovascular disease, CKD). (*See* **Resources 2**)
L	Look for current data and review care processes (lipids, renal function and ACR, blood pressure, foot exam).

*Urgent consultation needed, if suspected.

Decide WHEN and HOW to progress to consultation stage

- Refer to: How to prioritise diabetes services during and post COVID-19 pandemic.
- Refer to: How to undertake a remote diabetes review.

During the consultation

	Action
S	Share and discuss results, including self-monitoring blood glucose where relevant (is this compatible with HbA_{1c}?).
U	Uncover reasons for high HbA_{1c}: ● Medication – ask about adherence, administration, new medications, side effects. ● Illness, including infections. ● Lifestyle – diet, snacking, smoking, sleep, physical activity, relationships. ● Emotions and mental health problems – depression, anxiety, stress, loneliness, boredom, bereavement and break-ups. ● Socioeconomic impact of COVID-19 – furloughed, long hours, job loss or change, food banks, family support. (*See* **Resources 3**)
G	Gather missing data (weight, BMI, waist circumference, blood pressure, foot exam, injection technique, injection sites). Glucose and ketone point-of-care tests, if at risk DKA/HHS. Ask about osmotic symptoms. New underlying disease or complications, comorbidities? (*See* **Resources 4**)
A	Agree goals, management plan and further investigations needed. (*See* **Resources 5**)
R	Resistance – are there barriers to new intervention(s)? (*See* **Resources 6**) Referrals – are further investigations appropriate (e.g. to exclude malignancy [see **Box D** overleaf] or to other specialist services, such as foot-care team, retinal screening, health coaching). Review date for bloods and follow-up.

HbA_{1c} ≥86 mmol/mol

Is HbA_{1c} reliable in this person? The pitfalls of HbA_{1c}

Gives false high ▲
Conditions that **prolong** RBC life, or associated with **decreased** RBC turnover.

▲ Anaemias associated with decreased RBC turnover
▲ Asplenia
▲ Uraemia
▲ Severe hypertriglyceridaemia
▲ Severe hyperbilirubinaemia
▲ Chronic ingestion of alcohol, salicylate, opioids
▲ Lead poisoning
▲ RBC transfusion*

Gives false low ▼
Conditions that **reduce** RBC life, or associated with **increased** RBC turnover.

▼ Vitamin E ingestion
▼ Ribavirin and interferon-alpha
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**False low through 2nd trimester; may rise during 3rd trimester.

From: Radin (2014) Pitfalls of hemoglobin A1c measurement. When results may be misleading. *J Gen Intern Med* **29**: 388–94

Diggle J, Brown P (2022) How to manage high HbA1c in people with type 2 diabetes. Diabetes & Primary Care 24: 33–5

Nice guidance NG 28

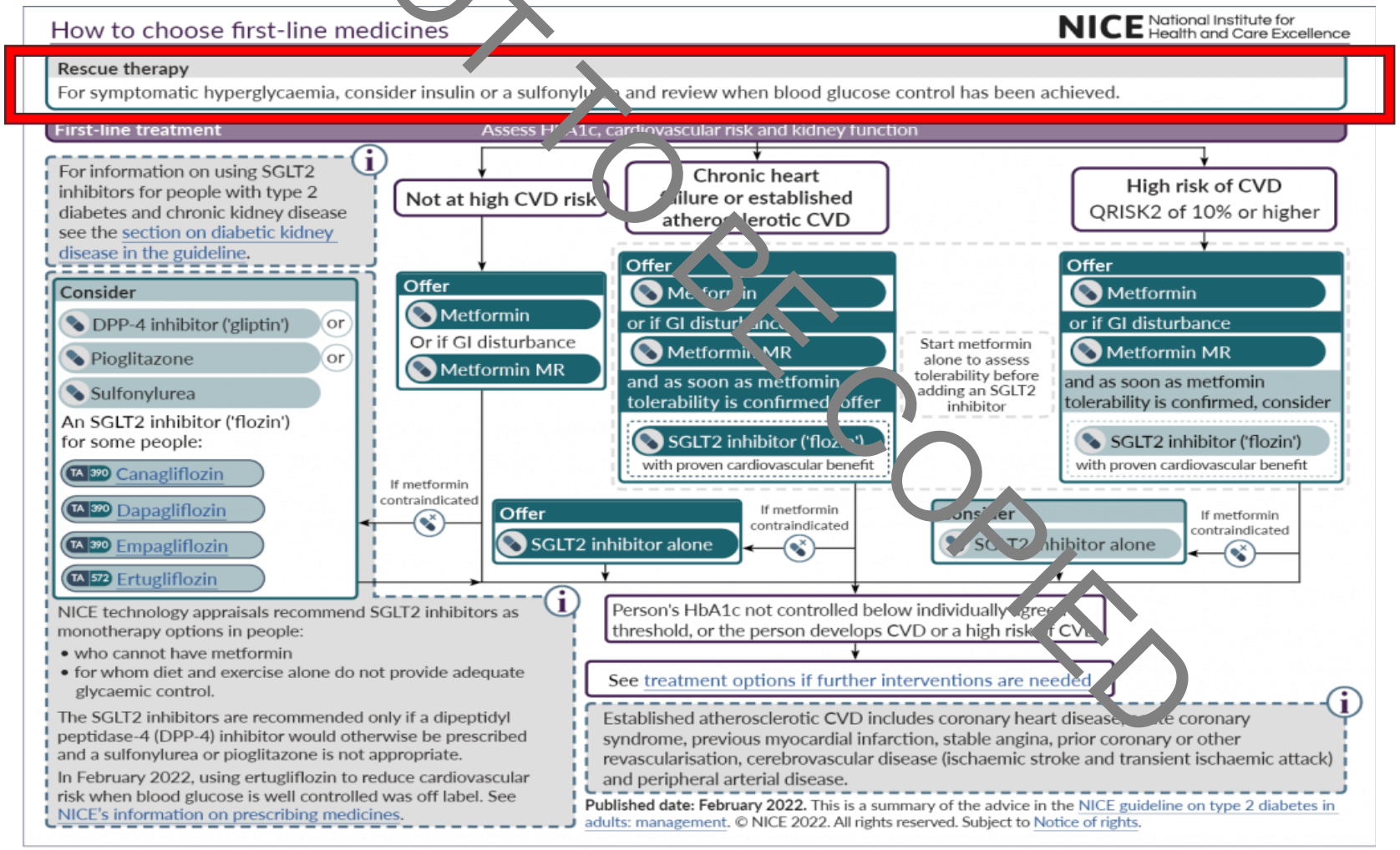
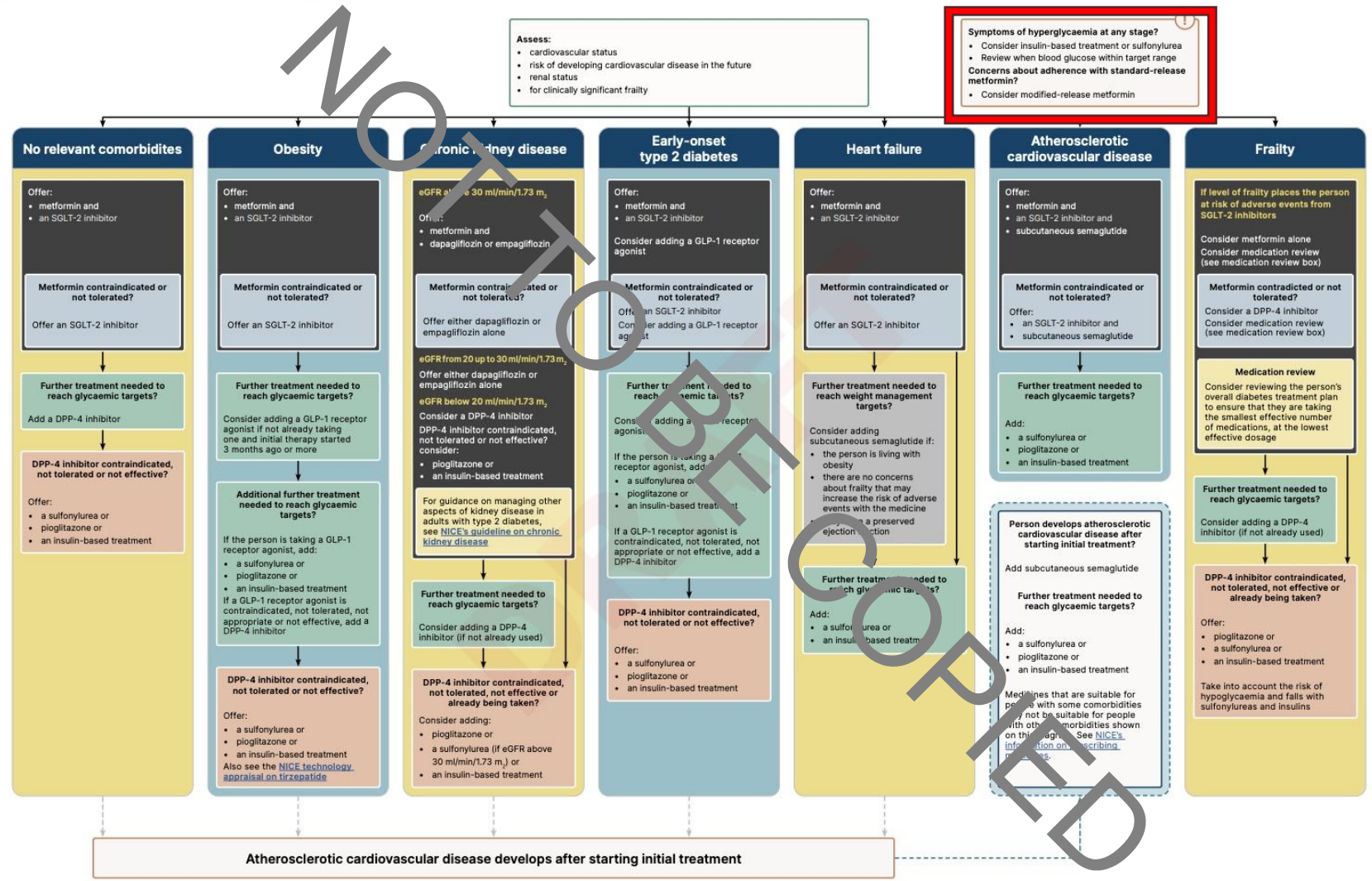
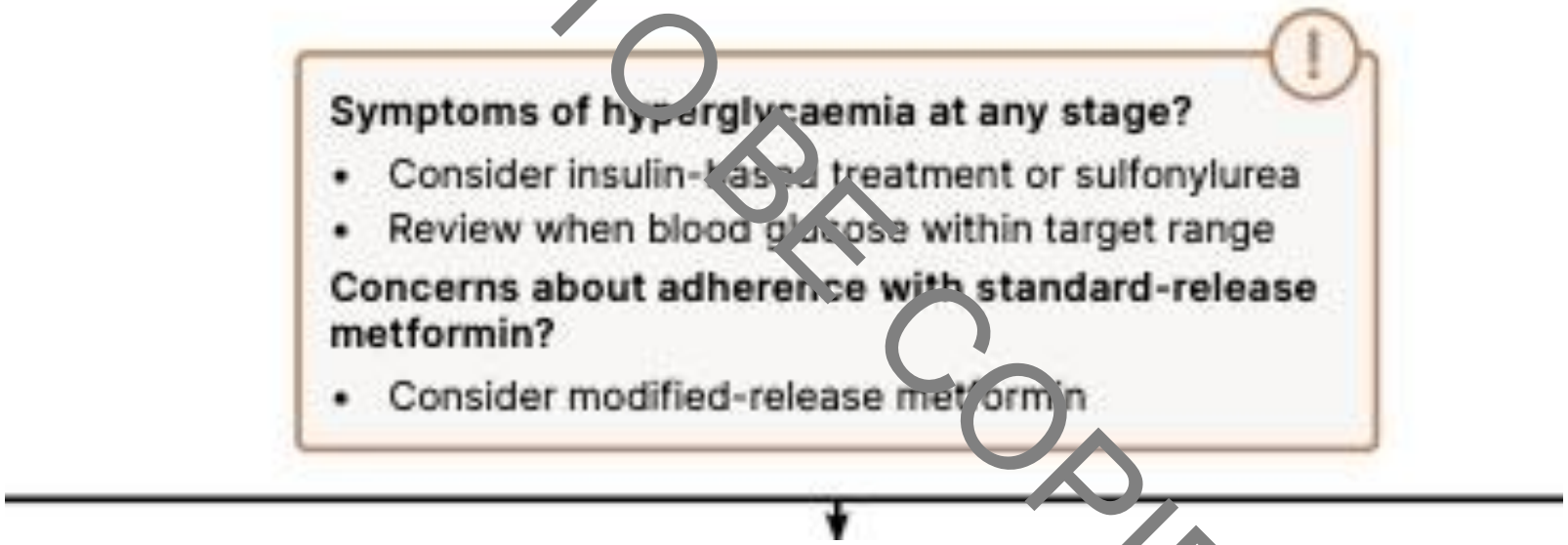


Figure 1. First-line treatment algorithm within the new guideline.

Type 2 diabetes in adults: choosing medicines for first line and further treatment





- why and when to use a glucose lowering medication
- Why have this step and not go straight for SGLT2 or GLP1ra?

evidence base…

- despite having this step referred to in many guidelines there is scant evidence base
- so, this is based on professional experience

what are we aiming for?

symptom relief:

- not complete glycaemic control
- to be able to start preferred diabetes medication with reduced risk of side effects
  - Metformin – gastro side effects
  - SGLT-2inh – thrush/balanitis
- to be able to start preferred diabetes medication with reduced risk of harm
  - SGLT-2inh – euglycaemic DKA
  - GLP1-ra or GIP/GLP1-ra – pancreatitis, advancing retinopathy

Sulphonylureas

- Gliclazide 80mgs twice daily, then self titrate to 160mgs twice daily if indicated
- in frailer people 80mgs in the morning increasing to twice daily if indicated

Insulin

- take local advice but usually use basal bolus or mixed insulin regimen
- titrate as per local guidance but to be effective upward titration needs to happen daily or 2-3 times weekly as a rescue therapy.

When to titrate and how

this is based on symptom relief and capillary glucose levels.

upward titrate needs to be rapid and therefore best to encourage and support self titration

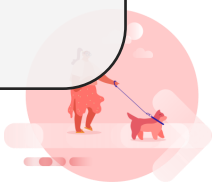
if starting Gliclazide increase dose weekly until glycaemic levels start to respond

how to monitor (not wait for HbA1c)

- symptoms – osmotic and fatigue levels
- glucose monitoring at least twice daily preferably 4 times daily

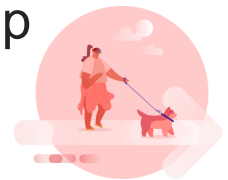
once symptoms have relieved and glycaemic levels have dropped a significant amount then start the preferred medication and stop the rescue treatment

if osmotic symptoms rapidly reappear or glucose levels rapidly rise again, restart the rescue treatment and consider a referral for further investigation or management

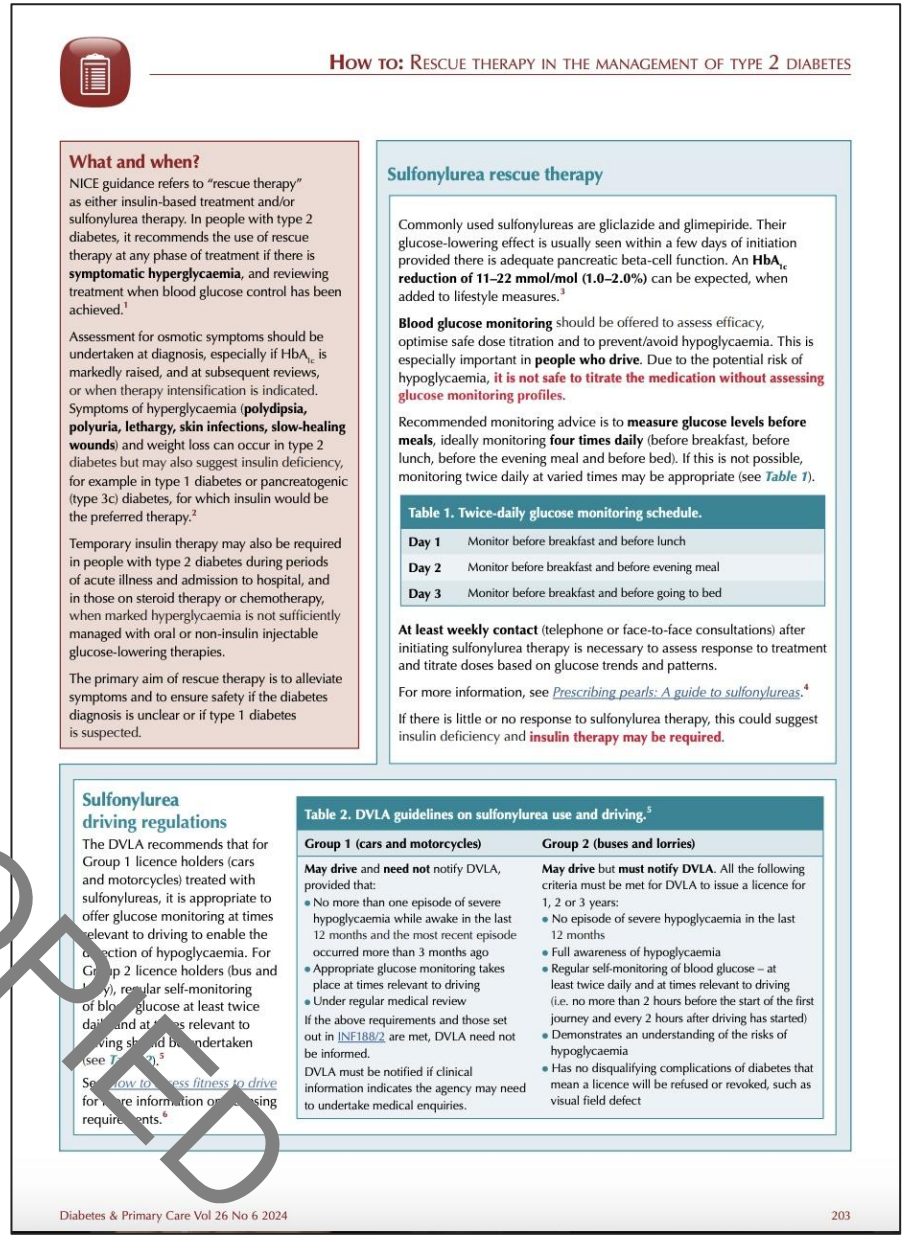


tips for rescue therapy

- provide the rescue therapy as an acute prescription to make it easier to stop as soon as symptomatic hyperglycaemia has resolved
- If no effect in short space of time from decent dose of SU, then refer as this may not be the issue
- ? another cause for sudden rise in glucose and symptoms ie Panc Ca/type 3c diabetes/other meds/ non compliance etc etc
- is there also weight loss with extreme fatigue despite glucose levels dropping?....refer for urgent CT scan
- remember to consider fluid intake (what have they been drinking and once they feel better have, they stopped sugary fluids?)
- review before glucose levels in normal range due to the increased insulin sensitivity as glucose level drop



How To: rescue therapy



What and when?

NICE guidance refers to "rescue therapy" as either insulin-based treatment and/or sulfonylurea therapy. In people with type 2 diabetes, it recommends the use of rescue therapy at any phase of treatment if there is **symptomatic hyperglycaemia**, and reviewing treatment when blood glucose control has been achieved.[1]

Assessment for osmotic symptoms should be undertaken at diagnosis, especially if HbA_{1c} is markedly raised, and at subsequent reviews, or when therapy intensification is indicated. Symptoms of hyperglycaemia (**polydipsia, polyuria, lethargy, skin infections, slow-healing wounds**) and weight loss can occur in type 2 diabetes but may also suggest insulin deficiency, for example in type 1 diabetes or pancreatogenic (type 3c) diabetes, for which insulin would be the preferred therapy.[2]

Temporary insulin therapy may also be required in people with type 2 diabetes during periods of acute illness and admission to hospital, and in those on steroid therapy or chemotherapy, when marked hyperglycaemia is not sufficiently managed with oral or non-insulin injectable glucose-lowering therapies.

The primary aim of rescue therapy is to alleviate symptoms and to ensure safety if the diabetes diagnosis is unclear or if type 1 diabetes is suspected.

Sulfonylurea rescue therapy

Commonly used sulfonylureas are gliclazide and glimepiride. Their glucose-lowering effect is usually seen within a few days of initiation provided there is adequate pancreatic beta-cell function. An **HbA_{1c} reduction of 11–22 mmol/mol (1.0–2.0%)** can be expected, when added to lifestyle measures.[3]

Blood glucose monitoring should be offered to assess efficacy, optimise safe dose titration and to prevent/avoid hypoglycaemia. This is especially important in **people who drive**. Due to the potential risk of hypoglycaemia, **it is not safe to titrate the medication without assessing glucose monitoring profiles.**

Recommended monitoring advice is to **measure glucose levels before meals**, ideally monitoring **four times daily** (before breakfast, before lunch, before the evening meal and before bed). If this is not possible, monitoring twice daily at varied times may be appropriate (see *Table 1*).

Table 1. Twice-daily glucose monitoring schedule.

Day 1	Monitor before breakfast and before lunch
Day 2	Monitor before breakfast and before evening meal
Day 3	Monitor before breakfast and before going to bed

At least weekly contact (telephone or face-to-face consultations) after initiating sulfonylurea therapy is necessary to assess response to treatment and titrate doses based on glucose trends and patterns.

For more information, see *Prescribing pearls: A guide to sulfonylureas*.[4]

If there is little or no response to sulfonylurea therapy, this could suggest insulin deficiency and **insulin therapy may be required**.

Sulfonylurea driving regulations

The DVLA recommends that for Group 1 licence holders (cars and motorcycles) treated with sulfonylureas, it is appropriate to offer glucose monitoring at times relevant to driving to enable the detection of hypoglycaemia. For Group 2 licence holders (bus and lorry), regular self-monitoring of blood glucose at least twice daily and at times relevant to driving should be undertaken (see *Table 2*).[5]

See *How to assess fitness to drive* for more information on assessing requirements.[6]

Table 2. DVLA guidelines on sulfonylurea use and driving.[5]

Group 1 (cars and motorcycles)	Group 2 (buses and lorries)
May drive and **need not** notify DVLA, provided that: • No more than one episode of severe hypoglycaemia while awake in the last 12 months and the most recent episode occurred more than 3 months ago • Appropriate glucose monitoring takes place at times relevant to driving • Under regular medical review If the above requirements and those set out in INF188/2 are met, DVLA need not be informed. DVLA must be notified if clinical information indicates the agency may need to undertake medical enquiries.	**May drive** but **must notify DVLA**. All the following criteria must be met for DVLA to issue a licence for 1, 2 or 3 years: • No episode of severe hypoglycaemia in the last 12 months • Full awareness of hypoglycaemia • Regular self-monitoring of blood glucose – at least twice daily and at times relevant to driving (i.e. no more than 2 hours before the start of the first journey and every 2 hours after driving has started) • Demonstrates an understanding of the risks of hypoglycaemia • Has no disqualifying complications of diabetes that mean a licence will be refused or revoked, such as visual field defect

Alabraba V (2024) How to: Rescue therapy in the management of type 2 diabetes. Diabetes & Primary Care 26: 203–6

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Sick day rules

Why do we need rules for sick days?

People with diabetes do not necessarily experience illness more often than those without;

however, if diabetes is not managed well during acute dehydrating illness, it can escalate and result in more serious conditions such as:

- Diabetic ketoacidosis (DKA),
- Hyperosmolar hyperglycaemic state (HHS)
- Acute kidney injury (AKI)
- Euglycaemic DKA

These are medical emergencies and will require hospital admission.

It is, therefore, vital that the right advice is given to manage the initial illness.

Sick day rules

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 these raised glucose levels
I (Insulin)	• **NEVER** stop insulin or oral diabetes medications* • Insulin doses may 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 • Give **extra rapid-acting insulin doses** (in addition to regular doses) based on total daily insulin dose if ketones are present – see insulin algorithm overleaf • Advise to drink plenty of water to maintain hydration and flush through ketones

*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 is feeling better and able to eat and drink for 24–48 hours, these medications should be restarted.

Signs of diabetic ketoacidosis

- Excessive thirst
- Polyuria

Signs of hyperosmolar hyperglycaemic state

- Typically seen after several days with glucose levels consistently above 30 mmol/L

About this series

The aim of the "How to" series is to provide readers with a guide to clinical procedures and aspects of diabetes care that are covered in the clinic setting.

What and why

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, hyperosmolar hyperglycaemic state and acute kidney injury, which will require emergency hospital admission. It is, therefore, vital that the right advice is given to manage the initial illness.

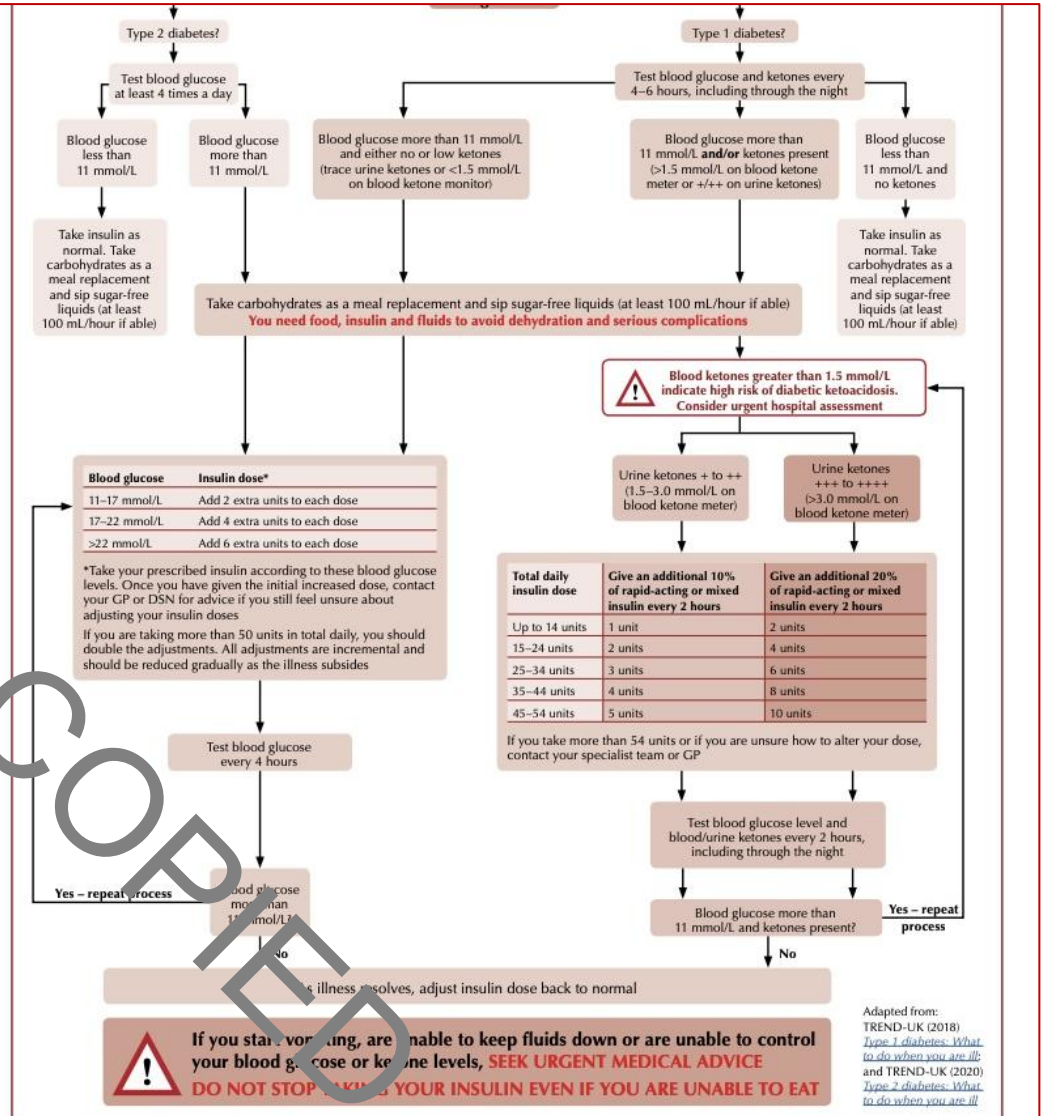
The aims of managing a person with diabetes during intercurrent illness are to:

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

Conditions that should trigger advice

Any intercurrent illness can cause glucose levels to rise. The following list of such illnesses is not exhaustive:

- The common cold
- Influenza
- Diarrhoea and vomiting
- Urinary tract infection
- Chest infection



Adapted from:
TREND-UK (2018) *Type 1 diabetes: What to do when you are ill*;
and TREND-UK (2020) *Type 2 diabetes: What to do when you are ill*

Useful reading and leaflets

Abbreviations

tips for sick day rules

- increase glucose monitoring
- may need to monitor for ketones
- if longer than 48 hours vomiting seek further advice
- if medications halted during dehydrating phase, remember to restart
- people forget advice when they are sick remember to document that advice has been given
- Advise people to screen shot sick day rules so they always have them on their phone (most will forget they have a leaflet!)
- remember people may tend to drink sugary drinks when ill and not eating
- if able to eat and drink most people will get through a short illness without issue

PCDO Society

Thank you.

any questions?

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In association with: Diabetes on the net.