Diabetes
Mate huka

The information in this guide is accurate to the best of our knowledge as of June 2023.

Definition

Diabetes mellitus (DM) is a term used to describe a group of conditions that result in hyperglycaemia (high blood glucose) from either a lack of insulin production or insensitivity to insulin that is produced (New Zealand Formulary 2022a).

- Type 2 diabetes mellitus (T2DM) occurs in over 90 percent of DM cases. It involves both reduced insulin production and insulin insensitivity. People with T2DM are treated with a range of hyperglycaemic tablets and/or insulin.
- Type 1 diabetes mellitus (T1DM) occurs where a loss of beta-cells in the pancreas results in a lack of insulin production. People with T1DM need insulin to survive.

Why this is important

An estimated 300,000 people in New Zealand have DM. Pacific peoples have the highest rate, followed by Indian and Māori populations. New Zealand Europeans have the lowest rate of DM (Te Whatu Ora 2023). Long-term diabetes causes a wide range of complications, including loss of vision, kidney disease, heart disease, chronic wounds and amputations. In the short term, extremes of blood glucose levels (hypo and hyperglycaemia) result in significant illness and mortality.

Implications for kaumātua*

Compared with New Zealand Europeans, Māori are two to four times more likely to be diagnosed with T2DM and to experience diabetes-related complications. They also have higher rates of mortality associated with diabetes (Mullane et al 2022; Yu et al 2021).

Māori have a holistic view of health and wellbeing. As diabetes affects every aspect of life, it is important to consider care from this perspective, rather than focusing solely on the disease of diabetes. A holistic approach takes account of the person's spiritual and emotional wellbeing, and includes their **whānau**/family. Research shows that providing care in which people and whānau/family feel culturally safe, taking a whānau/family-centred approach and using Māori principles, approaches and perspectives can all have a positive impact on the health of kaumātua (Tane et al 2021). See the *Guide for health professionals caring for kaumātua | Kupu arataki mō te manaaki kaumātua* for more information.

* Kaumātua are individuals and their connection with culture varies. This guide provides a starting point for a conversation about some key cultural concepts with kaumātua and their whānau/family. It is not an exhaustive list; nor does it apply to every person who identifies as Māori. It remains important to avoid assuming all concepts apply to everyone and to allow care to be person and whānau/family led.

The following are two key aspects to consider in your approach to care.

- The sharing of **kai** (food) is closely connected to **manaakitanga** (hospitality, reciprocity) and **whanaungatanga** (connectedness), which are central constructs in **te ao Māori** (Māori world view). For this reason, food and nutrition have spiritual and social significance, beyond physical sustenance.
- Some kaumātua and whānau/family may see symptoms associated with hypoglycaemia as **wairua** (spiritual) unrest or disturbance. Where they do, supporting holistic interventions is essential. (See the *Delirium | Mate kuawa* guide for more information.)

Assessment

The aim of day-to-day assessment is to keep older people safe. Its main focus is on managing blood glucose levels, diabetes medication and responding to sick days.

Blood glucose level (BGL) targets

Frail older people are at greater risk from hypoglycaemia (which can cause falls, cognitive decline, dementia, myocardial infarction, stroke and death) than the longer-term health outcomes of diabetes. Because of this, treatment focuses more on quality of life than on risk of future problems and so BGL targets are less tightly controlled.

Target HbA1c ranges in older people (bpac^{nz} 2019):

- older people (not frail): HbA1c of 58–64 mmol/mol
- older people with frailty: HbA1c up to 70 mmol/mol.

Where an older person with frailty exceeds the target of HbA1c up to 70 mmol/mol, they have a greater chance of glycosuria, dehydration, hyperglycaemic hyperosmolar syndrome, candidiasis, urinary tract infections and poor wound healing.

BGL monitoring frequency in stable disease

The general recommendation is to measure HbA1c six monthly. (Discuss individuals with their general practitioner (GP) or nurse practitioner (NP).) More frequent monitoring is recommended if HbA1c is below 58 or above 70.

Suggested capillary blood glucose level (CBGL) testing regimes

(Hawke's Bay District Health Board 2017)

DM treatment/medication	CBGL testing frequency
Diet, metformin, pioglitazone	CBGL testing not recommended
Sulphonylureas	Once a week: Before breakfast and before bed
Insulin (basal only) Lantus	Two consecutive mornings per week: Before breakfast
Insulin (fixed dose) Protaphane or Humulin NPH	Two days a week: Before each meal
Insulin (basal/bolus) Humalog or Novorapid or Aidpra **plus** Lantus or Protaphane / Humulin NPH or HumalogMix or NovoMix'30'	One day a week: Before each meal and 2 hours after a meal but may require more frequent monitoring. Discuss with GP, NP or diabetes service

Note: Where a person's condition or glycaemic medication regime (insulin or tablet) changes, increase the testing frequency.

Hypoglycaemia (CBGL 4 mmol/L or less)

Hypoglycaemia happens in minutes to hours and needs a rapid response. It can present as confusion, dizziness, weakness and/or visual disturbances, rather than the more common tremors, sweating and 'drunk-like' confusion.

Note: Be aware that people with lifetime diabetes who have experienced multiple hypoglycaemic episodes can get hypo-unawareness. Here the person gets few symptoms until BGL is very low (eg, 1.5–2 mmol/L) and consciousness changes.

Hypoglycaemia decision support

(New Zealand Society for the Study of Diabetes 2022a)

Where a person is unconscious or unable to cooperate, check CBGL. If ≤4 mmol/L, administer buccal glucose gel or 1 mg Glucagon intramuscular injection (according to local policy) and call ambulance or urgent care provider

Hypoglycaemia suspected due to symptoms in a conscious person

- ☐ Confusion, 'drunk-like' behaviour
- ☐ Sweating, chills, clammy
- ☐ Irritability or impatient, anger, stubbornness
- ☐ Hunger and nausea
- ☐ Light-headed, dizzy
- ☐ Tingling or numb lips or tongue
- ☐ Weakness, fatigue, sleepiness
- ☐ Blurred vision
- ☐ Lethargy, reduced consciousness (late stage)

Measure capillary blood glucose level (CBGL) immediately: **is it ≤4 mmol/L**?

N → Consider other causes of symptoms

Y

Person weighs more than 70 kg: give 30 g rapid-acting carbohydrate

Give **one** of the following:
- 10 Dextro or Vita glucose tablets
- 6 BD glucose tablets
- 30 g glucose powder
- 350 ml fruit juice or non-diet soft drink
- 18 jellybeans
- 2 tablespoons honey
- 3 tablespoons jam
- 2 Hypo-Fit gels

Person weighs less than 70 kg: give 15 g rapid-acting carbohydrate

Give **one** of the following:
- 5 Dextro or Vita glucose tablets
- 3 BD glucose tablets
- 15 g glucose powder
- 175 ml fruit juice or non-diet soft drink
- 9 jellybeans
- 1 tablespoon honey
- 1½ tablespoons jam
- 1 Hypo-Fit gel

Wait 15 minutes then recheck CBGL **Is it >4 mmol/L?**

N

Repeat hypoglycaemia treatment cycle once more

◄N

Y

Provide carbohydrate snack, eg, a slice of toast, 2 biscuits and crackers or, if due within 15 minutes, continue with usual food

Wait 30 minutes then recheck CBGL. Do not try to treat any resultant hyperglycaemia; it is expected after this treatment

Review likely causes of hypoglycaemia

- ☐ Over-treatment
- ☐ Not eating or reduced eating
- ☐ Increased physical activity

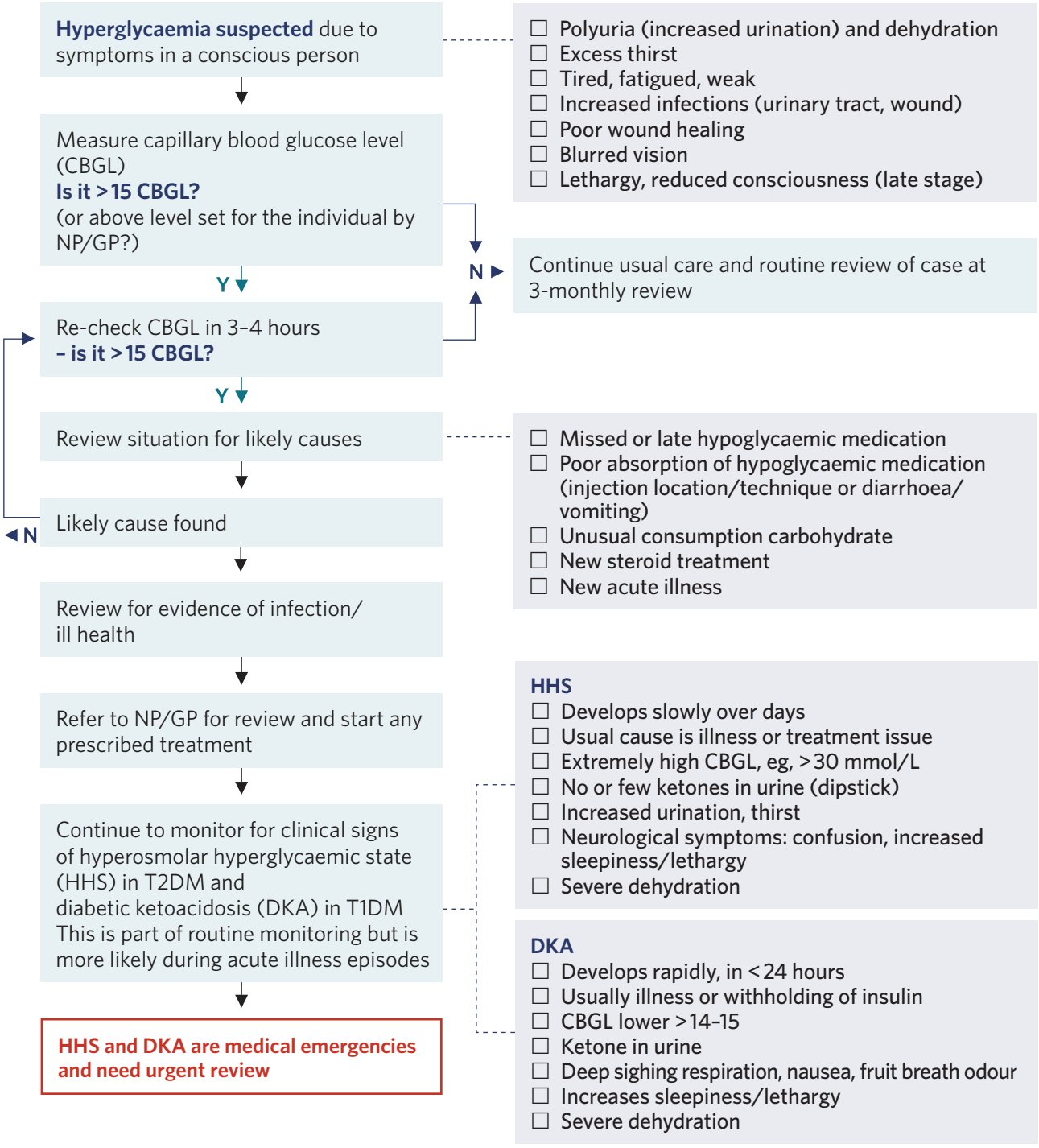
General practitioner/nurse practitioner case review

Note: If CBGL < 4 mmol/L after two treatment cycles and person is symptomatic get urgent support.

Hyperglycaemia

For frail older adults, a before-breakfast CBGL of approximately 8–10 mmol/L is generally acceptable provided they are not experiencing symptoms (bpac^{nz} 2019).

Hyperglycaemia decision support



CBGL = capillary blood glucose level GP = general practitioner NP = nurse practitioner

Sick day advice (New Zealand Society for the Study of Diabetes 2022b)

Type 1 DM

Do not withhold basal insulin of people with T1DM, as this can result in diabetic ketoacidosis. Liaise with GP, NP or diabetes service for sick day advice.

Type 2 DM Hawke's Bay District Health Board 2017; New Zealand Society for the Study of Diabetes 2022b

Acute illness (colds, infection, diarrhoea, vomiting) usually causes hyperglycaemia but reduced oral intake may lead to hypoglycaemia.

Increase CBGL monitoring (three to four times a day).

- Expect CBGL to between 8 and 15 mmol/L when sick.
- If CBGL stays above 15 mmol/L for 24 hours, refer GP or NP.
- If CBGL is less than 8 mmol/L, give fruit juice or full-sugar fizzy drinks.
- If CBGL is higher than 8 mmol/L, give water or low-carbohydrate fluid to drink.

Maintain food and fluid intake.

- Chart food and fluid intake.
- Provide one glass of fluid per hour. Aim for about 1,500 mL in 24 hours.
- Provide usual food if person able to tolerate. If unable to tolerate, consider custard, jelly, yoghurt, ice cream (if diarrhoea, avoid dairy) and use soup, bread, Marmite/Oxo broth.

General advice is to give usual diabetes tablets or insulin during sick days **except**:

- do not give sodium-glucose co-transporter 2 inhibitors (SGTL2i) empagliflozin
- do not give metformin or acarbose if person has diarrhoea or vomiting
- you may need to withhold sulfonylureas if person is not eating
- you may need to reduce basal or premixed insulin (by 20–30 percent) if person is not eating.

Contact GP or NP:

- to investigate cause of acute illness
- if in doubt about administering DM medications
- if diarrhoea or vomiting lasts more than 12 hours
- if CBGL stays above 15 mmol/L for 24 hours.

Treatment

Type 1 DM

People with T1DM need basal insulin every day to avoid diabetic ketoacidosis. Engaging older people with T1DM with a diabetes service is recommended.

Type 2 DM

Non-pharmacological

- Physical activity helps reduce blood sugar and is an effective frailty intervention. Culturally appropriate activities may be more appealing to kaumātua.
- A balanced diet including traditional cultural foods without undue restrictions is recommended. Full-fat products are recommended for people struggling to maintain weight.
- Weight loss **is not** recommended in frail older adults.

Pharmacological

DM pharmacological management escalates through a series of steps. Below is a brief overview of medication considerations. For more details, see the websites of the New Zealand Formulary and the New Zealand Society for the Study of Diabetes.

First-line medication

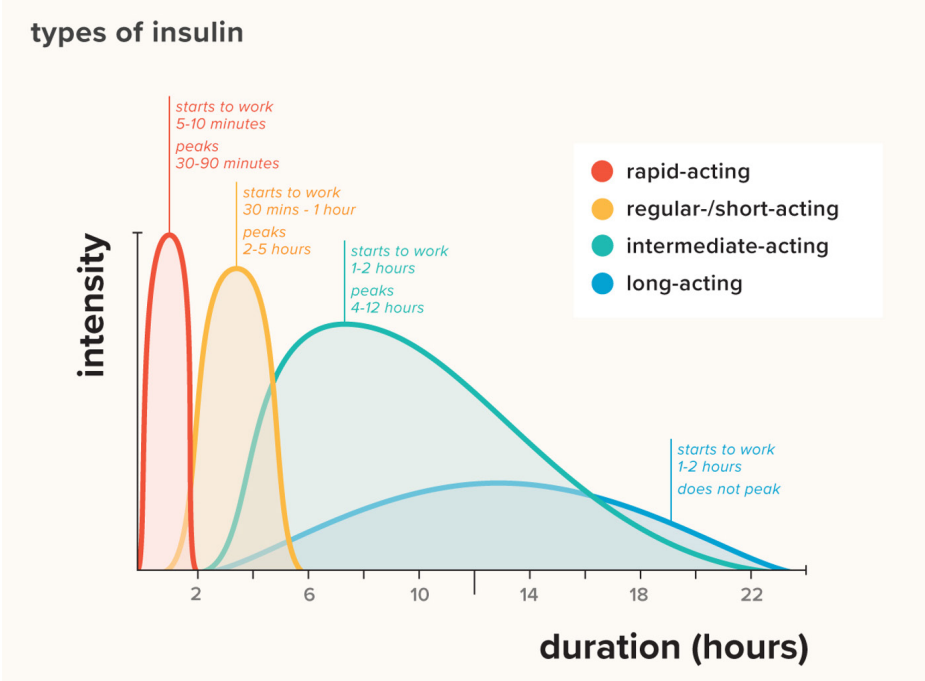
- **Metformin**: Common adverse drug effects (ADE) diarrhoea requires dose adjustment in renal impairment.

Second-line medication

- Sodium-glucose co-transporter 2 inhibitor (**SGTL2**): **Empagliflozin** comes combined with metformin or as a separate tablet. Common ADE include polyuria, skin reactions, urinary tract infection or urogenital infection (thrush). Rare ADEs diabetic ketoacidosis (CBGLs may be normal) and necrotising fasciitis of the perineum. In practice, genital hygiene including refreshing pads is important.
- Long-acting glucagon-like peptide 1 receptor agonist (**GLP-1**): Give **dulaglutide** or **liraglutide** as a weekly injection. Common ADE reduce appetite and lead to nausea, diarrhoea or constipation or, less commonly, vomiting. Rare ADE are myalgia, muscle weakness, Stevens-Johnson syndrome and thrombocytopenia.
- Dipeptidylpeptidase-4 inhibitor (**DPP-4**): **Vildagliptin** comes either combined with metformin or as a separate tablet. Rare ADE are angioedema when also taking ACE inhibitors, and liver dysfunction (test before treatment and every three months in first year of treatment). Do not use with GLP-1 receptor blocker.

Third-line medication

- **Thiazolidinedione**: **Pioglitazone** increases the risk of heart failure and bone fractures.
- **Sulfonylureas** may be **gliclazide** or **glipizide** or **glibenclamide**. A common ADE is hypoglycaemia, especially if the person is not eating.
- **Insulin** is required in later stages for T2DM. It comes as short-, intermediate- or long-acting medication. Introduce it in steps based on its effectiveness (Ministry of Health 2022; New Zealand Society for the Study of Diabetes 2022a):
  1. basal insulin (intermediate or long acting)
  2. add a separate bolus (short-acting) insulin with largest meal or mixed insulin (short-and long-acting) with largest meal or, if the person has multiple similar-sized meals in a day, split the dose
  3. insulin bolus with meals.



Source:
Healthline **www.healthline.com/health/type-2-diabetes/insulin-chart**

Care planning: monitoring

DM affects multiple systems of the body. Routine monitoring is an important part of the care plan. Appropriate target ranges for parameters are a balance between best outcome for DM and quality of life in frailty.

Blood pressure targets (Diabetes Canada Clinical Practice Guidelines Expert Committee 2018)

- Systolic blood pressure target is < 140–150 mmHg.
- Avoid < 130 mmHg, which has been associated with falls in frail older adults.

Dyslipidaemia (bpac^{nz} 2021)

In people with frailty and less than five-year life expectancy, treating dyslipidaemia is unlikely to be beneficial.

Kidney disease

In annual review of glomerular filtration (eGFR < 60 mL/min indicator of disease), liaise with GP or NP for medication review.

Foot care (bpac^{nz} 2021)

- Provide good-fitting shoes and skin care (use moisturiser) and keep nails short. Conduct neurovascular examination of feet each year. Refer to care via specialist service for older adults with high-risk feet. For new foot wound or infection, contact GP or NP urgently.
- For the New Zealand diabetes foot screening tool from Manatū Hauora, go to: **www.health.govt.nz/our-work/diseases-and-conditions/diabetes/about-diabetes/diabetes-related-conditions**.

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