

# Diabetes | Te mate huka

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## Hypoglycaemia

### Definition

Capillary glucose < 4 mmol/L in someone who has diabetes and is on a sulphonylurea and/or insulin.

- Type 1 requires insulin every day.
- Type 2 may have a mix of treatments: diet, oral hypoglycaemics and insulin.

### Hypoglycaemia signs and symptoms

- Nervousness
- Sweating, chills and clamminess
- Irritability or impatience
- Confusion, including delirium
- Rapid/fast heartbeat
- Light headedness or dizziness
- Hunger and nausea
- Sleepiness
- Blurred/impaired vision
- Tingling or numbness in the lips or tongue
- Headaches
- Weakness or fatigue
- Anger, stubbornness or sadness
- Lack of confidence
- Nightmares or crying out during sleep
- Seizures
- Unconsciousness
- Shakiness.



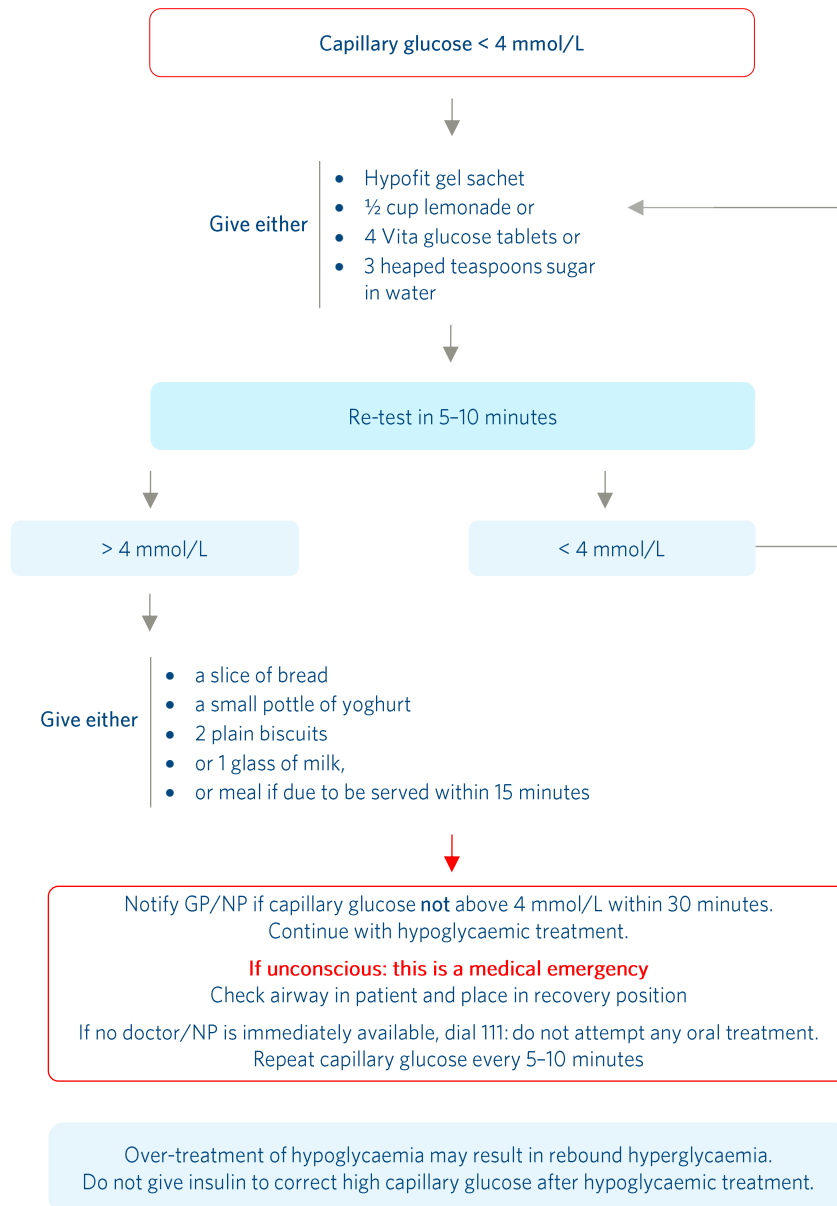
***Hypoglycaemia happens suddenly in minutes to hours.***

### Treatment of hypoglycaemia in the unconscious person

- IV access
  - 50 mls of 50% dextrose
  - Commence IV infusion 10% glucose at 100 mls/hour.
- No IV access
  - Glucagon 1 mg stat IM
  - If no response after 15 minutes, repeat (effect of glucagon can take 15 minutes and action is short).

When patient is conscious and cooperative, follow advice for conscious person.

## Treatment of hypoglycaemia in the conscious person



## Review for cause of hypoglycaemia

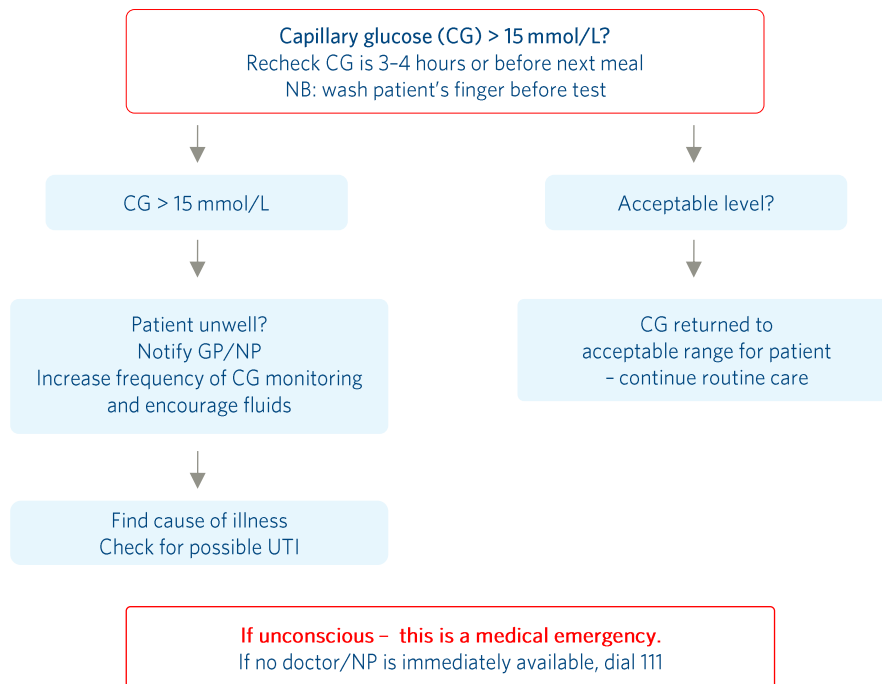
- Over-treatment with insulin or sulphonylurea (long-acting sulphonylurea) not recommended for older adults
- Inadequate carbohydrate intake
- Increased physical activity without carbohydrate top-up
- Alcohol consumption
- Increased insulin sensitivity, eg, weight loss
- Reduced renal clearance of medication.

## Hyperglycaemia

Definition: capillary glucose > 20 mmol/L

- Earliest symptoms: polyuria, polydipsia and weight loss
- Progression is marked by neurologic symptoms, including lethargy, focal signs and altered level for consciousness
- Can progress to coma in later stages.

### Treatment of mild hyperglycaemia in the conscious person



**Hyperglycaemic emergencies happen gradually over hours to days.**

## Diabetes complications and treatment

	Diabetic ketoacidosis (DKA)	Hyperosmolar hyperglycaemic state (HHS) known as hyperosmotic hyperglycaemic non-ketotic state (HHNK)
<b>DKA and HHS are two of the most serious acute complications of diabetes</b>		
<b>Common causes</b>	<ul style="list-style-type: none"> <li>• Infection, non-compliance</li> <li>• Inappropriate adjustment or cessation of insulin New onset diabetes mellitus and myocardial ischemia</li> </ul>	<ul style="list-style-type: none"> <li>• Infection or other illness, non-compliance, inappropriate adjustment or cessation of insulin, dehydration, medicines that affect blood sugar</li> </ul>
<b>Plasma glucose</b>	<ul style="list-style-type: none"> <li>• &gt; 13.9 mmol/L</li> </ul>	<ul style="list-style-type: none"> <li>• &gt; 33.3 mmol/L</li> </ul>
<b>Urine ketones</b>	<ul style="list-style-type: none"> <li>• Positive</li> </ul>	<ul style="list-style-type: none"> <li>• Little or none</li> </ul>
<b>Alertness</b>	<ul style="list-style-type: none"> <li>• Progression from alert to drowsy to stupor or coma</li> </ul>	<ul style="list-style-type: none"> <li>• Stupor or coma</li> </ul>
<b>Clinical presentation</b>	<ul style="list-style-type: none"> <li>• Usually evolves rapidly over a 24-hour period. May have a fruity odour due to exhaled acetone (like nail polish remover). Deep respirations reflecting compensatory hyperventilation. Hyperventilation and abdominal pain more common</li> </ul>	<ul style="list-style-type: none"> <li>• Develops insidiously with polyuria, polydipsia and weight loss, often persisting for several days. Neurological symptoms are more common</li> </ul>
<b>Physical examination</b>	<ul style="list-style-type: none"> <li>• Signs of volume depletion are common in both DKA and HHS and include decreased skin turgor, dry axillae and oral mucosa, low jugular venous pressure, tachycardia and, if severe, hypotension. Neurologic findings may be seen, particularly in people with HHS</li> </ul>	
<b>Treatment</b>	<ul style="list-style-type: none"> <li>• Both DKA and HHS are <b>medical emergencies</b> that require prompt recognition, management and hospital admission (unless at end of life due to other reasons)</li> <li>• DKA or HHS: vigorous IV electrolyte and fluid replacement to correct hypovolaemia and hyperosmolarity, metabolic acidosis (in DKA), potassium depletion, administration of insulin</li> <li>• Mild DKA can be treated with subcutaneous rapid-acting insulin but only when adequate staffing is available to carefully monitor the patient and check capillary blood glucose hourly</li> </ul>	

## Geriatric syndromes associated with diabetes

- Cognitive impairment: diabetes is associated with increased risk of dementia. Cognitive function should be assessed when there is non-adherence with therapy, frequent episodes of hypoglycaemia or deterioration of glycaemic control without obvious explanation.
- Depression occurs at a higher rate compared with age-matched control. Depression is frequently undiagnosed and remains untreated in this high-risk population.
- Polypharmacy is common because of management of multiple risk factors. This increases risk for side effects and interactions. Medication lists should be kept current and reviewed regularly.
- Falls risk is increased and multifactorial. Peripheral and/or autonomic neuropathy, reduced renal function, muscle weakness, functional disability, loss of vision, polypharmacy, comorbidities like osteoarthritis and even mild hypoglycaemia may contribute to falls in frail older adults.

## Summary of key recommendations for type 2 diabetes

Older adults with diabetes are a heterogeneous population. They can be fit and healthy or frail with many comorbidities and functional disabilities. They have increased risk for physical decline, cognitive dysfunction and mortality.

Frailty is a prognostic factor that identifies older people with diabetes who are at high risk of mortality. Most will have a high CV risk, and individualised targets need to be realistic and safe.

### Lifestyle advice

- Diet focused on glycaemic control, cardiovascular risk reduction and weight reduction, if appropriate, unless frailty is present
- Physical activity, especially walking: exercise also improves body composition and arthritic pain, reduces falls and depression, increases strength and balance, enhances the quality of life and improves survival
- Smoking cessation: smoking in people with diabetes is an independent risk factor for all-cause mortality due largely to CVD.

### Glycaemic management

- Goals should be individualised and based on the person's overall health and projected period of survival, because risk of complications is duration dependent.
- Vulnerability to hypoglycaemia is substantially increased in older adults. Even a mild episode of hypoglycaemia may lead to adverse outcomes in frail older people.
- Oral and injectable agents with low risk of hypoglycaemia are preferred in older adults. 'Start low and go slow'.
- Monitor blood sugar if the person is taking hypoglycaemic agents or is unwell.

### Frailty and age factors to consider when individualising glycaemic targets

%	Mmol/mol	
< 6	< 42	Non-diabetic range
6-6.5	42-48	May be too low for the fit older person
6.5-7.5	48-58	Appropriate in the fit older person, but be mindful of hypoglycaemia
7.5-8	58-64	Medication-treated, frail older adults with medical and functional comorbidities and in those whose life expectancy is less than 10 years
≤ 8.5	64-69	In the very old, efforts should include preserving quality of life and avoiding hypoglycaemia and related complications
≥ 8.5	> 69	For those at the end of life, there is no benefit to glycaemic control except in avoiding symptomatic hyperglycaemia

## Agents and recommendations

Agent	Recommendation
Metformin	<ul style="list-style-type: none"> <li>eGFR &gt; 30 ml/min is suggested as a safe level of renal function for the use of metformin</li> <li>eGFR 30–60 mls/min: no more than 1,000 mg/day</li> <li>Caution to stop taking if unwell for any reason or if the person is to undergo a procedure requiring the use of iodinated contrast material</li> <li>Renal function should be monitored every 3–6 months, rather than annually</li> </ul>
Short-acting sulphonylurea	<ul style="list-style-type: none"> <li>Use if contraindication and/or intolerance to metformin</li> <li>Avoid long-acting sulfonylureas due to risk of hypoglycaemia</li> </ul>
DPP IV inhibitors and GLP-1 agonists	<ul style="list-style-type: none"> <li>Have a marked glucose-lowering effect that reduces post-prandial hyperglycaemia with no additional risk of hypoglycaemia (not subsidised)</li> </ul>
SGLT2 inhibitors	<ul style="list-style-type: none"> <li>Generally well tolerated. Improve glycaemic control by reducing glucose absorption and increasing urinary glucose excretion. They do not increase the risk of hypoglycaemia (not subsidised)</li> </ul>
Insulin	<ul style="list-style-type: none"> <li>Consider for anyone with HbA1c persistently higher than their individualised target (especially HbA1c &gt; 65 mmol/L) despite optimal oral treatment, particularly if they have signs such as ketonuria and weight loss</li> </ul>

## Cardiovascular risk reduction

- Older people with diabetes have higher cardiovascular risk, morbidity and mortality, compared with older adults without diabetes.
- Benefit of cardiovascular risk reduction depends on the person's frailty, overall health and projected period of survival.

## Hypertension

- Treatment of hypertension in older people, including those over 80 years, is beneficial.
- Controlling blood pressure decreases the risk of myocardial infarction, heart failure, stroke and all-cause mortality, albuminuria, nephropathy, retinopathy and other microvascular complications.
- An ACE inhibitor is the preferred antihypertensive, an angiotensin II receptor blocker (ARB) is recommended if an ACE inhibitor is not tolerated.
- In older people, pharmacological control of blood pressure to  $\leq 130/70$  mmHg is not recommended. It has not been shown to improve cardiovascular outcomes. Treating the diastolic blood pressure < 70 mmHg has been associated with higher mortality (page 119 of standards of care).
- Systolic blood pressure < 120 mmHg is associated with increased risk of hypotension, falls and cardiac dysrhythmias.

## Dyslipidaemia

- Lipid-lowering: there is a role in secondary prevention for older people. Primary prevention: Should be based on individual clinical judgement. Age alone should not determine whether or not a statin should be prescribed.
- Older people are more likely to gain greater reduction in morbidity and mortality from CV risk reduction with statin therapy than from tight glycaemic control.
- Treatment of dyslipidaemia should be based on life expectancy, comorbidities, cognitive status and personal preferences.
- The risk of myopathy is usually dose related and is increased in the elderly and with combination treatments.
- Low lipid level may be an indicator of poor nutritional status or occult disease, and may reflect increased risk of underlying morbidity and mortality.

## Glycaemic control

- Intensive glycaemic therapy in people at high risk for cardiovascular disease, especially with polypharmacy, may increase risk for mortality.
- Check HbA1c 3-6 months and more regularly in those with frequent hypoglycaemia, hypoglycaemic unawareness, frailty or significant comorbidities.

## Reduce renal disease

- Control blood pressure. An ACE inhibitor is the preferred antihypertensive (if not tolerated, an ARB is recommended).
- In older people already taking an ACE inhibitor or ARB, it may not be necessary or helpful to continue testing for increased urinary albumin excretion on an annual basis.

## Reduce risk for stroke and MI

Aspirin as secondary prevention. Benefit is greatest in those over 65 years.

## Prevent vision loss

- Regular eye examinations are extremely important because poor vision can lead to social isolation, an increased risk of accidents and impaired ability to measure blood glucose and draw up insulin.
- A complete ophthalmologic exam should be performed by a qualified ophthalmologist or optometrist at the time of diagnosis and at least yearly thereafter.
- The purpose is to screen not only for diabetic retinopathy but also for cataracts and glaucoma, which are more common in older people with diabetes compared with those without diabetes.

## Preventing active foot problems and lower limb amputation

Foot ulcers are an important cause of morbidity in people with diabetes. Both vascular and neurological diseases increase the risk of foot ulcers. Address whether older people can see and reach their feet. If they cannot, another person should do the routine foot inspections.

- No problems: daily visual inspection, plus supportive well-fitting closed shoes, plus podiatry
- Diabetes podiatry review
- High-risk feet (eg, previous tissue loss, deformity, peripheral vascular disease, neuropathy): daily visual inspection, podiatry, custom-built footwear or orthotic insoles
- Peripheral vascular disease and tissue loss: as above, plus refer to vascular specialist, closely monitor wounds, regular wound care
- Clinically infected diabetic foot ulcer: broad spectrum antibiotic
- Cellulitis or osteomyelitis (suspected or present): refer promptly for intravenous antibiotics.

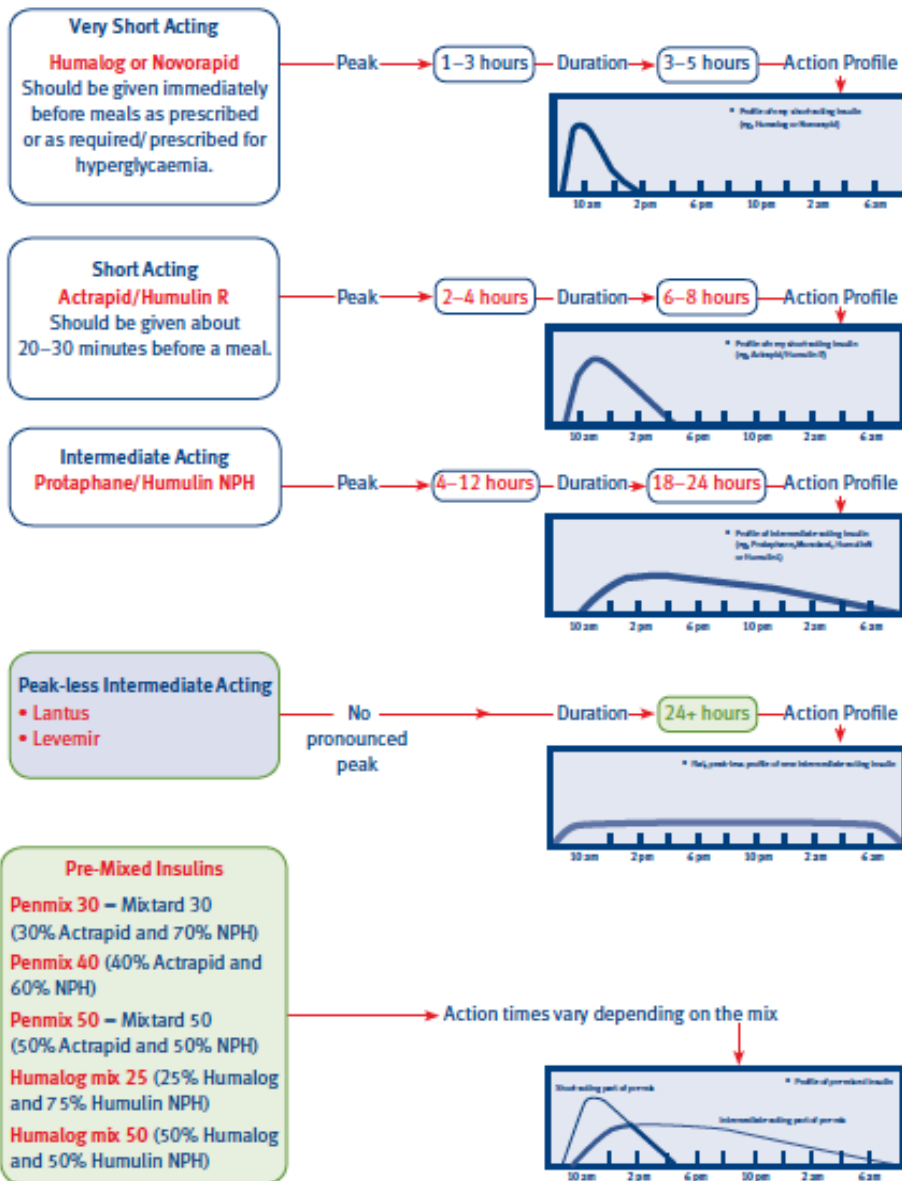
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## Annual diabetes review (bpac<sup>NZ</sup> 2015a)

	Assess at least annually	If moderate to high risk of complications
HbA1c	✓	✓ 3-monthly
Blood pressure	At every visit	
Lipid profile	✓	
Feet	✓	✓ 3-monthly
Retina check	✓	
Albumin: creatine ratio	✓	✓ 6-monthly
eGFR	✓	
BMI/weight	✓	
Teeth and gums	✓	
Healthy lifestyle advice	✓	



Diabetes medicines - insulin



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