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What and why

This "How to" explores background information regarding diabetes in older people, frailty, assessing frailty in clinical practice, hypoglycaemia and setting clinically appropriate glycaemic targets.

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Living with diabetes in later life

Although the global prevalence of diabetes is increasing in all countries of the world, with lifestyle factors, diet, sedentary behaviour and weight gain considered the major contributing factors, the decline in communicable disease, population growth and improving life expectancy mean that age and ageing are now recognised as risk factors for diabetes. The greatest age-specific rise in diabetes prevalence is expected in people ≥65 years, as more people will live for longer with diabetes and more will be diagnosed with diabetes later in life[1].

Increasing life expectancy carries the risk of living for more years with illness and disability[2]. Multimorbidity is almost inevitable amongst older people with diabetes[3], increasing the complexity of diabetes care and the likelihood of consequential polypharmacy. **The recent position statement from Primary Care Diabetes Europe provides a good summary**[4].

The complications associated with diabetes in later life are wide and varied (*see below*). Assessment must be holistic, taking account of physical and mental health, social circumstances and functional status.

Cerebrovascular disease:
- transient ischaemic attack
- stroke

Cognitive decline
Dementia (vascular and Alzheimer's)
Depression and anxiety

Chronic kidney disease:
- diabetic nephropathy
- hypertensive nephropathy
- ischaemic nephropathy
- obstructive uropathy
- nephrotoxic medications

Erectile dysfunction

Musculoskeletal disorders:
- low-back pain
- frozen shoulder
- diabetic cheiroarthropathy

Peripheral arterial disease
Peripheral neuropathy
Lower-limb amputation

Multimorbidity and polypharmacy
Retinopathy
Dry mouth
Poor dentition
Difficulty with mastication

Coronary disease:
- angina, myocardial infarction, heart failure

Frailty
Sarcopenia
Mobility difficulties

Falls
Incontinence
Dizziness
Sensory impairment
Malnutrition
Weight loss

Social isolation and loneliness

Hyperglycaemia **and** hypoglycaemia

Frailty

Frailty is: *"a medical syndrome with multiple causes and contributors, characterized by diminished strength, endurance, and physiologic function that increases an individual's vulnerability for developing increased dependency and/or death."*[5]

The relationship between diabetes and frailty is bidirectional, with loss of muscle mass (sarcopenia) associated with increased insulin resistance, thus exacerbating glycaemia. Poor health due to hyper- or hypoglycaemia may exacerbate loss of muscle mass, thus resulting in progressive sarcopenia. Poor nutrition, difficulties with dentition and low physical activity may contribute. The relationship between frailty in diabetes and weight is complex: weight loss, even in those who are overweight, may cause further loss of muscle mass and caution must be advised with use of medications known to be associated with weight loss.[6–9]

Assessing frailty in clinical practice

A number of assessment tools are available. Most practice clinical systems will now have access to the electronic Frailty Index (eFI), which is a computer algorithm that uses the accumulation of deficits model, taking coded information about an individual to generate a frailty score (*see right*):

However, the eFI may generate some surprises and so **must be confirmed** with clinical assessment. There are a number of tools that can be employed (***see Box 1 over page***).

Clinical category	eFI score
Fit	≤0.12
Mild frailty	0.13–0.24
Moderate frailty	0.25–0.36
Severe frailty	>0.36

References

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Box 1. Frailty assessment tools

1. Gait speed: the time taken to walk 4 m. A gait speed of >5 s to walk 4 m (>0.8 m/s) is suggestive of frailty.
2. Timed up and go (TUG) test.
3. FRAIL scale.[10]

Fatigue	Are you fatigued?
Resistance	Cannot walk up one flight of stairs?
Aerobic	Cannot walk one block?
Illnesses	Do you have ≥5 illnesses?
Loss of weight	>5% in the past 6 months?

1 or 2 positive answers indicates pre-frailty; ≥3 indicates frailty

4. Rockwood Clinical Frailty Scale© (*see right*).

Clinical Frailty Scale*

1 **Very Fit** – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.

2 **Well** – People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g. seasonally.

3 **Managing Well** – People whose **medical problems are well controlled,** but are **not regularly active** beyond routine walking.

4 **Vulnerable** – While **not dependent** on others for daily help, often **symptoms limit activities.** A common complaint is being "slowed up", and/or being tired during the day.

5 **Mildly Frail** – These people often have **more evident slowing,** and need help in **high order IADLs** (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.

6 **Moderately Frail** – People need help with **all outside activities** and with **keeping house.** Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.

7 **Severely Frail** – **Completely dependent for personal care**, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).

8 **Very Severely Frail** – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.

9. **Terminally Ill** - Approaching the end of life. This category applies to people with **a life expectancy <6 months**, who are **not otherwise evidently frail.**

Scoring frailty in people with dementia

The degree of frailty corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia**, they cannot do personal care without help.

* 1. Canadian Study on Health & Aging, Revised 2008.
2. K. Rockwood et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005;173:489-495.

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What else do we need to consider in someone with frailty?

- Difficulty walking or climbing a flight of stairs may suggest sarcopenia. Consider targeted exercise (physiotherapy or occupational therapy) and nutritional review.
- Fatigue should prompt clinical assessment to consider underlying causes (e.g. anaemia, B12 deficiency, hypothyroidism, depression, sleep apnoea, hypotension and pharmacological causes).
- Polypharmacy is a significant contributor to frailty: review medication, particularly looking for medications with anticholinergic properties; drug–drug interactions; drugs altering muscle power; drug-induced hyponatraemia or dehydration; and potential overtreatment with blood pressure or glucose-lowering medications.

Hypoglycaemia in older people

Older people are at increased risk from hypoglycaemia due to a constellation of factors:

- Age: advancing age[11], duration of diabetes[12]
- Comorbidity: renal[11] or cognitive impairment[11]
- Multimorbidity[13], frailty[8]
- Medications: polypharmacy[14], insulin[11] and sulfonlyurea[11]
- Physiological response to hypoglycaemia.

Older people are more likely to require hospital admission due to severe hypoglycaemia[15] and are at risk of injury or harm (including increased mortality) as a consequence.[13,16,17]

Blunting of the physiological adrenergic responses (tremor, sweating, palpitations) may mean that blood glucose levels fall further before the onset of symptomatic hypoglycaemia. Neuroglycopenic manifestations (confusion, sleepiness, aggression) may be mistaken for cognitive impairment.

Setting clinically appropriate glycaemic goals: consider the following factors

Functional status	Glycaemic range
Healthy or relatively healthy Fit and functionally independent Relatively longer anticipated life expectancy Managed on diet alone or oral glucose-lowering therapies associated with low risk of hypoglycaemia	HbA_{1c} 53*–59 mmol/mol (7.0–7.5%)
Complex/intermediate health or social care needs, with intermediate life expectancy or mild–moderate frailty and requiring oral glucose-lowering therapies Or, fit older people requiring sulfonylurea or insulin therapy	HbA_{1c} 53–64 mmol/mol (7.0–8.0%)
Very complex/poor health/frail Or, older people with complex/intermediate health or social care needs and/or mild frailty requiring insulin therapy	HbA_{1c} 59–69 mmol/mol (7.5–8.5%)
End-of-life palliative care	Avoid symptomatic hyper-/hypoglycaemia

*HbA_{1c} <53 mmol/mol (7.0%) may be considered acceptable in some fit older people on monotherapy associated with low risk of hypoglycaemia, although reviewing the ongoing need for medication should be considered.[4]

Principles for selecting glucose-lowering therapies

- Where you can, avoid the use of sulfonylurea and insulin therapies.
- Where you have to, ensure glucose monitoring and educate carers (atypical hypo symptoms and how to treat).
- Review promptly following any hypo.
- **Caution** with other glucose-lowering therapies – any ***can*** cause hypos!
- **Be aware** of other risks: renal impairment and need for dose adjustment (metformin, DPP-4 inhibitors); volume depletion with SGLT2 inhibitors; risk of heart failure (saxagliptin, pioglitazone); weight loss (can precipitate or exacerbate frailty).

Summary

- Be holistic.
- Consider physical and mental health, functional and social status.
- Look for and assess for frailty.
- Consider the risk of hypoglycaemia (avoid where possible).
- Set clinically appropriate glycaemic targets, based on holistic assessment.
- Consider the risks and benefits of the different glucose-lowering therapies when prescribing in older people.