

Diabetes in the elderly

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Abstract

The prevalence of diabetes mellitus is increasing, and its epidemiology is shifting towards old age because of increased life expectancies. As a result, diabetes mellitus is increasingly becoming a disease of older rather than middle age. The increased prevalence of co-morbidities associated with ageing, combined with the increased prevalence of geriatric syndromes that lead to physical and mental disabilities, contributes to the complexity of managing diabetes in the elderly. Taking into account the heterogeneous functional status, co-morbidities and life expectancy of older people, therapeutic interventions and glycaemic targets should be individualized, considering patients' preferences and putting quality of life at the heart of their care plans.

Keywords Ageing; care needs; diabetes mellitus; management; MRCP; older people

Introduction

With increasing ageing of the population and changes in lifestyle, the prevalence of diabetes is likely to increase, especially among older individuals aged 75 years and over. Diabetes mellitus is associated with premature morbidity and mortality, and places a substantial burden on individuals and healthcare systems. In older people, diabetes is a disabling disease because of its vascular complications and coexisting morbidities, as well as the increased prevalence of geriatric syndromes, including cognitive and physical dysfunction. As a result, diabetes increases the risk of nursing home admission by 3-fold. The management of and care for older people with diabetes are challenging because of the complexity of the condition in old age, and the heterogeneous nature of this age group.

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Key points

- The prevalence of diabetes mellitus in older people is increasing
- Care for older people with diabetes is a challenge because of their multiple co-morbidities and high prevalence of geriatric syndromes
- Quality of life should always be the focus for individual care

Epidemiology

The worldwide prevalence of diabetes increases with age from 12% in people aged 65–70 years to 15% in people >80 years. In France, the prevalence of diabetes peaks at age 75–79 years, affecting 19.7% of men and 14.2% of women, yet many cases remain undiagnosed. In the USA, the prevalence of diagnosed diabetes in those 75 years old or over was reported to be 14.9%, with undiagnosed diabetes in a further 13.4%, giving a total prevalence of 28.3%. In US care homes, the prevalence of diabetes is even higher, affecting up to 32.8% of residents, and this continues to rise.

Geriatric syndromes

Geriatric syndromes encompassing physical and mental disabilities are emerging as a third category of complications in addition to traditional micro- and macrovascular disease in older people with diabetes. It has been shown that diabetes is associated with accelerated loss of muscle strength and muscle quality that leads to sarcopenia.¹ Diabetes-related complications such as renal impairment and diabetes-associated co-morbidities such as hypertension increase the likelihood of frailty. The combination of sarcopenia and frailty mediate the pathway to physical disability.

In a meta-analysis of a total of 18 population-based prospective studies, diabetes increased the risk of all types of dementia by about 2-fold.² Longitudinal studies have also shown that diabetes increases the relative risk of incident depression by 27%.³ The risk of dementia increases by 2-fold in older people with co-morbid diabetes and depression, and this combination mediates the pathway to mental disability. Diabetes care depends on the patient's ability to perform self-care tasks, which can be compromised by the presence of geriatric syndromes. For example, patients with dementia may not be able to recognize or treat hypoglycaemia, or remember and administer their insulin regimen correctly. Moreover, patients with depression can have problems with medication or self-care compliance, leading to persistent hyperglycaemia and increased risk of diabetic complications (Figure 1).

Diagnosis and assessment

The criteria for diagnosis of diabetes in elderly individuals are no different from those used in the younger population, but clinical presentation, diagnosis and assessment can be challenging.

Interaction between diabetes and geriatric syndromes

Diabetes affects both physical and mental health leading to the development of geriatric syndromes. Similarly, the effects of geriatric syndromes can contribute to worsening of diabetes control, setting up a vicious circle of effect.

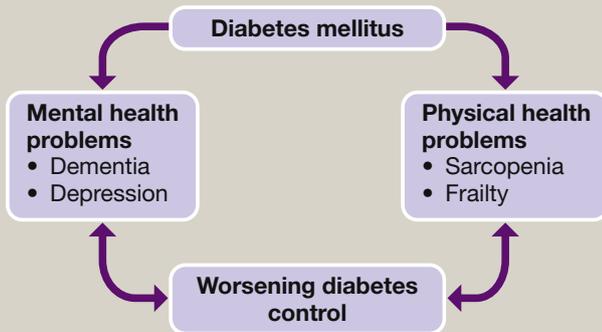


Figure 1

Comprehensive geriatric assessment (Table 1) should be performed when the diagnosis is first made and at annual reviews.

Diabetes care

Diabetes management in older people should take into account their heterogeneous nature and complex needs. Special aspects of drug therapy in elderly individuals, which have important clinical implications, are detailed in Table 2. Other considerations of diabetes care in elderly patients include screening for mental and physical health (Tables 3 and 4), and the use of appropriate and individualized glycaemic targets.

Mental health care

Older people with diabetes are twice as likely to develop dementia as age-matched individuals without diabetes. Persistent hyperglycaemia can lead to cognitive dysfunction by inducing inflammation, oxidative stress, endothelial dysfunction and cerebrovascular disease. Repeated episodes of hypoglycaemia can also induce brain damage that leads to cognitive dysfunction.

In a community-based study of 1398 older patients with diabetes (mean age 70 (standard deviation ± 7.4) years), adherence to diabetes self-care tasks (taking diabetes medication, performing regular exercise, following a recommended eating plan, undertaking blood glucose monitoring, inspecting the feet) decreased as cognitive impairment increased.⁴ Therefore screening for dementia (Table 3) is important if poor compliance with self-care tasks or repeated hypoglycaemia is observed.

Depressive illness is common in older people with diabetes and is associated with worse outcomes. The relationship of depression and diabetes appears to be bi-directional, the presence of one increasing the risk of the other, as discussed elsewhere in this chapter. Therefore, healthcare professional should be actively screening for depression in older people with diabetes (Table 3).

Special aspects of diabetes diagnosis and assessment in the elderly

A. Clinical presentation

- Less prominent osmotic symptoms as a result of the increased renal threshold for glucose (reducing the intensity of polyuria) and impairment of thirst sensation (reducing the intensity of polydipsia)
- Diabetes can be asymptomatic in up to 50% of patients
- When symptoms are present, they are non-specific, such as being generally unwell, fatigued or lethargic, and can mistakenly be attributed to ageing
- Diabetes complications such as non-ketotic hyperosmolar coma can be the first presentation

B. Diagnosis

- Fasting glucose in the early stages of diabetes can be normal.
- A random blood glucose, 2-hour postprandial blood glucose or 2-hour glucose tolerance test appears to capture undiagnosed cases
- HbA_{1c} can be used in diagnosis but it has low sensitivity and can miss up to 50% of cases.

C. Assessments

In addition to screening for micro- and macrovascular complications, comprehensive geriatric assessment should be performed on diagnosis. This includes screening for:

- Cognitive dysfunction
- Depression
- Disability and falls
- Urinary incontinence, persistent pain and nutritional status
- Polypharmacy
- Social status

Table 1

Physical health care

Diabetes in older people is associated with increased risk of muscle loss or sarcopenia that leads to functional impairment, falls, frailty and disability. Functional decline is associated with impairment in executing activities of daily living, which can have an impact on performing diabetes-related self-care. Therefore, sarcopenia and frailty (Table 4) should be regularly screened for in patient reviews.

Progressive resistance training exercise along with a diet rich in vitamin D and protein, especially the essential amino acid leucine, have been shown to improve muscle function.⁵ Nutritional guidelines should not be too restrictive, but should be healthy and tailored to reflect personal preferences. Individuals should be allowed freedom in their food selection, diabetes treatment being adjusted accordingly. The aims of nutritional choices are to maintain a healthy body weight and avoid malnutrition. Thirst sensation in elderly people, particularly those with dementia, is impaired, and maintenance of hydration is another important goal to reduce the risk of volume depletion and hyperglycaemic crises.

Glycaemic targets

Short term: short-term targets should include a daily random blood glucose of >4 mmol/litre but <15 mmol/litre, as

Special aspects of diabetes drug therapy in elderly individuals

Medication	Considerations
Metformin	Not suitable for patients with weight loss or at risk of lactic acidosis such as with renal impairment, dehydration, heart failure and acute illness
Sulfonylureas	Not suitable for obese individuals or those at risk of recurrent hypoglycaemia, particularly older individuals who live alone
α -Glucosidase inhibitors	High incidence of gastrointestinal adverse effects such as flatulence and diarrhoea, but low risk of hypoglycaemia
Meglitinides	Suitable for patients with an irregular eating pattern. Marginally lower risk of hypoglycaemia than sulfonylureas
Pioglitazone	Not suitable for patients with fluid retention or heart failure, but has low risk of hypoglycaemia. Also concerns over use in patients with osteoporosis
DPP-IV inhibitors	Dose adjustment required in renal impairment (except linagliptine), but low risk of hypoglycaemia.
GLP-1 mimetics	Not suitable for patients with weight loss. Injectable, but low risk of hypoglycaemia. Some agents in the class show vascular protective properties
SGLT-2 inhibitors	Not suitable for patients with weight loss. Increases risk of urinary tract infections, candidiasis, dehydration and hypotension. Beneficial in individuals with heart failure, and agents in this class display vascular protective properties.
Insulin	Has high risk of hypoglycaemia, requires glucose monitoring and can be difficult to administer. Long-acting insulin analogues are more convenient to use in elderly individuals, with lower risk of hypoglycaemia

DPP-IV, dipeptidyl peptidase-IV; GLP-1, glucagon-like peptide-1; SGLT-2, sodium glucose cotransporter 2.

Table 2

Screening tools for dementia and depression

Mini-Cog

Ask the patient to repeat three items such as lemon, key and balloon. Then provide a clock face.

- Ask the patient to draw the numbers on the clock face
 - Ask the patient to draw the hands of the clock to show the time as 10 to 3
 - Ask the patient to recall the three items they repeated
- Give 1 mark for each task performed and each item remembered. A score of ≤ 3 out of a maximum of 5 defines cognitive impairment.

Patient Health Questionnaire (PHQ-2)

- Ask whether the patient has little interest in doing things
 - Ask whether the patient is feeling down, depressed or hopeless
- Any positive answer triggers assessment using the detailed (PHQ-9) assessment

Table 3

concentrations outside this range are likely to cause symptoms and results in cognitive changes. Maintaining blood glucose in this 'comfort zone', especially in frail patients, avoids extreme blood glucose concentrations and maintains mental function and general well-being.

Long term: long-term targets are based on concentrations of glycated haemoglobin (HbA_{1c}), which should be around 53 mmol/mol (7%) in fit elderly individuals living in the community who have new-onset diabetes, similar to the target in younger people. For older people with established cardiovascular disease and long-standing diabetes, a safer target of around 58 mmol/mol (7.5%) is appropriate, and in frail older people with multiple co-morbidities a target of around 64 mmol/mol (8%) is suitable. Targets could be even higher for more frail elderly,

Screening tools for sarcopenia and frailty

SARC-F Scale

- Strength (difficulty lifting a weight of 10 pounds or 4.5 kg)
 - Assistance in walking (difficulty walking across a room)
 - Rising from a chair (difficulty in transferring from chair to bed)
 - Climbing stairs (difficulty in climbing a flight of stairs)
 - Falls (number of falls in the last year)
- Scoring: no difficulty = 0, some difficulty = 1, unable to carry out = 2; no falls = 0, 1–3 falls = 1, ≥ 4 falls = 2
A total score of ≥ 4 indicates a high risk of adverse outcomes from sarcopenia.

FRAIL Scale

- Fatigued (self-reported)
 - Resistance (unable to climb a flight of stairs)
 - Ambulation (unable to walk a block)
 - Illness (have >5 co-morbidities)
 - Loss of weight (>5 kg in the last 6 months)
- The presence of ≥ 3 indicators is diagnostic of frailty

Table 4

especially those in nursing homes with a very short life expectancy, in whom short-term targets are more important to avoid symptoms and preserve quality of life. ◆

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TEST YOURSELF

To test your knowledge based on the article you have just read, please complete the questions below. The answers can be found at the end of the issue or online [here](#).

Question 1

A 76-year-old man moved house and presented for a health check. He had a background of hypertension, ischaemic heart disease and stage 3 chronic kidney disease. He also had a family history of type 2 diabetes.

What is the most appropriate measure to exclude diabetes in these circumstances?

- Normal 2-hour post-prandial blood glucose or glucose tolerance test
- Check on classical symptoms of diabetes such as polyuria, polydipsia or weight loss
- Normal fasting blood glucose
- Normal HbA_{1c}
- Absence of glucosuria

Question 2

An 83-year-old woman presented because daughter noticed that she had become less compliant with her self-care tasks such as blood glucose monitoring, diet, medications, eye and foot care as previously. She had a 20-year history of type 2 diabetes and was reasonably controlled on a combination of metformin and basal insulin. She lived alone. Records indicated some deterioration in her diabetes control.

What is the most appropriate action?

- Switch basal to basal-bolus regime
- Add an additional oral hypoglycaemic drug
- Routine blood testing to look for a cause
- Refer to a dietician for more diet control
- Screen for depression or dementia

Question 3

An 88-year-old woman was admitted to a nursing home from hospital after a fall in which she had sustained a hip fracture. During that admission, she had been found to have type 2 diabetes and had been treated with oral hypoglycaemic agents. She also had moderate dementia.

What would be the most appropriate way to assess control of her diabetes?

- Keeping levels of HbA_{1c} <58 mmol/mol (<7.5%)
- Noting symptoms of polyuria and thirst
- Keeping random plasma glucose levels between 4 and 7 mmol/litre
- Measuring regular plasma glucose levels to avoid hypoglycaemia
- No measurements are necessary