



10. Older Adults

American Diabetes Association

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Recommendations

- Consider the assessment of medical, functional, mental, and social geriatric domains for diabetes management in older adults to provide a framework to determine targets and therapeutic approaches. **E**
- Screening for geriatric syndromes may be appropriate in older adults experiencing limitations in their basic and instrumental activities of daily living, as they may affect diabetes self-management. **E**
- Older adults (≥ 65 years of age) with diabetes should be considered a high-priority population for depression screening and treatment. **B**
- Hypoglycemia should be avoided in older adults with diabetes. It should be screened for and managed by adjusting glycemic targets and pharmacological interventions. **B**
- Older adults who are functional and cognitively intact and have significant life expectancy may receive diabetes care with goals similar to those developed for younger adults. **E**
- Glycemic goals for some older adults might reasonably be relaxed, using individual criteria, but hyperglycemia leading to symptoms or risk of acute hyperglycemic complications should be avoided in all patients. **E**
- Screening for diabetes complications should be individualized in older adults, but particular attention should be paid to complications that would lead to functional impairment. **E**
- Other cardiovascular risk factors should be treated in older adults with consideration of the time frame of benefit and the individual patient. Treatment of hypertension is indicated in virtually all older adults, and lipid-lowering and aspirin therapy may benefit those with life expectancy at least equal to the time frame of primary or secondary prevention trials. **E**
- When palliative care is needed in older adults with diabetes, strict blood pressure control may not be necessary, and withdrawal of therapy may be appropriate. Similarly, the intensity of lipid management can be relaxed, and withdrawal of lipid-lowering therapy may be appropriate. **E**
- Consider diabetes education for the staff of long-term care facilities to improve the management of older adults with diabetes. **E**
- Patients with diabetes residing in long-term care facilities need careful assessment to establish a glycemic goal and to make appropriate choices of glucose-lowering agents based on their clinical and functional status. **E**
- Overall comfort, prevention of distressing symptoms, and preservation of quality of life and dignity are primary goals for diabetes management at the end of life. **E**

OVERVIEW

Diabetes is an important health condition for the aging population; ~26% of patients over the age of 65 years have diabetes (1), and this number is expected to grow rapidly in the coming decades. Older individuals with diabetes have higher rates of premature death, functional disability, and coexisting illnesses, such as hypertension, coronary heart disease, and stroke, than those without diabetes. Older adults with diabetes also are at a greater risk than other older adults for several common geriatric syndromes, such as polypharmacy, cognitive impairment, urinary incontinence, injurious falls, and persistent pain. Screening for diabetes complications in older adults also should be individualized and periodically revisited, since the results of screening tests may impact therapeutic approaches and targets. Older adults are at increased risk for depression and should therefore be screened and treated accordingly

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(2). Diabetes management may require assessment of medical, functional, mental, and social domains. This may provide a framework to determine targets and therapeutic approaches. Particular attention should be paid to complications that can develop over short periods of time and/or that would significantly impair functional status, such as visual and lower-extremity complications. Please refer to the American Diabetes Association (ADA) consensus report “Diabetes in Older Adults” for details (3).

NEUROCOGNITIVE FUNCTION

Older adults with diabetes are at higher risk of cognitive decline and institutionalization (4,5). The presentation of cognitive impairment ranges from subtle executive dysfunction to memory loss and overt dementia. Diabetes increases the incidence of all-cause dementia, Alzheimer disease, and vascular dementia when compared with rates in people with normal glucose tolerance (6). The effects of hyperglycemia and hyperinsulinemia on the brain are areas of intense research interest. Clinical trials of specific interventions—including cholinesterase inhibitors and glutamatergic antagonists—have not shown positive therapeutic benefit in maintaining or significantly improving cognitive function or in preventing cognitive decline (7). Recent pilot studies in patients with mild cognitive impairment evaluating the potential benefits of intranasal insulin therapy or metformin therapy provide insights for future clinical trials and mechanistic studies (8–10).

The presence of cognitive impairment can make it challenging for clinicians to help their patients to reach individualized glycemic, blood pressure, and lipid targets. Cognitive dysfunction makes it difficult for patients to perform complex self-care tasks, such as glucose monitoring and adjusting insulin doses. It also hinders their ability to appropriately maintain the timing and content of diet. When clinicians are managing these types of patients, it is critical to simplify drug regimens and to involve caregivers in all aspects of care.

Poor glycemic control is associated with a decline in cognitive function (11), and longer duration of diabetes worsens cognitive function. There are ongoing studies evaluating whether preventing or delaying diabetes onset may help to

maintain cognitive function in older adults. However, studies examining the effects of intensive glycemic and blood pressure control to achieve specific targets have not demonstrated a reduction in brain function decline (12).

Older adults with diabetes should be carefully screened and monitored for cognitive impairment (3). Several organizations have released simple assessment tools, such as the Mini-Mental State Examination (MMSE) and the Montreal Cognitive Assessment (MoCA), which may help to identify patients requiring neuropsychological evaluation, particularly those in whom dementia is suspected (i.e., experiencing memory loss and decline in their basic and instrumental activities of daily living).

HYPOGLYCEMIA

It is important to prevent hypoglycemia to reduce the risk of cognitive decline and to carefully assess and reassess patients' risk for worsening of glycemic control and functional decline. Older adults are at higher risk of hypoglycemia for many reasons, including insulin deficiency and progressive renal insufficiency. In addition, older adults tend to have higher rates of unidentified cognitive deficits, causing difficulty in complex self-care activities (e.g., glucose monitoring, adjusting insulin doses, etc.). These deficits have been associated with increased risk of hypoglycemia and with severe hypoglycemia linked to increased dementia. Therefore, it is important to routinely screen older adults for cognitive dysfunction and discuss findings with the caregivers. Hypoglycemic events should be diligently monitored and avoided, whereas glycemic targets and pharmacological interventions may need to be adjusted to accommodate for the changing needs of the older adult (3).

TREATMENT GOALS

Rationale

The care of older adults with diabetes is complicated by their clinical and functional heterogeneity. Some older individuals may have developed diabetes years earlier and have significant complications, others are newly diagnosed and may have had years of undiagnosed diabetes with resultant complications, and still other older adults may have truly recent-onset disease with few or

no complications. Some older adults with diabetes are frail and have other underlying chronic conditions, substantial diabetes-related comorbidity, or limited physical or cognitive functioning. Other older individuals with diabetes have little comorbidity and are active. Life expectancies are highly variable for this population but are often longer than clinicians realize. Providers caring for older adults with diabetes must take this heterogeneity into consideration when setting and prioritizing treatment goals (Table 10.1).

Healthy Patients With Good Functional Status

There are few long-term studies in older adults demonstrating the benefits of intensive glycemic, blood pressure, and lipid control. Patients who can be expected to live long enough to reap the benefits of long-term intensive diabetes management, who have good cognitive and physical function, and who choose to do so via shared decision making may be treated using therapeutic interventions and goals similar to those for younger adults with diabetes. As with all patients with diabetes, diabetes self-management education and ongoing diabetes self-management support are vital components of diabetes care for older adults and their caregivers.

Patients With Complications and Reduced Functionality

For patients with advanced diabetes complications, life-limiting comorbid illness, or substantial cognitive or functional impairment, it is reasonable to set less intensive glycemic target goals. These patients are less likely to benefit from reducing the risk of microvascular complications and more likely to suffer serious adverse effects from hypoglycemia. However, patients with poorly controlled diabetes may be subject to acute complications of diabetes, including dehydration, poor wound healing, and hyperglycemic hyperosmolar coma. Glycemic goals at a minimum should avoid these consequences.

Vulnerable Patients at the End of Life

For patients receiving palliative care and end-of-life care, the focus should be to avoid symptoms and complications from glycemic management. Thus, when organ failure develops, several agents will have to be titrated or discontinued. For the

Table 10.1—Framework for considering treatment goals for glycemia, blood pressure, and dyslipidemia in older adults with diabetes

Patient characteristics/ health status	Rationale	Reasonable A1C goal‡	Fasting or preprandial glucose	Bedtime glucose	Blood pressure	Lipids
Healthy (few coexisting chronic illnesses, intact cognitive and functional status)	Longer remaining life expectancy	<7.5% (58 mmol/mol)	90–130 mg/dL (5.0–7.2 mmol/L)	90–150 mg/dL (5.0–8.3 mmol/L)	<140/90 mmHg	Statin unless contraindicated or not tolerated
Complex/intermediate (multiple coexisting chronic illnesses* or 2+ instrumental ADL impairments or mild-to-moderate cognitive impairment)	Intermediate remaining life expectancy, high treatment burden, hypoglycemia vulnerability, fall risk	<8.0% (64 mmol/mol)	90–150 mg/dL (5.0–8.3 mmol/L)	100–180 mg/dL (5.6–10.0 mmol/L)	<140/90 mmHg	Statin unless contraindicated or not tolerated
Very complex/poor health (LTC or end-stage chronic illnesses** or moderate-to-severe cognitive impairment or 2+ ADL dependencies)	Limited remaining life expectancy makes benefit uncertain	<8.5%† (69 mmol/mol)	100–180 mg/dL (5.6–10.0 mmol/L)	110–200 mg/dL (6.1–11.1 mmol/L)	<150/90 mmHg	Consider likelihood of benefit with statin (secondary prevention more so than primary)

This represents a consensus framework for considering treatment goals for glycemia, blood pressure, and dyslipidemia in older adults with diabetes. The patient characteristic categories are general concepts. Not every patient will clearly fall into a particular category. Consideration of patient and caregiver preferences is an important aspect of treatment individualization. Additionally, a patient’s health status and preferences may change over time. ADL, activities of daily living.

‡A lower A1C goal may be set for an individual if achievable without recurrent or severe hypoglycemia or undue treatment burden.

*Coexisting chronic illnesses are conditions serious enough to require medications or lifestyle management and may include arthritis, cancer, congestive heart failure, depression, emphysema, falls, hypertension, incontinence, stage 3 or worse chronic kidney disease, myocardial infarction, and stroke. By “multiple,” we mean at least three, but many patients may have five or more (27).

**The presence of a single end-stage chronic illness, such as stage 3–4 congestive heart failure or oxygen-dependent lung disease, chronic kidney disease requiring dialysis, or uncontrolled metastatic cancer, may cause significant symptoms or impairment of functional status and significantly reduce life expectancy.

†A1C of 8.5% (69 mmol/mol) equates to an estimated average glucose of ~200 mg/dL (11.1 mmol/L). Looser A1C targets above 8.5% (69 mmol/mol) are not recommended as they may expose patients to more frequent higher glucose values and the acute risks from glycosuria, dehydration, hyperglycemic hyperosmolar syndrome, and poor wound healing.

dying patient most agents for type 2 diabetes may be removed. There is, however, no consensus for the management of type 1 diabetes in this scenario (13,14).

Beyond Glycemic Control

Although hyperglycemia control may be important in older individuals with diabetes, greater reductions in morbidity and mortality are likely to result from control of other cardiovascular risk factors rather than from tight glycemic control alone. There is strong evidence from clinical trials of the value of treating hypertension in the elderly (15,16). There is less evidence for lipid-lowering and aspirin therapy, although the benefits of these interventions for primary and secondary prevention are likely to apply to older adults whose life expectancies equal or exceed the time frames seen in clinical trials.

PHARMACOLOGICAL THERAPY

Special care is required in prescribing and monitoring pharmacological therapy in older adults (17). Cost may be a significant factor, especially as older adults tend to be on many medications.

Insulin Sensitizers

Metformin is the first-line agent in older adults with type 2 diabetes. However, it is contraindicated in patients with renal insufficiency or significant heart failure. Since serum creatinine levels do not adequately reflect renal function in older people (muscle mass losses are associated with chronic conditions and functional decline), a timed urine collection to assess creatinine clearance has been recommended, particularly in those aged ≥80 years. Metformin may be temporarily discontinued before procedures, during hospitalizations, and when acute illness may compromise renal or liver function. Thiazolidinediones, if used at all, should be used very cautiously in those with, or at risk for, congestive heart failure and have been associated with fractures.

Insulin Secretagogues

Sulfonylureas and other insulin secretagogues are associated with hypoglycemia and should be used with caution. Glyburide is contraindicated in older adults (18). Insulin can also cause

hypoglycemia, and its use requires that patients or caregivers have good visual and motor skills and cognitive ability.

Incretin-Based Therapies

Glucagon-like peptide 1 receptor agonists and dipeptidyl peptidase 4 inhibitors have few side effects, but their costs may be a barrier to some older patients. A systematic review concluded that incretin-based agents do not increase major adverse cardiovascular events (19). Glucagon-like peptide 1 receptor agonists are injectable agents, which require visual, motor, and cognitive skills.

Sodium–Glucose Cotransporter 2 Inhibitors

Sodium–glucose cotransporter 2 inhibitors offer an oral route, which may be convenient for older adults with diabetes; however, long-term experience is limited despite the initial efficacy and safety data reported with these agents.

Other Factors to Consider

The needs of older adults with diabetes and their caregivers should be evaluated

to construct a tailored care plan. Social difficulties may impair their quality of life and increase the risk of functional dependency. The patient's living situation must be considered, as it may affect diabetes management and support.

Older adults in assisted living facilities may not have support to administer their own medications, whereas those living in a nursing home (community living centers) may rely completely on the care plan and nursing support. Those receiving palliative care (with or without hospice) may require an approach that emphasizes comfort and symptom management, while deemphasizing strict metabolic and blood pressure control.

TREATMENT IN SKILLED NURSING FACILITIES AND NURSING HOMES

Management of diabetes in the long-term care (LTC) setting (i.e., nursing homes and skilled nursing facilities) is unique. Individualization of health care is important in all patients; however, practical guidance is needed for medical providers as well as the LTC staff and caregivers. The American Medical Directors Association (AMDA) guidelines offer a 12-step program for staff (20). This training includes diabetes detection and institutional quality assessment. It is also recommended that LTC facilities develop their own policies and procedures for prevention and management of hypoglycemia.

Resources

Staff of LTC facilities should receive appropriate diabetes education to improve the management of older adults with diabetes. Major organizations such as the ADA, the American Geriatrics Society (AGS), the International Association of Gerontology and Geriatrics (IAGG), and the European Diabetes Working Party for Older People (EDWPOP) concur with the AMDA on the need to individualize treatments for each patient, the need to avoid both hypoglycemia and the metabolic complications of diabetes, and the need to provide adequate diabetes training to LTC staff (3,21).

Nutrition Considerations

An older adult residing in an LTC facility may have irregular and unpredictable meal consumption, undernutrition, anorexia, and impaired swallowing. Furthermore, therapeutic diets may inadvertently lead to decreased food

intake and contribute to unintentional weight loss and undernutrition. Diets tailored to a patient's culture, preferences, and personal goals might increase quality of life, satisfaction with meals, and nutrition status (22).

Hypoglycemia

Older adults with diabetes in LTC are especially vulnerable to hypoglycemia. They have a disproportionately high number of clinical complications and comorbidities that can increase hypoglycemia risk: impaired renal function, slowed hormonal regulation and counterregulation, and suboptimal hydration, variable appetite and nutritional intake, polypharmacy, and slowed intestinal absorption (23).

Another consideration for the LTC setting is that unlike the hospital setting, medical providers are not required to evaluate the patients daily. According to federal guidelines, assessments should be done at least every 30 days for the first 90 days after admission and then at least once every 60 days. Although in practice the patients may actually be seen more frequently, the concern is that patients may have uncontrolled glucose levels or wide excursions without the practitioner being notified. Providers may make adjustments to treatment regimens by telephone, fax, or order directly at the LTC facilities provided they are given timely notification from a standardized alert system.

The following alert strategy could be considered:

1. **Call provider immediately:** in case of hypoglycemia (<70 mg/dL [3.9 mmol/L]). Low finger-stick blood glucose values should be confirmed by laboratory glucose measurement.
2. **Call as soon as possible:** a) glucose values between 70 and 100 mg/dL (between 3.9 and 5.6 mmol/L) (regimen may need to be adjusted), b) glucose values greater than 250 mg/dL (13.9 mmol/L) within a 24-h period, c) glucose values greater than 300 mg/dL (16.7 mmol/L) within 2 consecutive days, d) or when any reading is too high, e) or the patient is sick, with vomiting or other malady that can reflect hyperglycemic crisis, may lead to poor oral intake, and thus requires regimen adjustment.

END-OF-LIFE CARE

The management of the older adult at the end of life receiving palliative medicine or hospice is a unique situation. Overall, palliative medicine promotes comfort, symptom control, and prevention (pain, hypoglycemia and hyperglycemia, dehydration) and preservation of dignity and quality of life in patients with limited life expectancy (21,24). A patient has the right to refuse testing and treatment, whereas providers may consider withdrawing treatment and limiting diagnostic testing, including a reduction in the frequency of finger-stick testing (25). Glucose targets should aim to prevent hypoglycemia and hyperglycemia. Treatment interventions need to be mindful of quality of life. Careful monitoring of oral intake is warranted. The decision process may need to involve the patient, family, and caregivers, leading to a care plan that is both convenient and effective for the goals of care (26). The pharmacological therapy may include oral agents as first line, followed by a simplified insulin regimen. If needed, basal insulin can be implemented, accompanied by oral agents and without rapid-acting insulin. Agents that can cause gastrointestinal symptoms such as nausea or excess weight loss may not be good choices in this setting. As symptoms progress, some agents may be slowly tapered down and discontinued.

Strata have been proposed for diabetes management in those with advanced disease (14).

1. **A stable patient:** continue with the patient's previous regimen, with a focus on the prevention of hypoglycemia and the management of hyperglycemia, keeping levels below the renal threshold of glucose. There is very little role for A1C monitoring and lowering.
2. **A patient with organ failure:** preventing hypoglycemia is of greater significance. Dehydration must be prevented and handled. In people with type 1 diabetes, insulin administration may be reduced as the oral intake of food decreases. For those with type 2 diabetes, agents that may cause hypoglycemia should be titrated. The main goal is to avoid hypoglycemia, allowing for glucose values in the upper level of the desired target range.

3. **A dying patient:** for patients with type 2 diabetes, the discontinuation of all medications may be a pertinent approach, as they are unlikely to have any oral intake. In patients with type 1 diabetes, there is no consensus, but a small amount of basal insulin may maintain glucose levels and prevent acute hyperglycemic complications.

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