



# Management of Diabetes in Long-term Care and Skilled Nursing Facilities: A Position Statement of the American Diabetes Association

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Diabetes is more common in older adults, has a high prevalence in long-term care (LTC) facilities, and is associated with significant disease burden and higher cost. The heterogeneity of this population with regard to comorbidities and overall health status is critical to establishing personalized goals and treatments for diabetes. The risk of hypoglycemia is the most important factor in determining glycemic goals due to the catastrophic consequences in this population. Simplified treatment regimens are preferred, and the sole use of sliding scale insulin (SSI) should be avoided. This position statement provides a classification system for older adults in LTC settings, describes how diabetes goals and management should be tailored based on comorbidities, delineates key issues to consider when using glucose-lowering agents in this population, and provides recommendations on how to replace SSI in LTC facilities. As these patients transition from one setting to another, or from one provider to another, their risk for adverse events increases. Strategies are presented to reduce these risks and ensure safe transitions. This article addresses diabetes management at end of life and in those receiving palliative and hospice care. The integration of diabetes management into LTC facilities is important and requires an interprofessional team approach. To facilitate this approach, acceptance by administrative personnel is needed, as are protocols and possibly system changes. It is important for clinicians to understand the characteristics, challenges, and barriers related to the older population living in LTC facilities as well as the proper functioning of the facilities themselves. Once these challenges are identified, individualized approaches can be designed to improve diabetes management while lowering the risk of hypoglycemia and ultimately improving quality of life.

The epidemic growth of type 2 diabetes in the U.S. has disproportionately affected the elderly. In 2012, the prevalence of diabetes among people aged  $\geq 65$  (25.9%) was more than six times that of people aged 20–24 years (4.1%) (1). In the long-term care (LTC) population, the prevalence of diabetes ranges from 25% to 34% across multiple studies (2–4). The high prevalence of diabetes among older adults has contributed to the unsustainable growth of health care costs in the U.S. The estimated total cost of diabetes in 2012 was \$245 billion. Average medical expenditures for people with diagnosed diabetes were 2.3 times higher than among people without diabetes. LTC costs for people with diabetes were estimated at \$19.6 billion in 2012 (5).

The high prevalence of diabetes in older adults is due to age-related physiological changes, such as increased abdominal fat, sarcopenia, and chronic low-grade inflammation, that lead to increased insulin resistance in peripheral tissues and relatively impaired pancreatic islet function (6). Diabetes increases the risk of cardiovascular and

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microvascular complications but also increases the risk of common geriatric syndromes, including cognitive impairment, depression, falls, polypharmacy, persistent pain, and urinary incontinence (7,8). The older diabetes population is highly heterogeneous in terms of comorbid illnesses and functional impairments. These characteristics have frequently been used to exclude older individuals from randomized clinical trials. The heterogeneity of the population and the lack of clinical trial data represent challenges to determining standardized intervention strategies that can work for all older adults with diabetes. As the vast majority of the patients with diabetes in LTC facilities have type 2 diabetes, most recommendations in this position statement are directed toward that population. However, we have suggested specific recommendations for patients with type 1 diabetes when appropriate.

**GENERAL APPROACH TO CARE**

**Recommendations**

- Management of diabetes among older adults residing in LTC facilities is challenging due to heterogeneity in this population. Careful evaluation of comorbidities and overall health is needed before developing goals and treatment strategies for diabetes management. **E**
- Diabetes management in LTC patients (residents) requires different approaches because of unique challenges faced by this population and the workings of LTC facilities. **E**

**Need for Different Approaches for LTC Population**

The challenge of caring for older adults with diabetes arises not only from their clinical heterogeneity but also from their considerable variability in living arrangements and social support, which significantly impacts diabetes management. Some older adults live independently, some in assisted care facilities that provide partial support with medical management, and some in fully supervised LTC facilities. As the challenges and self-care responsibilities change in these different environments, different recommendations are needed for each setting on how to manage diabetes in individual patients (Table 1). The management strategies for community-dwelling and hospitalized patients with diabetes

**Table 1—Characteristics of older adults and their diabetes management based on living situation**

	Community-dwelling patients	Assisted living facilities	Hospitalized inpatients	Skilled nursing facility	Nursing facility (long-term)
General characteristics	<ul style="list-style-type: none"> <li>• Independent living</li> <li>• Medically stable</li> </ul>	<ul style="list-style-type: none"> <li>• Partially ADL/IADL dependent</li> </ul>	<ul style="list-style-type: none"> <li>• Acutely ill</li> </ul>	<ul style="list-style-type: none"> <li>• Admitted for rehabilitation</li> <li>• Probable home discharge</li> </ul>	<ul style="list-style-type: none"> <li>• Chronically ill</li> <li>• ADL dependence</li> </ul>
Caregiver support	<ul style="list-style-type: none"> <li>• Variable</li> </ul>	<ul style="list-style-type: none"> <li>• Support of IADL</li> <li>• Variable medication management</li> </ul>	<ul style="list-style-type: none"> <li>• Temporary supervision</li> </ul>	<ul style="list-style-type: none"> <li>• Full or partial</li> </ul>	<ul style="list-style-type: none"> <li>• Full or partial</li> </ul>
Comorbidities	<ul style="list-style-type: none"> <li>• Variable</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate</li> </ul>	<ul style="list-style-type: none"> <li>• Variable</li> </ul>	<ul style="list-style-type: none"> <li>• Variable</li> </ul>	<ul style="list-style-type: none"> <li>• Extensive</li> </ul>
Ability to perform ADL and/or IADL	<ul style="list-style-type: none"> <li>• Independent or adequate support</li> </ul>	<ul style="list-style-type: none"> <li>• Partial dependence</li> </ul>	<ul style="list-style-type: none"> <li>• Temporary dependence</li> </ul>	<ul style="list-style-type: none"> <li>• Variable with potential for improvement</li> </ul>	<ul style="list-style-type: none"> <li>• Dependent</li> </ul>
Diabetes self-care goals	<ul style="list-style-type: none"> <li>• Usually independent</li> <li>• Best achievable without risk of hypoglycemia</li> </ul>	<ul style="list-style-type: none"> <li>• May need assistance</li> <li>• Based on comorbidities and preferences</li> </ul>	<ul style="list-style-type: none"> <li>• Temporary assistance</li> <li>• Optimal control for recuperation</li> </ul>	<ul style="list-style-type: none"> <li>• Partial assistance</li> <li>• Optimal control for recuperation</li> </ul>	<ul style="list-style-type: none"> <li>• Dependent</li> <li>• Avoid severe hypo- and hyperglycemia</li> </ul>
Diabetes self-care education needs	<ul style="list-style-type: none"> <li>• Frequent education and reeducation</li> </ul>	<ul style="list-style-type: none"> <li>• Frequent education and reeducation</li> </ul>	<ul style="list-style-type: none"> <li>• Education prior to discharge</li> </ul>	<ul style="list-style-type: none"> <li>• Education prior to discharge</li> </ul>	<ul style="list-style-type: none"> <li>• Ongoing staff education at all levels of care</li> </ul>
Major challenges	<ul style="list-style-type: none"> <li>• Acute illnesses cause fluctuations in cognitive and/or physical status</li> </ul>	<ul style="list-style-type: none"> <li>• Blood glucose monitoring and/or insulin injection assistance usually not provided</li> <li>• Inadequate diabetes education for staff</li> </ul>	<ul style="list-style-type: none"> <li>• Failure to switch to prehospitalization regimen at discharge</li> </ul>	<ul style="list-style-type: none"> <li>• Need to be able to perform self-care after discharge</li> <li>• New or complex regimen might be too difficult for home management</li> </ul>	<ul style="list-style-type: none"> <li>• Erratic intake of food and fluids</li> <li>• Inadequate diabetes education for staff</li> <li>• Staff turnover</li> <li>• Time constraints</li> <li>• Lack of diabetes-specific protocols</li> <li>• Variation in practitioner practices</li> <li>• Excessive use of SSI</li> </ul>

ADL, activities of daily living (such as bathing, toileting, eating, dressing, transferring); IADL, instrumental activities of daily living (such as cooking, taking medications, traveling, using the telephone, shopping, managing finances, housework).

have been previously described by the American Diabetes Association (ADA) (9,10).

### Current Literature in Management of Diabetes in LTC Patients

Several organizations have developed diabetes guidelines for patients living in LTC settings. Almost all of these guidelines emphasize the need to individualize care goals and treatments related to diabetes, the need to avoid sliding scale insulin (SSI) as a primary means of regulating blood glucose, and the importance of providing adequate training and protocols to LTC staff who may be operating without the presence of a practitioner for prolonged periods.

#### The American Medical Directors Association Guidelines

The most extensive guideline available was developed by the American Medical Directors Association (AMDA) (11). These guidelines include a 12-step program for LTC staff that comprises all phases of diabetes care from diabetes detection to institutional quality assessment. The glucose-lowering steps advocated by the AMDA are consistent with those published in the ADA position statement on patient-centered individualized approaches to glucose lowering in adults with diabetes (12). In terms of A1C goals, the AMDA guidelines are also consistent with those recommended in the 2012 ADA consensus report (9). To achieve goals, it is acknowledged that the notion of a "diabetic diet" is outdated and that a more liberal diet may be appropriate among LTC patients. The guidelines are fairly nonspecific with regard to choice of glucose-lowering agents but advise practitioners to avoid the use of SSI and to transition to scheduled basal insulin (and prandial as required) shortly after admission. Beyond these long-term goals of care, the AMDA guidelines provide recommendations to LTC staff regarding when to call a practitioner (11). The guidelines recommend that LTC facilities develop their own facility-specific policies and procedures for hypoglycemia treatment. These guidelines emphasize that frail patients with cognitive impairment may present with atypical symptoms, mainly neuroglycopenic or behavioral in nature. The unique needs of patients with diabetes who are terminally ill or have limited life expectancy are also discussed.

#### Other Guidelines

Along with the AMDA guidelines, guidelines from the ADA, the International Association of Gerontology and Geriatrics (IAGG), and the European Diabetes Working Party for Older People (EDWPOP) have provided selective guidance for LTC populations. The ADA consensus panel identified the challenges of caring for patients in LTC facilities, such as irregular and unpredictable meal consumption, inadequate staffing, and frequent transitions in care (9). Additionally, the IAGG and EDWPOP have called to reduce the prevalence and burden of pressure ulcers (13).

Building on a core set of principles from these guidelines, this position statement elaborates on unique features of diabetes management in patients in LTC facilities and provides practical strategies to the clinical staff caring for them.

## GOALS AND STRATEGIES

### Recommendations

- Hypoglycemia risk is the most important factor in determining glycemic goals due to the catastrophic consequences in this population. **B**
- Simplified treatment regimens are preferred and better tolerated. **E**
- Sole use of SSI should be avoided. **C**
- Liberal diet plans have been associated with improvement in food and beverage intake in this population. To avoid dehydration and unintentional weight loss, restrictive therapeutic diets should be minimized. **B**
- Physical activity and exercise are important in all patients and should depend on the current level of the patient's functional abilities. **C**

Establishing the goals of care and management strategies for an individual in the LTC setting requires an acknowledgment of heterogeneity in terms of stage of disease, complications, comorbidities, self-care ability, life expectancy, and risk of adverse drug events (2–4). The most important aspects of developing goals and strategies for a patient residing in LTC are described below.

### Hypoglycemia

Care goals should be established at the time of admission to the LTC facility for all chronic conditions. Glycemic goals in particular are dependent on the patient's risk of hypoglycemia. Hypoglycemia is the

leading limiting factor in the glycemic management of type 1 and insulin-treated type 2 diabetes (14–16). Multiple factors increase the risk of hypoglycemia in older adults, including impaired renal function, slowed hormonal regulation and counterregulation, variable appetite and nutritional intake, polypharmacy, and slowed intestinal absorption (17). The strongest predictors of severe hypoglycemia have been found to be advanced age, recent hospitalization, and polypharmacy (18,19), all of which are common in the LTC population.

Advanced age is associated with higher rates of cognitive dysfunction, causing difficulty in carrying out complex care activities such as glucose monitoring and adjustment of insulin doses. Impaired renal function and reduced hepatic enzyme activity may interfere with the metabolism of sulfonylureas and insulin, thereby potentiating their hypoglycemic effects. Age-related decrease in  $\beta$ -adrenergic receptor function and defective glucose counterregulatory hormone responses increase the vulnerability of older adults to severe hypoglycemia (6). The presenting symptoms of hypoglycemia in older adults can be primarily neuroglycopenic (confusion, delirium, dizziness) rather than adrenergic (palpitation, sweating, tremors) (20). The presence of cognitive impairment coupled with hypoglycemia unawareness puts some older adults with diabetes in LTC facilities at increased risk because they may not recognize and/or fail to communicate hypoglycemia to their caregivers. Additionally, caregivers may not recognize that symptoms such as confusion, delirium, and dizziness may be related to hypoglycemia.

### Hyperglycemia

Although much attention is rightly focused on hypoglycemia, persistent hyperglycemia increases the risk of dehydration, electrolyte abnormalities, urinary incontinence, dizziness, falls, and hyperglycemic hyperosmolar syndrome. The 2012 ADA consensus report states that goals that minimize severe hyperglycemia are indicated for all patients (9). Thus, glycemic goals for patients in LTC are guided by preventing hypoglycemia while avoiding extreme hyperglycemia. Table 2 provides a framework for considering treatment goals for patients living in different settings, facing distinct clinical circumstances.

**Table 2—Framework for considering diabetes management goals**

	Special considerations	Rationale	A1C	Fasting and premeal blood glucose targets	Glucose monitoring
Community-dwelling patients at skilled nursing facility for short rehabilitation	<ul style="list-style-type: none"> <li>• Rehabilitation potential</li> <li>• Goal to discharge home</li> </ul>	<ul style="list-style-type: none"> <li>• Need optimal glycemic control after recent acute illness</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid relying on A1C due to recent acute illness</li> <li>• Follow current glucose trends</li> </ul>	<ul style="list-style-type: none"> <li>• 100–200 mg/dL</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring frequency based on complexity of regimen</li> </ul>
Patients residing in LTC	<ul style="list-style-type: none"> <li>• Limited life expectancy</li> <li>• Frequent changes in health impacting glucose levels</li> </ul>	<ul style="list-style-type: none"> <li>• Limited benefits of intensive glycemic control</li> <li>• Focus needs to be on better quality of life</li> </ul>	<ul style="list-style-type: none"> <li>• &lt;8.5% (69 mmol/mol)</li> <li>• Use caution in interpreting A1C due to presence of many conditions that interfere with A1C levels</li> </ul>	<ul style="list-style-type: none"> <li>• 100–200 mg/dL</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring frequency based on complexity of regimen and risk of hypoglycemia</li> </ul>
Patients at end of life	<ul style="list-style-type: none"> <li>• Avoid invasive diagnostic or therapeutic procedures that have little benefit</li> </ul>	<ul style="list-style-type: none"> <li>• No benefit of glycemic control except avoiding symptomatic hyperglycemia</li> </ul>	<ul style="list-style-type: none"> <li>• No role of A1C</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid symptomatic hyperglycemia</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring periodically only to avoid symptomatic hyperglycemia</li> </ul>

**Strategies to Improve Diabetes Management**

The clinical complexity and functional and psychosocial heterogeneity of the older population in LTC facilities require innovative thinking and individualized strategies to care for them (7,21–24). Certain conditions such as cognitive dysfunction, depression, physical disabilities, eating problems, and repeated infections are commonly found in the LTC population. Moreover, patients in LTC are now more likely to undergo invasive interventions and treatments such as gastrostomies for enteral feeding, hemodialysis, prolonged courses of intravenous antibiotics, advanced wound care treatments, and even chronic ventilator management. Possible strategies to manage diabetes in some of these clinical presentations are described in Table 3.

**Medication Management**

Glucose-lowering medications also require attention to comorbid conditions and other medications to avoid side effects and drug interactions. Unlike in older adults living in the community, insulin injections for individuals in LTC are usually given by the facility staff. However, risk of hypoglycemia remains high with insulin in this population, especially due to irregular eating patterns, evolving health status, and the inappropriate use of SSI. Many other glucose-lowering

agents are now available; Table 4 outlines the advantages, disadvantages, and caveats in using common glucose-lowering agents in the LTC population.

**SSI**

Across existing guidelines, one consistent recommendation is to avoid the sole use of SSI, which was recently added to the Beers Criteria for Potentially Inappropriate Medication Use in Older Adults (25). Unfortunately, it is customary in most facilities to check premeal and bedtime blood glucose levels and to rely on the sole use of SSI or either oral agents or basal insulin accompanied by SSI as the primary means to control blood glucose. Persistent SSI use leads to wide blood glucose excursions. It is also a burden for patients and requires significant nursing time and resources (26). However, there is no clearly defined practical guide to switch patients who are admitted to LTC from SSI to basal–bolus insulin. Table 5 provides strategies to convert insulin treatment from an SSI-based regimen to scheduled insulin therapy.

**Improving Nutrition Health**

Historically, therapeutic “diabetic” diets have been prescribed to older adults in the LTC setting. There is growing evidence that such therapeutic diets may inadvertently lead to decreased food intake, unintentional weight loss, and

undernutrition, which is the opposite of the desired outcome. In response, LTC facilities have shifted away from therapeutic diets, offering a wider variety of food choices, addressing personal food preferences, and providing dining options in regard to time and type of meals. Liberal diets have been associated with improvement in food and beverage intake in the LTC population to better meet caloric and nutrient requirements (27). While carbohydrate intake should be taken into consideration, “no concentrated sweets” or “no sugar” diet orders are ineffective for glycemic management and should not be recommended. Instead, a consistent carbohydrate meal plan that allows for a wide variety of food choices (e.g., general diet) may be more beneficial for both nutritional needs and glycemic control in patients with type 1 diabetes or type 2 diabetes on mealtime insulin.

**Enteral Nutrition Support**

Diabetes-specific enteral nutrition formulas (DSFs) (e.g., Glucerna, Glytrol, Diabetisource AC) are available to help to manage glycemic excursions during tube feedings. These formulas generally have lower carbohydrate and higher monounsaturated fat content compared with standard formulas (SFs). Randomized controlled trials have found DSFs favorable to SFs for blood glucose management. However,

**Table 3—Commonly found comorbidities in LTC and strategies to improve diabetes care**

	Clinical presentation that may interfere with diabetes management	Possible strategies to manage diabetes
Confusion, cognitive dysfunction, delirium	<ul style="list-style-type: none"> <li>• Irregular dietary intake or skipped meals</li> <li>• Refusal of blood glucose monitoring</li> <li>• Refusal of medications or injections</li> </ul>	<ul style="list-style-type: none"> <li>• Offer a regular diet and preferred food items</li> <li>• Offer food substitutions if meal intake is &lt;75%</li> <li>• Administer prandial insulin immediately after meals to match carbohydrate intake to avoid hypoglycemia</li> <li>• Block testing (monitoring at different times of the day to identify patterns, e.g., checking fasting glucose on some days, pre-lunch or pre-dinner on other days) to provide pattern without multiple daily checks</li> <li>• Increase glucose monitoring during acute mental status or behavior changes</li> <li>• Switch to a long-acting form of oral medications that can be given once daily or to crushed or liquid formulation</li> <li>• Switch to mixed insulin to decrease daily injections, although hypoglycemia risk will remain high</li> </ul>
Depression	<ul style="list-style-type: none"> <li>• Not interested in activities</li> <li>• Weight loss, refusal to eat</li> <li>• Excessive intake of sugary foods</li> </ul>	<ul style="list-style-type: none"> <li>• Assess and treat depression</li> <li>• Encourage physical activity as possible</li> <li>• Encourage socialization, especially during meals</li> </ul>
Physical disability	<ul style="list-style-type: none"> <li>• Unable to exercise</li> <li>• High risk of deconditioning and pressure ulcers</li> <li>• Require assistance with food and fluid intake</li> <li>• High risk of functional disability</li> </ul>	<ul style="list-style-type: none"> <li>• Encourage activity that patient can perform, e.g., exercise pedals for non-weight-bearing patients</li> <li>• Assessment for pressure ulcers</li> <li>• Encourage ADL independence</li> </ul>
Excessive skin problems, e.g., infections, ulcers, delayed wound healing	<ul style="list-style-type: none"> <li>• Causes hyperglycemia</li> <li>• Anorexia, poor dietary intake</li> <li>• May decrease physical activity</li> </ul>	<ul style="list-style-type: none"> <li>• Nutrition consult</li> <li>• More frequent glucose monitoring and temporary regimen intensification</li> <li>• Exercises appropriate for non-weight-bearing patients</li> <li>• Regular skin checks and foot assessments by nursing staff</li> </ul>
Hearing and vision problems	<ul style="list-style-type: none"> <li>• Decreased hearing can lead to isolation and depression</li> <li>• Low vision has large impact on quality of life</li> </ul>	<ul style="list-style-type: none"> <li>• Continue hearing and vision screening and preventive strategies if feasible</li> </ul>
Oral health problems, teeth decay, dry mouth	<ul style="list-style-type: none"> <li>• High risk of infection</li> <li>• Weight loss due to loss of chewing ability</li> <li>• Loss of taste sensation</li> </ul>	<ul style="list-style-type: none"> <li>• Regular oral health evaluations and cleaning</li> <li>• Ensure appropriate daily oral care</li> </ul>

ADL, activities of daily living (such as bathing, toileting, eating, dressing, transferring).

this recommendation about DSFs remains controversial in the LTC population (28,29). Nutrition goals should be guided by, among other things, the patient's prognosis and expressed preferences and include a discussion with the patient and family whenever possible.

### Physical Activity

Frailty, fear of falls, inadequate staff supervision, and lack of incentives act as barriers to regular physical activity for patients in the LTC facility. However, physical activity should be encouraged in all individuals to improve independence, functionality, and quality of life. The type of activity recommended should depend on the patient's current level of activity and ability. Programs to enhance mobility, endurance, gait,

balance, and overall strength are important for all patients in LTC facilities.

### DIABETES MANAGEMENT DURING TRANSITIONS OF CARE

#### Recommendations

- Care transitions are important times to revisit diabetes management targets, perform medication reconciliation, provide patient and caregiver education, reevaluate the patient's ability to perform diabetes self-care behaviors, and have close communication between transferring and receiving care teams to ensure patient safety and reduce readmission rates. **E**
- At the time of admission to a facility, transitional care documentation should include the current meal

plan, activity levels, prior treatment regimen, prior self-care education, laboratory tests (including A1C, lipids, and renal function), hydration status, and previous episodes of hypoglycemia (including symptoms and patient's ability to recognize and self-treat). **E**

Transitions from the hospital or home to LTC, transitions across care settings in LTC facilities, changes in providers, and discharges to the community setting are high-risk times for patients with diabetes. For older adults with diabetes, especially those with complex comorbidities, limited health literacy, cognitive impairment, five or more prescribed medications, or end-of-life care, the risk for adverse outcomes during these care transitions is

**Table 4—Advantages, disadvantages, and caveats in using glucose-lowering agents in LTC population**

	Advantages	Disadvantages	Caveats in LTC population
Biguanides	<ul style="list-style-type: none"> <li>• Low hypoglycemia risk</li> </ul>	<ul style="list-style-type: none"> <li>• Many contraindications in population with high comorbidity burden</li> </ul>	<ul style="list-style-type: none"> <li>• Can be used until estimated glomerular filtration rate is <math>&lt;30</math> mL/min/1.73 m<sup>2</sup></li> </ul>
Metformin	<ul style="list-style-type: none"> <li>• Low cost</li> <li>• Known side effects</li> <li>• Established safety record</li> </ul>	<ul style="list-style-type: none"> <li>• May cause weight loss or gastrointestinal upset in frail patients</li> </ul>	<ul style="list-style-type: none"> <li>• Extended release formulation has lower complexity and fewer gastrointestinal side effects</li> <li>• Assess for vitamin B<sub>12</sub> deficiency</li> </ul>
Sulfonylureas	<ul style="list-style-type: none"> <li>• Low cost</li> </ul>	<ul style="list-style-type: none"> <li>• High risk of hypoglycemia</li> <li>• Glyburide has the highest risk of hypoglycemia and should be avoided</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid if inconsistent eating pattern</li> <li>• Careful glucose monitoring during acute illness or weight loss</li> <li>• Consider discontinuing if already on substantial insulin dose (e.g., <math>&gt;40</math> units/day)</li> </ul>
Meglitinides	<ul style="list-style-type: none"> <li>• Short duration of action</li> </ul>	<ul style="list-style-type: none"> <li>• Can be held if patient refuses to eat</li> </ul>	<ul style="list-style-type: none"> <li>• Some risk of hypoglycemia</li> <li>• Increased regimen complexity due to multiple daily mealtime doses</li> </ul>
TZDs	<ul style="list-style-type: none"> <li>• Low hypoglycemia risk</li> <li>• Low cost</li> <li>• Can be used in renal impairment</li> </ul>	<ul style="list-style-type: none"> <li>• Many contraindications in population with high comorbidity burden</li> </ul>	<ul style="list-style-type: none"> <li>• Less concern for bladder cancer if shorter life expectancy</li> </ul>
DPP-4 inhibitors	<ul style="list-style-type: none"> <li>• Low hypoglycemia risk</li> <li>• Once-daily oral medication</li> </ul>	<ul style="list-style-type: none"> <li>• High cost</li> <li>• Lower efficacy</li> </ul>	<ul style="list-style-type: none"> <li>• Can be combined with basal insulin for a low complexity regimen</li> </ul>
SGLT2 inhibitors	<ul style="list-style-type: none"> <li>• Low hypoglycemia risk</li> </ul>	<ul style="list-style-type: none"> <li>• High cost</li> <li>• Limited evidence in LTC population</li> </ul>	<ul style="list-style-type: none"> <li>• Watch for increased urinary frequency, incontinence, lower blood pressure, genital infections, and dehydration</li> </ul>
GLP-1 agonists	<ul style="list-style-type: none"> <li>• Low hypoglycemia risk</li> <li>• Once-daily and once-weekly formulation</li> </ul>	<ul style="list-style-type: none"> <li>• High cost</li> <li>• Injection</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor for anorexia and weight loss</li> </ul>
Insulin	<ul style="list-style-type: none"> <li>• No ceiling effect</li> <li>• Many different types can be used to target hyperglycemia at different times of the day</li> </ul>	<ul style="list-style-type: none"> <li>• High risk of hypoglycemia</li> <li>• Matching carbohydrate content with prandial insulin if variable appetite</li> </ul>	<ul style="list-style-type: none"> <li>• Basal insulin combined with oral agents may lower postprandial glucose while reducing hypoglycemia risk and regimen complexity</li> <li>• Continue basal–bolus regimen in patients with type 1 or insulin-deficient type 2 diabetes</li> </ul>

DPP-4, dipeptidyl peptidase 4; GLP-1, glucagon-like peptide 1; SGLT2, sodium–glucose cotransporter 2; TZDs, thiazolidinediones.

even greater (30,31). Transitional care is defined as “actions that ensure coordination and continuity of care and are based on a comprehensive care plan” (32). Poorly executed transitional care can result in significant financial burdens for patients, payers, facilities, and the U.S. health care system as a whole. Preventable costs occur because of unnecessary rehospitalizations, inconsistent patient monitoring, duplicative tests, medication errors, delays in diagnosis, and lack of follow-through on referrals (33,34).

Transitions in care indicate that a patient is undergoing changes in health status, which may include physical and/or cognitive function, changes in dietary patterns, and ability to perform diabetes self-care behaviors. For example, an older adult on insulin may experience delirium as a common complication during and after hospitalization or may require a change in insulin dose when recuperating from acute illness and as nutritional intake improves. Inadequate communication

between inpatient and outpatient providers and a lack of an effective communication infrastructure contribute to poor patient outcomes (35,36).

#### Challenges in Transition Care

To date, there is no standard transition of care document with all the needed information for diabetes management that accompanies a patient from one setting to another (30). Discharge summaries often lack crucial information such as diagnostic test results, treatment or hospital course, discharge medications, test results pending at discharge, patient or family education, and follow-up plans (37). Therefore, the need to restart oral therapies (e.g., metformin), typically discontinued in the inpatient setting, can be overlooked. Additionally, pending results, such as those regarding renal function after contrast dye studies are performed, may not be shared with the LTC facility, leading to test duplication. In addition, continuance

of SSI after admission or transfer back to the LTC facility is a long-standing problem for patients with diabetes (26).

Often neither the provider responsible for the patient’s care nor the consulting pharmacists are present on-site at LTC facilities on a daily basis. Thus, the need to obtain further testing or outpatient follow-up may not be adequately communicated or coordinated by the LTC providers (38). Furthermore, the lack of a readily available complete interprofessional care team may present challenges for nursing staff providing daily care, especially when clarifying medication orders due to formulary conversions or trying to answer questions from patients or family members (30). A pharmacist-provided medication regimen review may not be readily available in all assisted living facilities, which increases the risk of medication errors, unnecessary medications, and potential drug–drug interactions (e.g., sulfonylureas and antibiotics) (39). Another

**Table 5—Strategies to replace SSI in LTC**

Current regimen	Suggested steps
SSI is the sole mode of insulin treatment	<ul style="list-style-type: none"> <li>• Review average daily insulin requirement over prior 5–7 days</li> <li>• Give 50–75% of the average daily insulin requirement as basal insulin</li> <li>• Stop SSI</li> <li>• Use noninsulin agents or fixed-dose mealtime insulin for postprandial hyperglycemia</li> <li>• Consider giving basal insulin in the morning to impact postprandial hyperglycemia and reduce risk of early-morning hypoglycemia</li> </ul>
SSI is being used in addition to scheduled basal insulin	<ul style="list-style-type: none"> <li>• Add 50–75% of the average insulin requirement used as SSI to the existing dose of basal insulin</li> <li>• Use noninsulin agents or fixed-dose mealtime insulin for postprandial hyperglycemia</li> </ul>
SSI is being used in addition to basal and scheduled meal time insulin (i.e., correction dose insulin)	<ul style="list-style-type: none"> <li>• If correction dose is required frequently, add the average correction dose before a meal to the scheduled mealtime insulin dose at the <b>preceding</b> meal. For example, if glucose values are consistently elevated before lunch or dinner requiring 2–3 unit corrections, the scheduled breakfast or lunchtime dose of insulin could be increased by the average correction dose (2 units), respectively. Similarly, if glucose values are consistently elevated before breakfast requiring correction doses, the scheduled basal insulin dose could be increased by the average correction dose used</li> </ul>
SSI is used in short term due to irregular dietary intake or due to acute illness	<ul style="list-style-type: none"> <li>• Short-term use may be needed for acute illness and irregular dietary intake</li> <li>• As health and glucose levels stabilize, stop SSI and return to previous regimen as tolerated</li> </ul>
Wide fluctuations in glucose levels in patients with cognitive decline and/or irregular dietary intake on a chronic basis	<ul style="list-style-type: none"> <li>• Use scheduled basal and mealtime insulin based on individual needs with the goal of avoiding hypoglycemia</li> <li>• May use a simple scale, such as “give 4 units of mealtime insulin if glucose &gt;300 mg/dL”</li> <li>• Keep patients hydrated, especially when glucose levels are high (e.g., &gt;300 mg/dL)</li> </ul>

factor contributing to the challenges during care transitions is the lack of a single clinician taking responsibility for coordination across the continuum of the patient's overall health care, regardless of setting (40). High staff turnover is another issue that may affect the continuity of care of LTC patients (41). Well-designed systems of care, thorough documentation, and appropriate communication can help to alleviate some of the problems associated with high staff turnover and meet the often complex care needs of patients with diabetes. Focused, interprofessional quality improvement initiatives have been shown to decrease hypoglycemia rates and improve processes of diabetes care in skilled nursing facilities (42).

#### Patient-Level Factors

Barriers at the patient or family level may include limited disease state knowledge and erroneous or unrealistic expectations. For example, some patients or family members may not be aware of the

chronic and progressive nature of type 2 diabetes or of the possible need to convert from oral therapies to insulin therapy despite appropriate dietary intake in patients with long-standing illness. Clear and direct communication of treatment plans and follow-up expectations with patients and/or caregivers by health care providers is critical to decrease patient/family barriers.

#### Strategies for Successful Transitions

A successful transition is a process whereby senders and receivers validate the transfer, accept the information, clarify any discrepancies, and act on the information to ensure a smooth and safe transition of care (32). The AMDA clinical practice guidelines have identified a series of steps, potential barriers, and strategies for management at system and provider levels as well as the patient level (32,43). At the system and provider level, there is a focus on accountability, communication, timely interchange

of information, identification of medical home or coordinating clinician, coordination of care across the continuum, national standards, and standardized metrics for quality improvement. The LTC facility should have processes in place for planned and, even more importantly, unplanned transitions. Several sample admission and transfer forms are available for download from the AMDA Web site (<http://www.amda.com/tools/guidelines.cfm>). These documents include a table that covers the essential information that should accompany every transitioning patient, an AMDA Universal Transfer Form, the Recommended Elements of a Discharge or Course-of-Treatment Summary, Practitioner Request for Notification of Medication Changes, and an Example of a Skilled Nursing Facility-to-Emergency Department transition. In addition, Wagle (44) provides a sample form using an electronic medical record. Using these forms can facilitate the development of a process for the transition of patients and

improve safety and quality of diabetes care. At the patient level, improvement is recommended for advocacy and social support, disease state knowledge, empowerment and self-efficacy, health literacy/fluency, and cognitive status.

### DIABETES MANAGEMENT IN PATIENTS AT END OF LIFE (INCLUDING ISSUES FOR PALLIATIVE CARE AND HOSPICE PATIENTS)

#### Recommendations

- Goals for diabetes management at end of life need to focus on promoting comfort; controlling distressing symptoms (including pain, hypoglycemia, and hyperglycemia); avoiding dehydration; avoiding emergency room visits, hospital admissions, and institutionalization; and preserving dignity and quality of life. **E**
- Decreasing complexity of treatment and a higher threshold for additional diagnostic testing including capillary monitoring of glucose should be considered. **E**
- It is important to respect a patient's right to refuse treatment and withdraw oral hypoglycemic agents and/or stop insulin if desired during the end-of-life care. **E**

#### Overall Strategy to Manage Diabetes

Concerns about diabetes management at end of life have been reported by providers (45), but until fairly recently, no guidelines were available. Dunning et al. (46) proposed the development of one of the first clinical practice guidelines for diabetes and end-of-life care (47). Early identification of patients who require end-of-life care is critical. Despite the reported increase in the rate of palliative care enrollment over the past 2 decades, about one-third of patients have been enrolled within last 2 weeks of their lives, preventing them from receiving the full benefits of palliative care services. One way to improve the timely identification of patients that might benefit from earlier enrollment in palliative care would be to use diabetes registries in collaboration with the palliative care team and primary care services.

The therapeutic decisions for diabetes management at end of life should be made after consideration of 1) risk of hypoglycemia and hyperglycemia, 2) presence

of geriatric syndromes and comorbidities, and 3) life expectancy. These patients tend to have compromised self-care due to end-stage disease itself in addition to fatigue and drowsiness from medicines. In addition, it is important to respect the patient's right to refuse treatment as well as to consider religion and cultural traditions, including the care of the body after death.

Strategies for diabetes management may include relaxing glycemic targets, simplifying regimens, using low-risk glucose-lowering agents, providing education on recognition of hypoglycemia, and enhancing communication strategies. Several conditions may result in hypoglycemia (anorexia–cachexia syndrome from chemotherapy and opiate analgesics, malnourishment, swallowing disorders). Therefore, it is important to have timely discussions about nutritional support, advance directives, and ethical issues, involving the patient, family, and caregivers in the decision process.

#### Glucose Monitoring

It is not always possible to decrease the frequency of capillary glucose monitoring in patients with type 1 diabetes. However, in most patients residing in LTC facilities with type 2 diabetes, a high frequency of capillary monitoring of blood glucose should only be considered under special circumstances (e.g., starting corticosteroids) and where the danger of hypoglycemia is particularly high (e.g., with significant nutritional problems). Capillary monitoring of blood glucose could vary from twice daily to once every 3 days depending on the patient's condition. Oral glucose-lowering agents are preferred, as are simplified insulin regimens with a low hypoglycemic risk and avoidance of complex regimens with higher treatment burden, to reduce the risk of adverse effects and medication errors (48). Tables 4 and 5 provide additional information on insulin therapy. In some patients, agents that might cause nausea, gastrointestinal disturbance, or excess weight loss (e.g., metformin or glucagon-like peptide 1 receptor agonist) may need to be discontinued, while in other patients it may be appropriate to withdraw therapy, including insulin, during the terminal stage.

#### Management of Comorbidities

Comorbidities in patients with diabetes present challenges and special

consideration when the patient has limited life expectancy. The International Diabetes Federation (IDF) guideline describes management of blood pressure, lipids, and foot care at end of life in patients with diabetes (<http://www.idf.org/sites/default/files/IDF-Guideline-for-older-people-T2D.pdf>).

Pain is an important component of end-of-life management. Pain could be related to diabetes complications and comorbidities, such as peripheral neuropathy, depression, falls, trauma, skin tears, and periodontal disease, and should be well managed (49). For those with evidence of cognitive dysfunction, end-of-life planning and a communication strategy should be undertaken while the individual can still make rational decisions. Meal plans that avoid weight loss, nonpharmacological options to prevent or manage behavioral problems, and timely identification and management of depression should be used to improve the quality of remaining life.

Diabetes management in patients with advanced cancer presents unique challenges. Specific recommendations for management of hyperglycemia, hypoglycemia, corticosteroid use, and education for patients and families are well described in a recent guideline (50).

#### Treatment Strategies

Simplified treatment regimens are generally recommended. Common reasons for overly tight glycemic control in hospice patients were found to be 1) discomfort with discussions about reducing or stopping chronic medications, 2) concern about mild hyperglycemia especially by patients and caregivers, and 3) worry about not achieving quality indicators for glycemic control (51). To address these issues, it is important to educate patients, families, and other providers about the fact that Healthcare Effectiveness Data and Information Set (HEDIS) measures do not apply to hospice patients and that it is acceptable to keep blood glucose levels between 200 and 300 mg/dL in hospice patients taking glucose-lowering medication.

Similarly, Angelo et al. (52) questioned the benefit of tight glycemic control and raised the concern about potential harm in patients with diabetes approaching the end of life. They proposed three strata for management of patients with diabetes and advanced disease.

### Stable Patients

These patients are inclined to simply continue with their previous regimen. Practitioners must use this stage to begin a dialogue with patients and caregivers about reducing the intensity of glycemic control. There is very little role for measuring A1C in these patients. Patients should be warned and educated about the signs of hypoglycemia and hypoglycemia unawareness. The acute risks of hyperglycemia as experienced in this stage center mainly on the risk of a hyperosmolar hyperglycemic state and associated complications, such as osmotic diuresis, recurrent infection, and poor wound healing.

### Patients With Organ Failure

As patients move into this phase, the importance of glycemic control is less apparent and preventing hypoglycemia is of greater significance. Patient and caregiver education regarding the telltale signs of dehydration and hypoglycemia and an appropriate plan of action is of vital importance. The risk of renal or hepatic failure becomes more evident at this stage, and insulin or other glucose-lowering medication dosages may need to be reduced in both patients with type 1 diabetes and patients with type 2 diabetes.

### Dying Patient

Most practitioners in this case would simply withdraw all oral hypoglycemic agents and stop insulin in most patients with type 2 diabetes. Ford-Dunn et al.

(53) suggested that treatment and monitoring be stopped in patients with type 2 diabetes once they are in the terminal phase, but there was less consensus for the management of type 1 diabetes under similar scenarios. At this point, care is focused on patient comfort and preparatory bereavement counseling for caretakers and patients, where appropriate.

## INTEGRATION OF DIABETES MANAGEMENT INTO LTC FACILITIES

### Recommendation

- Patients admitted to LTC facilities are not seen daily by a practitioner. Because of this reality, successful diabetes care needs to include a dedicated interprofessional team. This team may be composed of practitioners (physicians, nurse practitioners, and physician assistants), registered nurses, licensed practical/vocational nurses, certified nursing assistants, diabetes educators, dietitians, food service managers, consultant pharmacists, physical therapists, and/or social workers. E

Patients admitted to LTC facilities are typically seen by a medical provider at least once every 30 days for the first 90 days after admission and at least once every 60 days thereafter. In practice, patients are seen within the first week of admission and also when medically

necessary (although this may be several days after an event or change of condition). This system means that patients may have uncontrolled blood glucose levels or wide excursions without the practitioner being notified. Adjustments to treatment regimens can be made by telephone, fax, or order entry into electronic health records. Standing orders for glucose monitoring and practitioner notification that are approved by the facility and the practitioner at the time of admission may be useful.

Table 6 delineates the practical recommendations for the LTC staff in management of specific situations in patients with diabetes.

### Challenges for Facilities and Staffing

Pandya and Patel (54) have described the challenges in managing diabetes in post-acute and LTC settings. The challenges specific to patients include altered pharmacokinetics and pharmacodynamics of medications, increased risk of hypoglycemia, unpredictable meal consumption, comorbidities such as cognitive dysfunction and depression, psychological resistance to insulin, impaired vision and dexterity, and greater potential for adverse effects and drug interactions. Institutional-level challenges include staff turnover and lack of familiarity with patients, restrictive diet orders, inadequate review of glucose logs and trends, lack of facility-specific diabetes treatment algorithms for blood glucose

**Table 6—Specific situations needing attention in patients with diabetes in LTC setting**

	Recommendations for LTC staff for diabetes management*
Glucose meter reading <70 mg/dL and unresponsive Consecutive glucose meter readings <70 mg/dL	<ul style="list-style-type: none"> <li>• Treat hypoglycemia per protocol without any delay</li> <li>• Call practitioner</li> <li>• Confirm low glucose value by laboratory test</li> <li>• Evaluate nutritional intake</li> <li>• Consider an increase in frequency of glucose monitoring for 24 h</li> <li>• Adjust diabetes regimen as needed</li> </ul>
Glucose meter readings >250 mg/dL two or more times within 24-h period accompanied by a new or change in medical or functional status Glucose meter readings >300 mg/dL during all or part of 2 consecutive days Any glucose reading too high to measure by glucose meter	<ul style="list-style-type: none"> <li>• Call practitioner</li> <li>• Increase frequency of glucose monitoring</li> <li>• Confirm high glucose value by laboratory test</li> <li>• Evaluate nutritional intake</li> <li>• Adjust diabetes regimen as needed</li> <li>• If glucose levels are persistently high after changes to the diabetes regimen, consider medical evaluation for other causes (i.e., infection)</li> </ul>
Patient not eating, vomiting, or unable to take oral glucose-lowering medications	<ul style="list-style-type: none"> <li>• Call practitioner <b>as soon as possible</b></li> <li>• Consider insulin therapy and adjust dose accordingly based on nutritional status</li> </ul>

\*It is more important to address persistently abnormal trends in blood glucose values rather than attempting to adjust the treatment regimen in response to a few isolated abnormal values.

levels and provider notifications, and, often, lack of administrative buy-in to promote the roles of the medical director, the director of nursing, and the consultant pharmacist. Challenges specific to staff and practitioners include multiple changing treatment approaches, lack of team communication, excessive reliance on SSI, inappropriate dosing or timing of insulin, knowledge deficits, lack of comfort with new insulin and injectable agents, failure of timely stepwise advance in therapy, failure to individualize care, and therapeutic nihilism. It requires a dedicated interprofessional team composed of registered nurses, certified nursing assistants, diabetes educators, dietitians, food service managers, consultant pharmacists, physical therapists, social workers, and practitioners to manage older patients with diabetes in LTC facilities.

#### Monitoring the Facility's Management of Diabetes

In order to assess and improve facility-wide management of diabetes directed by multiple practitioners, the facility leadership (e.g., the director of nursing, nurse managers, medical director, and consultant pharmacist) should collect data and trends and plan strategies to improve selected process or outcome indicators relevant to diabetes management. These could include sharing data with managerial staff, providing staff education, and planning a performance improvement project. In general, the facility medical leadership and nursing administration have the opportunity to develop and implement patient care policies that can facilitate optimal management of the older patient with diabetes and to coordinate efforts with the multidisciplinary team. Nursing leadership training programs for nurses working in LTC facilities that include skills in diabetes management can also help to improve quality of care offered to patients in these facilities (55,56).

Federal citation tags (F-tags) are federal regulations that are used by each state's Department of Health and Centers for Medicare and Medicaid Services to survey quality of care provided to patients in LTC facilities. F-tags can be given at an annual state licensing survey or in response to a complaint survey at any time of the year. LTC facilities that are noncompliant may be subject to financial

penalties. Consequently, ensuring a high level of care for patients with diabetes in LTC facilities is also necessary for compliance with federal regulations.

#### CONCLUSIONS

Diabetes is a common, morbid, and costly disease in older adults. This population is heterogeneous and presents unique challenges pertaining to diabetes management. It is important for clinicians to understand the characteristics, challenges, and barriers related to the older population living in LTC facilities. This understanding requires knowledge of the patient population as well as the functioning of the facilities. Once the challenges are identified, individualized approaches can be designed to improve diabetes management while lowering the risk of hypoglycemia and ultimately improving quality of life.

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