CPG SERIES

CLINICAL PRACTICE GUIDELINE

PALTmed
POST-ACUTE AND LONG-TERM CARE MEDICAL ASSOCIATION

DIABETES MANAGEMENT

in the Post-Acute and Long-Term Care Setting

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PREFACE

The Post-Acute and Long-Term Care Medical Association (PALTmed) is the national professional association representing medical directors, physicians, nurse practitioners, physician assistants, and others practicing in the post-acute and long-term care (PALTC) continuum. Beginning in the 1990s, PALTmed has developed clinical practice guidelines (CPGs) to help improve the quality of care in these settings. CPG topics reflect common concerns in the PALTC continuum.

CPGs fulfill three purposes:

- To guide clinical practice and individualized, person-centered patient care
- To assist facilities with developing or modifying existing policies and procedures that guide staff and practitioners
- To help answer specific questions and apply general advice to specific situations unique to the PALTC setting

The guideline development and revision process is directed by PALTmed's Publications Committee. The committee determines the expertise needed for the CPG workgroup and assesses volunteers for expertise regarding the CPG's subject matter as well as for potential conflicts of interest. The committee chair addresses conflict-of-interest and confidentiality concerns.

Literature Review

Guidelines are developed by interprofessional workgroups consisting of medical practitioners and others involved in patient care in PALTC settings. These workgroups systematically review and incorporate relevant literature, including books, journal articles, and other references, into a concise, usable guideline tailored to the PALTC setting. CPG development also occurs against the background of a relative lack of high-quality studies (e.g., randomized controlled trials) conducted in PALTC settings.

In addition to addressing approaches relevant to all patients with a condition, CPGs also stress considerations specific to the PALTC setting and population. While comprehensive, they

are not intended to provide an exhaustive review of the topic. The reader can refer to the references or bibliography within each CPG to learn more about the basis for recommendations.

To develop the Diabetes Management CPG, the workgroup followed key parts of the process used by the Cochrane Library to review the literature and synthesize information from multiple sources.

Audience

Guidelines are written for members of the PALTC interprofessional team (IPT), who typically include the medical director, attending physicians, director of nursing, advanced practice clinicians, nursing staff, consultant pharmacists, and other professionals such as therapists, social workers, dietitians, and nursing assistants who care for patients residing in PALTC facilities.

Assumptions

- **Patient-centered care.** PALTmed CPGs are consistent with the fundamental goals of providing high-quality, person-centered care for all patients. Recognizing that PALTC facilities care for a variety of individuals (including young adults and others with chronic diseases and disabilities, short-stay patients needing post-acute care, and individuals of advanced age who may be frail and have multiple chronic medical and psychiatric conditions), guidelines emphasize the functions and tasks related to recognizing, assessing, treating, and monitoring the medical condition or situation of interest.

  Patient-centered care involves establishing individualized goals of care for each patient. In this context, it is crucial to consider whether a potential workup or treatment is appropriate for each individual and reflects relevant social and economic factors that influence the individual's health (i.e., social determinants of health). When patients residing in PALTC facilities are at or near the end of life, care goals will shift from curative care, functional improvement, or physical stability to end-of-life/comfort care. PALTmed CPGs address this transition and suggest appropriate modification of the patient's care plan.
- **Care delivery process (CDP).** All of PALTmed's CPGs follow the care delivery process, which is the foundation for providing high-quality, person-centered care for all patients, symptoms, and situations. (**Table**, p. ix) identifies this process and explains its importance.
- **Guideline implementation.** Implementation of current, evidence-based guidelines helps to optimize care and improve the care delivery process. PALTmed CPGs emphasize systematic, sequential clinical decision making that follows key care-delivery process steps. To guide staff and practitioner practices and oversee and improve performance, facility-specific policies and procedures should be based on these universally relevant steps.

  While CPGs' steps are universally applicable, details may be affected by factors such as available resources, staffing, the philosophy of care, specific patient population, and resident and family goals and preferences. Implementation toolkits associated with individual CPGs offer additional detailed help and provide the resources needed to optimally implement the CPG within a care setting. These toolkits can help change practices by engaging communities, staff, and various stakeholders.

CPG Organization

Each CPG includes a narrative portion that begins by defining the definition of the condition(s) being addressed, as well as the following:

- **Recognition** refers to identifying the presence of a condition, situation, or risk, and collecting the details needed for cause identification, interpretation, and subsequent management.
- **Assessment** refers to the process of defining causes and consequences of a symptom, condition, or problem and identifying the meaning and implications of the information gathered during the assessment.
- **Treatment** addresses the selection and provision of appropriate interventions for the identified condition or situation.
- **Monitoring** addresses reviewing the course of a condition or situation as a basis for deciding whether and how to modify interventions.

Terminology

We recognize that people who reside in PALTC communities are residents. However, PALTmed CPGs refer to "patients" because they primarily (although not solely) focus on addressing treating medical conditions. When referring to pharmaceutical products, we avoid the use of brand names and refer primarily to classes of drugs (e.g., advising the use of diuretics in general, rather than a specific diuretic, to treat fluid overload).

TABLE. Clinical Problem-Solving and Decision-Making Process Steps and Objectives

Process Step / Objectives *	Key Tasks **
Recognition / Assessment *Gather essential information about the individual*	– Identify and collect information that is needed to identify an individual's conditions that enables proper definition of their conditions, strengths, needs, risks, problems, and prognosis – Obtain a personal and medical history – Perform a physical assessment
Problem definition *Define the individual's problems, risks, and issues*	– Identify any current consequences and complications of the individual's situation, underlying condition and illnesses, etc. – Clearly state the individual's issues and physical, functional, and psychosocial strengths, problems, needs, deficits, and concerns – Define significant risk factors
Diagnosis / Cause-and-effect analysis *Identify physical, functional, and psychosocial causes of risks, problems, and other issues, and relate to one another and to their consequences*	– Identify causes of, and factors contributing to, the individual's current dysfunctions, disabilities, impairments, and risks – Identify pertinent evaluations and diagnostic tests – Identify how existing symptoms, signs, diagnoses, test results, dysfunctions, impairments, disabilities, and other findings relate to one another – Identify how addressing those causes is likely to affect consequences
Identifying goals and objectives of care *Clarify purpose of providing care and of specific interventions, and the criteria that will be used to determine whether the objectives are being met*	– Clarify prognosis – Define overall goals for the individual – Identify criteria for meeting goals
Selecting interventions / planning care *Identify and implement interventions and treatments to address the individual's physical, functional, and psychosocial needs, concerns, problems, and risks*	– Identify specific symptomatic and cause-specific interventions (physical, functional, and psychosocial) – Identify how current and proposed treatments and services are expected to address causes, consequences, and risk factors, and help attain overall goals for the individual – Define anticipated benefits and risks of various interventions – Clarify how specific treatments and services will be evaluated for their effectiveness and possible adverse consequences
Monitoring of progress *Review individual's progress towards goals and modify approaches as needed*	– Identify the individual's response to interventions and treatments – Identify factors that are affecting progress towards achieving goals – Define or refine the prognosis – Define or refine when to stop or modify interventions – Review effectiveness and adverse consequences related to treatments – Adjust interventions as needed – Identify when care objectives have been achieved sufficiently to allow for discharge, transfer, or change in level of care

* Refers to key steps in the care delivery process, related to clinical problem solving and decision making
** Refers to key tasks at each step in the care delivery process

Source: Center for Medicare & Medicaid Services. Long-Term Care Facility Resident Assessment Instrument 3.0 User's Manual. Version 1.16. October 2018. **https://downloads.cms.gov/files/1-MDS-30-RAI-Manual-v1-16-October-1-2018.pdf**. Accessed 7/30/2024.

GLOSSARY OF ABBREVIATIONS

A1C	glycosylated hemoglobin
AACE	American Association of Clinical Endocrinology
ADA	American Diabetes Association
AGS	American Geriatrics Society
ALF	assisted living facility
ASCP	American Society of Consultant Pharmacists
ASCVD	atherosclerotic cardiovascular disease
BG	blood glucose
BGM	blood glucose monitoring
CGM	continuous glucose monitors
CHF	congestive heart failure
CKD	chronic kidney disease
CKM	cardiovascular-kidney-metabolic
COPD	chronic obstructive pulmonary disease
CPG	clinical practice guideline
CrCl	creatinine clearance
CV	cardiovascular
CVD	cardiovascular disease
CVOTs	cardiovascular outcomes trials
DC	discharge
DKA	diabetic ketoacidosis
DKD	diabetic kidney disease
DPP-4	dipeptidyl peptidase IV
eGFR	estimated glomerular filtration rate
ER	extended release
ESRD	end-stage renal disease
FBG	fasting blood glucose
FPG	fasting plasma glucose
GI	gastrointestinal
GLP	glucagon-like peptide
GLP1-RA	glucagon-like peptide-1 receptor agonist
HF	heart failure
IADL	instrumental activities of daily living
iDegLira	degludec/liraglutide
IFG	impaired fasting glucose
iGlarLixi	glargine/lixisenatide
IGT	impaired glucose tolerance
LPN	licensed practical nurse
LTC	long-term care
MACE	major adverse cardiovascular events
MTC	medullary thyroid carcinoma
NPH	neutral protamine Hagedorn
NYHA	New York Heart Association
OT	occupational therapist
PALTC	post-acute and long-term care
PO	by mouth
PPG	postprandial glucose
PT	physical therapist
QAPI	Quality Assessment and Performance Improvement
QOL	quality of life
RA	receptor agonist
RN	registered nurse
SC	subcutaneously
SGLT2	sodium-glucose cotransporter 2
SLP	speech-language pathologist
SNF	skilled nursing facility
SSI	sliding-scale insulin
T1DM	type 1 diabetes
T2DM	type 2 diabetes
TDD	total daily dose
TZD	thiazolidinediones
UTI	urinary tract infection

INTRODUCTION

Definition

Diabetes mellitus is a chronic, progressive metabolic condition characterized by hyperglycemia. Type 2 diabetes (T2DM), the form most prevalent in post-acute and long-term care (PALTC) settings, is caused by (1) underutilization of glucose as an energy source and (2) overproduction of glucose due to insulin resistance, relative insulin deficiency, glycogen breakdown, and other mechanisms. The chronic hyperglycemia of diabetes may be associated with multiple organ dysfunction or failure.

Scope of the Problem in the Post-Acute and Long-Term Care Setting

The prevalence of patients with diabetes in PALTC facilities in the United States is estimated to be between 25% and 34%. For older adults, diabetes is an independent predictor of placement in a PALTC facility. Patients with diabetes in PALTC facilities are a heterogenous and vulnerable group who often take multiple medications; experience frequent infections; and have high rates of cardiovascular complications, dehydration, hospitalizations, hyperosmolar states, and functional decline and cognitive impairment.

Multimorbidity, functional impairments, and psychosocial issues may increase the complexity of diabetes management in the PALTC setting while, at the same time, the presence of diabetes may increase the complexity of the management of patients with multiple comorbid conditions. In patients with dementia, hyperglycemia and hypoglycemia may impact cognition, while chronic hyperglycemia may contribute to further decline in physical function. Hyperglycemia may also decrease pain thresholds, impair vision, impede wound healing, and increase risk for falls.

Increased attention is now focused on cardiovascular-kidney-metabolic (CKM) health, which is described in a **2023 Presidential Advisory** from the American Heart Association as "the clinical presentation of the pathophysiological interactions among metabolic risk factors such as obesity and diabetes, chronic kidney disease, and the cardiovascular system." Poor CKM health is a matter of public health urgency due to the high societal prevalence of obesity and diabetes. Improvement of CKM health necessitates the adoption of interdisciplinary care models that support

more-holistic approaches to patient care. It is therefore essential that healthcare providers caring for the whole person understand the role that diabetes management plays in a patient's overall health and well-being.

This clinical practice guideline (CPG) is intended to enhance specific knowledge and skills needed by interprofessional team members who care for patients with diabetes in the PALTC setting. By implementing the processes described in this guideline, practitioners and PALTC facilities can be better equipped to systematically manage and improve the care of patients with diabetes through greater individualization of care; earlier identification of diabetes; and better documentation of, and rationale for, patients' personal goals and decision-making processes regarding their disease and its treatment.

Goals of Diabetes Care in the PALTC Setting

In the PALTC setting, goals for glycemic control and risk-factor management should be based on the individual patient's overall health, goals of care, preferences and values, and life expectancy, as well as anticipated clinical benefits. Other considerations include the risks associated with tight glucose control (e.g., polypharmacy, hypoglycemia, falls, cognitive impairment) and the impact of treatment (e.g., medications, blood glucose monitoring [BGM]) on the patient's quality of life. While there is no consensus definition of overtreatment, studies suggest that, in the PALTC setting, treating to achieve a hemoglobin A1C level below 7% and treatment with glucose-lowering agents in patients who have more than one risk factor for hypoglycemia, dementia, or functional impairment may be consistent with overtreatment in the PALTC setting. In such patients, it is appropriate to liberalize goals for glycemic control. Reasons for less-stringent diabetes management in individual patients and discussions on shared decision-making should always be documented in the patient's medical record.

The Institute of Health Care's evidence-based *4Ms Framework of Age-Friendly Care* may be applied to persons with diabetes to address the medical, psychological, functional and social aspects of the condition in an organized manner (**Figure 1**).

FIGURE 1. 4Ms Framework of Age-Friendly Care to Address Patient-Specific Issues That Can Affect Diabetes Management in the PALTC Setting

WHAT MATTERS	MEDICATION
■ Advance care planning ■ Macrovascular and microvascular complications ■ Quality of life ■ Life expectancy ■ Risks, burdens, benefits of treatment ■ Treatment preferences (diet, injections, BGM)	■ Affordability of insurance coverage ■ End-organ disease or complications affecting medication choice ■ History of adverse medication effects ■ Place of care (community, group home, PALTC facility) ■ Risk of hypoglycemia, hypoglycemia unawareness ■ Social and family support ■ Type 1 diabetes – insulin-dependent?
MENTATION	**MOBILITY**
■ Ability to use diabetes technology ■ Anxiety ■ Cognitive impairment ■ Coping skills and self-care (diabetes distress) ■ Depression	■ Foot complications ■ Frailty, sarcopenia ■ Functional ability ■ Leg weakness ■ Neuropathy ■ Vision status

BGM, blood glucose monitoring; PALTC, post-acute long-term care

Taking a Leap of Faith – With Supporting Evidence

This CPG presents an updated, evidence-based approach to diabetes management among older adults across PALTC settings. Major changes around managing medications, setting individual patient goals, and other key components of quality care require clinicians to re-evaluate how they treat patients with diabetes and how to most effectively collaborate with the interdisciplinary team to achieve optimal results.

In conjunction with integrating the "4Ms" into plans of care (What Matters, Medication, Mentation, and Mobility; see **Figure 1**), diabetes management should also incorporate shared decision making and goal setting that includes the older adult and, where appropriate, their primary healthcare decision maker. This is all quite different from how many practitioners may have learned to treat diabetes in the past and calls for significant behavior change and taking a leap of faith.

That leap starts with trusting the evidence and changing some previous beliefs and practices. **Table 1** provides guidance for evidence-based principles of care that can improve patients' health outcomes and quality of life. Many practitioners have taken this leap and have cases to share that demonstrate the benefit of doing so. Please see **Appendix 1** for a case example. This CPG provides a "roadmap" to help practitioners take this leap.

TABLE 1. Key Research-Based Findings and Recommendations for Diabetes Care

1. **Avoid prescribing restrictive diets** for patients with diabetes unless this is a justified patient preference (usually with a goal of weight loss)
2. Avoid strict adherence to low A1C numbers
3. **Avoid using sliding-scale insulin**
4. Consider using oral agents in the classes DPP-4 inhibitors; SGLT2 inhibitors; and oral or injectable GLP1-RAs, each of which can improve diabetes management without increasing risk for hypoglycemia or other negative outcomes among older adults with diabetes. These agents are easily given by staff either orally or by weekly injections, without the need for regular BGM. Newer agents should be avoided in patients with contraindicated symptoms or conditions (e.g., GLP1-RAs in patients with motility issues or unintentional weight loss; SGLT2 inhibitors in patients who are bedbound and incontinent).

BGM, blood glucose monitoring; DPP-4, dipeptidyl peptidase 4; GLP1-RA, glucagon-like 1 receptor agonist; SGLT2, sodium glucose transporter [2]

Sources: Evans et al, 2022; Karagiannis et al, 2022; Le et al, 2022; Lipska, et al, 2015; Miller et al, 2022; Pandya et al, 2023; Remelli et al, 2022; Thomas et al, 2021; Umpierrez & Klonoff, 2018

Components of a Systematic Facility Approach to Diabetes Management

At the facility level, a systematic approach to diabetes management may include the following components:

- Use of an interprofessional approach and clarification of the roles of all participants in a patient's care (Table 2)
- Staff education and training in diabetes management, including the use of wearable technologies such as continuous glucose monitors (CGM) and insulin pumps
- Nursing assistant education and training (of particular importance since these staff members have substantial direct patient contact and may be the first to recognize symptoms of hypo- or hyperglycemia)
- For all patients diagnosed with diabetes:
  - Periodic review of blood glucose levels and glucose trends, with more-frequent reviews for an acutely ill or newly admitted patient
  - Collaboration with the consultant pharmacist to review medication regimens
  - Regular assessment of eyes, feet, oral cavity, and skin
  - Collaboration with the dietitian to promote the provision of a healthy, carbohydrate-consistent diet that includes snacks
  - Involvement of patients and families or other responsible parties in diabetes management
- Use of outcome and process indicators by which a facility can assess its performance in managing diabetes (see examples in Role of the Medical Director in Diabetes Management)

Table 3 outlines site-specific considerations in the care of patients with diabetes in the PALTC continuum.

TABLE 2. Examples of Staff Roles in Diabetes Management

Note: Full implementation of the CPG requires collaboration with the facility staff educator to ensure appropriate levels of competency across disciplines.

Competency	RNs and LPNs	Nursing Assistants	Registered Dietitians	Social Worker	PT/OT/SLP	Recreational Therapists and Activities Staff	All Staff
Monitoring for Change in Condition							
Signs and symptoms of hyper- and hypoglycemia	✓	✓	✓	✓	✓	✓	✓
Change in condition and when to notify practitioner	✓		✓		✓		
What to know before you call	✓						
Medications that affect blood glucose	✓		✓		✓		
Care and Use of Equipment							
Glucometer use and care	✓						
Use and care of insulin pumps and CGM	✓	✓			✓		
Person-Centered Care Planning							
Psychosocial needs	✓	✓	✓	✓	✓	✓	
Nutritional approach	✓	✓	✓	✓	✓	✓	
Oral care	✓	✓			✓		
Fall risk	✓	✓			✓	✓	
Foot and nail care and appropriate footwear	✓	✓		✓			
Annual eye exam	✓						

CGM, continuous glucose monitoring; LPN, licensed practical nurse; OT, occupational therapist; PT, physical therapist; RN, registered nurse; SLP, speech-language pathologist

TABLE 3. Caring for Patients with Diabetes in the PALTC Continuum: Cross-Site and Site-Specific Considerations

SITE OF CARE			
LONG-TERM CARE			ALF
SKILLED REHAB	LTC	HOSPICE/PALLIATIVE	
Ascertain if T1DM if in doubt Document goals Set BG notification parameters Foot and skin evaluation Simplify/deintensify medications Replace SSI Review BG 2x/wk Reduce BG checks Interdisciplinary communication Prompt evaluation of acute change DC planning — Patient/staff/care partner education Consider CGM	Document goals Set BG notification parameters Foot and skin evaluation Simplify/deintensify medications Replace SSI Review BG q1–2 mo Reduce BG checks Interdisciplinary communication Patient/staff/care partner education Prompt evaluation of acute change	Discuss goals of care with patient/family Simplify/deintensify medications Replace SSI Reduce BG checks Avoid symptomatic hyperglycemia and hypoglycemia Focus on comfort, personal care	Document goals Identify team roles Set BG notification parameters Foot and skin evaluation Simplify/deintensify medications Replace SSI and injectables Review BG in 2 wks Consider CGM Patient/staff/care partner education (hypoglycemia) Prompt notification of acute change of condition

ACROSS ALL SITES OF CARE:
Perform foot and skin checks on shower days. Look for

- Calluses
- Intertrigo (infection between toes)
- Overgrown nails
- Ulcers
- Non-healing wounds
- Cold or blue areas

ALF, assisted living facility; BG, blood glucose; CGM, continuous glucose monitoring; DC, discharge; LTC, long-term care; SSI, sliding-scale insulin; T1DM, type 1 diabetes

Role of the Medical Director in Diabetes Management

Key elements of the medical director's role may include the following:

- Performing staff education on topics such as hypoglycemia management, practitioner notification parameters for hypoglycemia, hyperglycemia, or related change of condition, and use of CGM and insulin pumps if feasible
- Conducting quality improvement initiatives. For example, implementation of this CPG could be a quality improvement project (Appendix 2). Measurable performance indicators that could be evaluated as part of a quality improvement initiative include
  - **Outcome indicators**
    - Prevalence of hypoglycemic episodes
    - Prevalence of severe hyperglycemia requiring an emergency room transfer or hospitalization
    - Rates of lower-extremity amputations, infections, or ulcers that can be attributed to diabetes
  - **Process indicators**
    - Limited use of sliding-scale insulin (SSI), with adequate supporting documentation to validate its use
    - Appropriate monitoring of blood glucose control (e.g., A1C, BGM, CGM)
    - Appropriate frequency of foot inspections

Expected Outcomes from Implementation of this Clinical Practice Guideline

This guideline recommends processes that, if implemented, should help PALTC facilities systematically manage and improve the care of patients with diabetes. Measurable outcomes associated with the implementation of this guideline may include the following:

- Better documentation of, and rationale for, patients' personal goals and decision-making processes regarding their disease and its treatment
- Fewer hypoglycemic events
- Fewer hyperglycemic events
- Fewer emergency-room visits and avoidable hospitalizations related to diabetes
- Improved staff knowledge of the management of diabetes
- Reduction in the use of SSI

RECOGNITION

In a newly admitted patient, always consider the possible presence of diabetes or prediabetes (impaired fasting glucose [IFG] or impaired glucose tolerance [IGT]). Patients with prediabetes are at high risk for developing diabetes and cardiovascular complications. The patient who is hyperglycemic during an acute illness, hospital stay, or course of systemic glucocorticoids may or may not be determined to have diabetes, IFG, or IGT (i.e., be euglycemic) when medically stable.

STEP 1 — Identify diabetes using clinical suspicion and laboratory tests

On admission or during the pre-admission assessment

- Ask the patient and family members if the patient has diabetes or has shown signs or symptoms that suggest diabetes (Table 4).
- Review the patient's medical record for a diagnosis of diabetes or for the use of medications that may increase risk for diabetes (Table 5).
- Evaluate the patient for evidence of hyperglycemia (Table 6) and for problems or complications associated with diabetes in older adults (Table 7).
- Review or order laboratory test results to evaluate the presence of diabetes or prediabetes (Table 8).

Practitioners should be aware that, while measurement of A1C is an essential element of screening for diabetes in the PALTC setting, certain conditions may affect the accuracy of the A1C test (Table 9). See Appendix 3 for correlation of A1C levels with mean blood glucose levels.

TABLE 4. Non-Specific Symptoms and Unique Syndromes Associated with Diabetes in Older Adults

Non-Specific Symptoms

- Blurred vision
- Failure to thrive/weight loss
- Myocardial infarction or stroke when hospitalized
- New or increasing confusion
- New or worsening incontinence
- Polydipsia, polyphagia, or dehydration
- Recurrent infections

Unique Syndromes

- Diabetic neuropathic cachexia (painful peripheral neuropathy, anorexia, depression, and weight loss)
- Diabetic ketoacidosis (if severe stressors, or use of antipsychotics or SGLT2 inhibitors)
- Diabetic neuropathy (focal or symmetric)
- Malignant otitis externa
- Papillary necrosis with pyelonephritis or UTI

SGLT2, sodium glucose transporter 2; UTI, urinary tract infection

Sources: Chau et al, 2002; Meneilly et al, 2000

TABLE 5. Commonly Used Classes of Medications That May Cause or Exacerbate Hyperglycemia

- Atypical antipsychotics
- Beta blockers (e.g., atenolol, metoprolol, propranolol)
- Calcineurin inhibitors (e.g., cyclosporine, tacrolimus)
- Corticosteroids
- Megestrol acetate
- Protease inhibitors (e.g., ritonivir, indinivir)
- Quinolone antibiotics (e.g., levofloxacin, moxifloxacin)
- Thiazides, thiazide-like diuretics

Adapted from Rehman et al, 2011

TABLE 6. Possible Symptoms and Signs of Hyperglycemia in Frail Elderly Patients

- Blurred vision
- Dehydration
- Increased thirst
- Lethargy
- New or increasing confusion
- Polydipsia, polyphagia
- Weight loss
- Worsening incontinence

TABLE 7. Problems and Complications Associated with Diabetes in Older Adults

- Accelerated atherosclerosis with vascular complications (e.g., myocardial infarction, stroke)
- Changes in weight (gain or loss)
- Confusion, acceleration of cognitive impairment
- Decline in ability to perform activities of daily living
- Dehydration
- Depression
- Excessive skin problems (infections, ulcers, delayed wound healing)
- Eye problems (e.g., blurring or loss of vision)
- Falls
- Foot ulcers, foot deformities, gangrene, other foot problems
- Frequent infections
- Impaired pain perception, neuropathy

TABLE 8. Criteria for a Diagnosis of Prediabetes or Diabetes

Prediabetes	Diabetes
A1C 5.7%–6.4% (39–47 mmol/mol) **or** FPG 100 mg/dL (5.6 mmol/L)–125 mg/dL (6.9 mmol/L) (definition of IFG)	1. A1C 6.5% or higher (48 mmol/mol or higher) **or** 2. FPG 126 mg/dL or higher (7 mmol/L or higher); patient must have fasted for at least 8 h before test **or** 3. In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose level of 200 mg/dL or higher (11.1 mmol/L or higher)

FPG, fasting plasma glucose; IFG, impaired fasting glucose

Notes:

1. Oral glucose tolerance test is not optimal in patients residing in PALTC settings
2. For both A1C and FPG tests, risk is continuous, extending below the lower limit of the range and becoming disproportionately greater at the higher end of the range

Source: Adapted from ADA, 2024 (Ch 2)

TABLE 9. Conditions That Can Affect the Accuracy of the A1C Test

A1C levels can be *reduced* by	A1C levels can be *increased* by
■ Anemia (hematocrit less than 30%) ■ Blood loss ■ Blood transfusions ■ Iron or erythropoietin-stimulating agents (in patients with chronic kidney disease)	■ Hypothyroidism ■ Iron, vitamin B12, or folate deficiency ■ Chronic salicylate ingestion ■ Racial/ethnic origin (African, Asian, Hispanic)

Sources: Kim et al, 2010; Ng et al, 2010; Peacock et al, 2008; Radin, 2014

Optimizing the Recognition and Management of Type 1 Diabetes in Older Adults in the PALTC Setting

Better management of type 1 diabetes (T1DM), along with improved cardiovascular risk factors, has resulted in people living much longer with this disease. As people with T1DM age, they also experience a higher comorbidity burden, which can complicate management and treatment. It is also important to note that T1DM may also develop throughout adult life and into old age. The same principles of comprehensive geriatric assessment and person-centered goals and treatment regimens used for T2DM also apply when caring for patients with T1DM.

Key Issues to Remember About Type 1 Diabetes in PALTC

- Do not assume all patients have T2DM, especially if there is a lack of caregiver engagement or access to current medical records. Patients' medical records may not correctly identify a diagnosis of T1DM, and for those with cognitive impairment and poor social support, clarification of this may not be available.
- Insulin is a life-preserving therapy, and basal insulin is required even if meal intake is poor
- Hyperglycemia and diabetic ketoacidosis (DKA) may develop if insulin treatment is inadequate or omitted due to fear of hypoglycemia
- DKA may be mistaken for, or occur concurrently with, organ failure, sepsis, or medication-related acidosis, and may not be recognized or managed in a timely manner
- People with T1DM are at high risk for hypoglycemia, especially if they are cognitively impaired
- Insulin requirements may increase during acute infections, cardiovascular events, and other medical emergencies
- Practitioners may be unfamiliar with insulin pumps or CGM, which can help reduce hypoglycemia and glycemic variability
- Consider an endocrinology consultation to guide therapy in patients with complex treatment regimens or those who are using advanced therapeutic technologies
- First-line caregivers and nursing staff may need more-intensive diabetes management education, especially if a patient is using an insulin pump or CGM.

STEP 2 — Screen for possible diabetes in patients *without* a current diagnosis

Abnormal glucose values may be attributed to stress, acute illness, or a medication interaction. Always consider the presence of undiagnosed diabetes, particularly in the following circumstances:

- An acute change in the patient's condition (e.g., severe infection, dehydration)
- An elevated blood glucose value on an incidental laboratory test.
- Hyperglycemia noted in the patient's hospital record
- Current use of an antipsychotic medication. (All patients receiving antipsychotics should be screened for diabetes at baseline, at 3 months after initiation of therapy, and then annually or more frequently if risk factors are present.)

ASSESSMENT

NOTE: *Although the assessment process has been broken down into several steps, in practice multiple steps may be performed simultaneously, and it may be unnecessary to complete all steps for every patient. The step-by-step breakdown is presented to ensure that a thorough, systematic assessment is undertaken for any patient in whom diabetes is suspected.*

STEP 3 — Assess the patient's risk for hypoglycemia

Older adults with diabetes in PALTC are especially vulnerable to hypoglycemia. They have a disproportionately high number of clinical complications and comorbidities that can increase hypoglycemia risk (Table 10). The risk of severe hypoglycemia is the most important factor determining glycemic goals and treatment choices in older patients with diabetes.

The three categories of hypoglycemia are

- **Level 1:** Glucose level below 70 mg/dL (3.0 mmol) and above 54 mg/dL (3.0 mmol/L)
- **Level 2:** Glucose level below 54 mg/dL (3.0 mmol/dL)
- **Level 3:** A severe event characterized by altered mental or physical status and requiring caregiver assistance for treatment of hypoglycemia

TABLE 10. Risk Factors for Hypoglycemia

- Presence of multiple comorbidities
- Advanced age and impaired counterregulation
- Polypharmacy
- Use of insulin or a sulfonylurea
- Impaired cognitive function and hypoglycemia unawareness
- Impaired renal function, chronic liver disease or advanced heart failure
- Variable appetite and food intake
- Increased insulin sensitivity (weight loss, increased activity)
- Impaired intestinal absorption
- Multidose insulin administration (basal and mealtime)
- History of hypoglycemia
- Gastroparesis
- Post-bariatric surgery

Signs and Symptoms of Hypoglycemia in Older Adults

Look for the following signs and symptoms of hypoglycemia:

- Altered behavior (e.g., agitation)
- Altered level of consciousness (e.g., drowsiness, lethargy)
- Confusion or disorientation
- Falls
- Generalized weakness
- Hunger
- Increased or prolonged sweating
- Irritability
- Poor concentration and coordination
- Seizures
- Stroke
- Tachycardia

Insulin as a Cause of Hypoglycemia

In older adults, the use of long-acting basal insulin alone is associated with severe hypoglycemia–related hospitalization and emergency department visits. Hypoglycemia risk is even higher with the use of regular and rapid-acting insulins, especially SSI. Risk occurs across all levels of diabetes control, and is prevalent even at A1C levels above 9%. Widespread staffing shortages can make it challenging to give the mealtime dose at the right time, further increasing risk for hypoglycemia. In older adults with comorbidities, intensive glycemic control with regimens including insulin and sulfonylureas has been identified as overtreatment and found to be very common in clinical practice.

Effects of Hypoglycemia in Older Adults

The effects of hypoglycemia may present differently in older adults than in younger patients and may include

- Confusion
- Anxiety
- Combative behavior
- Coma and seizures possible
- Stroke
- Death

Preventing Hypoglycemia

Approaches that can help to prevent hypoglycemia include

- Monitor to ensure that insulin is administered with meals
- Avoid prolonged use of SSI
- Use CGM
- Use non-insulin agents (e.g., SGLT2 inhibitors, GLP1-RAs)

See **Treating Hypoglycemia**.

STEP 4 — Assess cardiac comorbidities exacerbated by diabetes

Strong evidence shows that T2DM increases cardiovascular morbidity and death. Risk for acute coronary heart disease, ischemic stroke, and mortality are all increased two- to fourfold in patients with diabetes. T2DM affects life quality and expectancy by increasing risk for heart failure, peripheral arterial insufficiency, and microvascular complications. People with diabetes typically have an estimated life expectancy 4 to 8 years shorter than people without diabetes. Patients with diabetes and cardiovascular disease may have the following clinical problems or findings:

- Hypertension
- Hyperlipidemia
- History of smoking
- Heart failure with preserved or reduced ejection fraction
- Peripheral arterial disease or amputations
- History of stroke or transient ischemic attacks

STEP 5 — Evaluate the nature and severity of diabetic complications

Older adults with longstanding diabetes can generally be expected to have associated macro- and microvascular complications. During the time that older adults spend in a PALTC facility (often more than 2 years), comorbidities and complications of diabetes can worsen, leading to adverse physical and psychosocial sequelae. Patients with diabetes tend to have higher rates of cardiovas-

cular disease, dementia, falls, kidney disease, and visual impairment than those without diabetes, as well as more frequent emergency room visits, hospital transfers, and infections.

Patients with diabetes have an increased incidence of foot ulcers, oral infections, periodontal disease, and skin problems. Poor oral hygiene and inadequate glucose management can increase risk for oral infections and progressive periodontal disease, which is now recognized as a significant complication of diabetes. Diabetes is also an independent risk factor for falls among older adults in PALTC facilities; contributory factors include hypoglycemia, visual impairment, polypharmacy, and peripheral neuropathy. Depression is more common in older adults with diabetes than in those who do not have diabetes; the presence of depression can negatively affect diabetes management and patient outcomes.

Assessment of diabetic complications among patients in the PALTC setting is further complicated by age-related physiological changes and by the presence of multimorbidity that may resemble complications associated with diabetes but have a separate etiology. Screening for diabetic complications should be individualized, with a focus on those that could lead to impaired function. Table 11 provides a suggested approach to screening for diabetes-associated complications.

TABLE 11. Suggested Approach to Screening for Diabetes-Associated Complications

Assess the patient for the following conditions if appropriate:

- Coronary artery disease (symptomatic)
- Dementia
- Depression
- Gait imbalance, fall risk
- Periodontal disease, tooth loss
- Suboptimal foot care, foot ulcers
- Vision or hearing impairment

Adapted from Moreno et al, 2013

TREATMENT

STEP 6 — Develop an individualized care plan and define the goals of medical treatment

Appropriate and timely diabetes management can decrease disease burden and improve quality of life. For the individual patient, the goals of treatment should be to improve blood glucose control, optimize cardiovascular risk factors, and minimize complications. Take into account individual preferences, existing diabetic complications, life expectancy, and quality of life as defined by the patient or their legally authorized representative. **Avoiding adverse drug events and hypoglycemia are primary concerns in formulating a treatment plan.**

Table 12 outlines clinical care considerations in different PALTC care settings. Table 13 offers a framework for considering diabetes management goals in PALTC facilities.

The American Diabetes Association's *Standards of Care in Diabetes – 2024* is available as an additional resource at https://diabetesjournals.org/care/issue/47/Supplement_1

TABLE 12. Clinical Care Considerations Across the PALTC Continuum

LONG-TERM CARE			ALF
SKILLED REHAB	LTC	HOSPICE/PALLIATIVE	
Avoid reliance on A1C BG target 100–200 mg/dL (5.5–11.1 mmol/L) Potential for discharge Cognitive impairment Expressed wishes of patient Self care and function Community support	Avoid reliance on A1C Avoid hypoglycemia and symptomatic hyperglycemia Goals of care Cognitive impairment Glycemic goals Complications and comorbidities	Avoid hypoglycemia and symptomatic hyperglycemia Goals of care Clinical complexity Comfort Wishes of patient and family	Avoid hypoglycemia A1C below 8% if feasible Complications and comorbidities Cognition Functional ability Staffing capability BG monitoring/injections

ASSESS ALL PATIENTS FOR THE FOLLOWING:

- Hypoglycemic risk
- Renal function
- CV risks and complications
- Weight loss
- Frailty
- Prognosis

ALF, assisted living facility; BG, blood glucose; CV, cardiovascular; LTC, long-term care

TABLE 13. Framework for Considering Diabetes Management Goals in PALTC Facilities

	Special Considerations	Rationale	A1C	Fasting and Premeal Blood Glucose Targets	Blood Glucose Monitoring
Patients residing in ALFs	■ Multiple chronic conditions ■ Impairment in 2 or more IADLs ■ Variable life expectancy	■ Individual preferences ■ Facility capabilities	Less than 8.0% (64 mmol/mol)	90–150 mg/dL (5.0–8.3 mmol/L)	Monitoring frequency based on complexity of regimen
Community-dwelling patients at SNF for rehabilitation	■ Rehabilitation potential ■ Goal to discharge home	■ Need optimal glycemic control after acute illness	■ Avoid relying on A1C due to acute illness ■ Follow current blood glucose trends	100–200 mg/dL	Monitoring frequency based on complexity of regimen
Patients residing in LTC	■ Limited life expectancy ■ Frequent health changes ■ Avoid symptomatic hyper- or hypoglycemia	■ Limited benefit of intensive control ■ Focus on QOL	Avoid relying solely on A1C	100–200 mg/dL	Monitoring frequency based on complexity of regimen and risk of hypoglycemia
Patients at end of life	Avoid invasive diagnostic/therapeutic procedures with little benefit		No role for A1C	Avoid symptomatic hyperglycemia	Monitoring periodically only to avoid systemic hyperglycemia

ALF, assisted living facility; IADLs, instrumental activities of daily living; LTC, long-term care; QOL, quality of life; SNF, skilled nursing facility

Adapted from ADA, 2024 (Ch 13); Munshi et al, 2016

Classes of Medications* That May Be Used to Treat Type 2 Diabetes (With Commonly Used Abbreviations)

The following classes of agents may be used either as monotherapy or in combination therapy to treat type 2 diabetes:

Oral Agents

- Alpha glucosidase inhibitors (e.g., acarbose, miglitol)
- Biguanide (metformin)
- Bile acid sequestrants (BASs; e.g., colesvelam)
- Dipeptidyl peptidase IV (DPP-4) inhibitors (e.g., alogliptin, linagliptin, saxagliptin, sitagliptin)
- Dopamine-2 agonists (e.g., bromocriptine)
- Meglitinides (e.g., nateglinide, repaglinide)
- Sodium-glucose cotransporter 2 (SGLT2) inhibitors (e.g., bexagliflozin, canagliflozin, dapagliflozin, empagliflozin)
- Sulfonylureas (e.g., glimepiride, glipizide, glyburide)
- Thiazolidinedione (TZD; i.e., pioglitazone)

Agents Administered Orally or by Injection

- Glucagon-like peptide 1 receptor agonists (GLP1-RAs; e.g., dulaglutide, exenatide, liraglutide, lixisenatide, semaglutide)
- Dual GLP1 and gastric inhibitory peptide (GIP) receptor agonists (e.g., tirzepatide)

Fixed-Ratio Combinations (GLP-1 + Basal Insulin)

iDegLira (degludec/liraglutide)
iGlarLixi (glargine/lixisenatide)

*Insulin may also be used to treat type 2 diabetes

Sources: ADA, undated; Feingold, 2022

STEP 7 — Implement the treatment plan

Recommended Approach to Diet

The following approach to diet is currently recommended for patients with diabetes in the PALTC setting:

1. Provide a regular diet that contains a variety of foods and consistent amounts of carbohydrates at meals and snacks
2. Consider adjusting portion size and total calorie consumption. Base caloric needs on the individual's height, weight, activity level, and acute illnesses or wounds that may increase metabolic needs.

3. Increase consumption of dietary fiber, which contributes to blood glucose control and reduces gastrointestinal problems
4. Avoid excessively restricting fat. Fat restriction reduces the palatability of food and is not indicated for most PALTC patients, some of whom are at risk of undernutrition.
5. Encourage family members who like to bring in food for the patient to inform the staff so that the patient's treatment plan can be adjusted if necessary

Pharmacotherapy

Because of the importance of individualizing therapy and the diversity of available oral medications, insulins, and non-insulin injectable agents, this CPG does ***not*** recommend specific drug or insulin regimens. Instead, it recommends a general approach to pharmacotherapy for diabetes to achieve optimal blood glucose control.

Recognizing that polypharmacy is a concern for many patients in the PALTC setting, an important principle is to review the patient's medical regimen and preferentially select agents with dual benefits – e.g., to treat both diabetes and cardiac comorbidities, choose GLP1-RAs and SGLT2 inhibitors over anti-glycemic agents with no additional benefits.

In general, oral agents are considered first-line therapy and may be initiated concurrently with appropriate lifestyle and diet modifications. If lifestyle modification is not appropriate or feasible, consider the advantages and disadvantages of each antihyperglycemic agent and individualize drug selection.

Oral agents may be used alone or in combination to take advantage of their respective mechanisms of action. If the initial oral agent fails to achieve adequate blood-glucose control, consider combination therapy with another oral agent that has a different mechanism of action. The following classes of drugs are less likely to cause hypoglycemia: alpha-glucosidase inhibitors, biguanides, DPP-4 inhibitors, SGLT2 inhibitors, and thiazolidinediones (TZDs).

Patients with a long history of diabetes may not respond adequately to oral therapy because of a significant decline in insulin production. When selecting a medication, consider the duration of diabetes, the patient's age and comorbidities (e.g., congestive heart failure, chronic liver disease, renal insufficiency); the likelihood of adverse drug reactions and interactions; and the patient's preferences.

In patients for whom other oral medications fail to achieve treatment goals, consider the use of oral or injectable GLP1-RAs. These agents may be considered for patients who have or are at high risk for arteriosclerotic cardiovascular disease. However, because of their potential to cause gastrointestinal adverse effects, exercise caution when prescribing these agents to frail older adults and those with unintentional weight loss in the PALTC setting. SGLT2 inhibitors have also been shown to be of benefit for patients with heart failure and in slowing the progress of chronic kidney disease.

Table 14 presents an overview of available oral antidiabetic agents; Table 15, an overview of non-insulin injectable agents used in pharmacotherapy for diabetes; Table 16, guidance on optimal medication selection by clinical criteria; Table 17, additional caveats and cautions when prescribing diabetes medications in the PALTC setting.

TABLE 14. Overview of Available Oral Antidiabetic Agents

Notes:
1. Asterisk next to agent name denotes **boxed warning** (see p. 29)
2. Cost definitions (based on wholesale cost; assume access to generic version): $, less than $50/mo; $$, $50–$99/mo; $$$, $100–249/mo; $$$$, more than $250/mo
3. eGFR values are expressed in mL/min/1.73m^2

Sources: AACE, 2023; ADA, 2024 (Ch 9); AHFS Clinical Drug Information; Med Lett Drugs Ther, 2022. Additional source information indicated for specific drug classes.

Medication Class: BIGUANIDES

Primary Modes of Action: Decrease insulin resistance, primarily by decreasing hepatic glucose output; minor increase in muscle glucose uptake
Source: Goldberg et al, 2022

Agent(s)	Typical Dose	Meal Timing	Advantages	Use in CVD	Use in CKD	Precautions/ Potential Adverse Effects	Cost
Metformin tablet*	500 mg once or twice daily or 850 mg once daily. Increase by 500 mg intervals weekly or by 850 mg every 2 wk. Max dose 2550 mg/day. If dose over 2000 mg, may divide into 3 doses for better tolerance. Often limited to 2000 mg/day as most effective dose.	With meals	Expected decrease in A1C 1: 1.5% First-line therapy Hypoglycemia risk low Commercially available in combination products No known drug interactions	No benefit on MACE (Goldberg, 2022) No HF benefit	Neutral effect on progression of CKD Contraindicated with eGFR below 30 ml/min per 1.73m2 Alternative strategy: Reduce dose if eGFR 30–60	Avoid in severe HF to avoid lactic acidosis Age 80 and over: Monitor renal function regularly Consider monitoring for B12 deficiency with long-term use (less than 5 years) May cause GI symptoms, especially diarrhea, upon initiation Find alternative with ongoing reduction in appetite Contraindicated in liver disease	$
Metformin oral solution*	Same as tablet (above)	With meals					$$
Metformin extended-release tablet* (Glumetza)	Initially, 1000 mg/day. Titrate in 500 mg increments to 2000 mg/day. Consider splitting dose to achieve greater glucose control.	Preferably with evening meal					$
Metformin extended-release oral solution* (Riomet ER)	Initially, 500 mg/day. Increase by 500 mg weekly as needed to max dose of 2000 mg/day.	With evening meal					$$$$

TABLE 14 continued

TABLE 14. continued Overview of Available Oral Antidiabetic Agents

Medication Class: SECOND-GENERATION SULFONYLUREAS

Primary Mode of Action: *Stimulate increased insulin production by pancreatic islet beta cells*

Sources: ADA, 2024 (Ch 9, Ch 13); AGS Beers Criteria Update Expert Panel, 2023

Agent(s)	Typical Dose	Meal Timing	Advantages	Use in CVD	Use in CKD	Precautions/ Potential Adverse Effects	Cost
Glipizide (Glucotrol)	Initially, 5 mg once daily. Adjust at 2.5–5 mg intervals. Once-daily dose range 2.5–15 mg/day. Max dose 40 mg/day. Divide doses higher than 15 mg. Older adults: Start at 2.5 mg once daily.	Give 30 min before meals	Expected decrease in A1C: 1%–1.5% Few drug-drug interactions	No benefit on MACE No benefit on HF Potential risk of CV events, CV mortality (Lee et al, 2022)	Neutral effect on progression of CKD Use with caution if eGFR below 30 Initiate conservatively to avoid hypoglycemia	Contraindicated in severe liver or renal disease and severe allergy to sulfa Use with caution in elderly patients because of possible severe hypoglycemia Contraindicated in diabetic ketoacidosis May cause weight gain	$
Glipizide extended-release (Glucotrol XL)	Initially, 5 mg once daily. If needed, increase to 10 mg/day. Max dose 20 mg/day. (Max dose may not increase benefit.)	Give in morning with breakfast					
Glimepiride (Amaryl)	Initially, 1–2 mg once daily. After 2 mg/day, wait 1–2 wk between dose increases. Dose range 1–4 mg once daily. Max dose 8 mg/day. Older adults: Start at 1 mg/day.	Give in morning with breakfast		No benefit on MACE No benefit on HF	Neutral effect on progression of CKD Avoid if eGFR below 30 Initiate conservatively to avoid hypoglycemia	High risk of hypoglycemia. Risk increases when combined with other agents. Glimepiride is long-acting compared to glipizide Causes weight gain	$

TABLE 14 continued

TABLE 14. continued Overview of Available Oral Antidiabetic Agents

Medication Class: MEGLITINIDES

Primary Mode of Action: *Increase insulin release from the pancreas*

Note: Rarely used alternatives to other oral agents in PALTC

Agent(s)	Typical Dose	Meal Timing	Advantages	Use in CVD	Use in CKD	Precautions/ Potential Adverse Effects	Cost
Repaglinide (Prandin)	Starting dose 0.5 mg. May be increased weekly to max 4 mg before each meal. May be taken up to 4 times daily. Max dose 16 mg/day.	Take 15–30 min before a meal. A dose may be omitted if a meal is skipped or added if an extra meal is consumed.	Expected decrease in A1C: 0.5%–1%	No benefit on MACE No benefit on HF	Neutral effect on progression of CKD Avoid if eGFR below 20	Use lower doses with caution in mild to moderate hepatic impairment and severe renal impairment Not indicated for use with NPH insulin because of possible cardiovascular events May cause hypoglycemia May cause weight gain	$
Nateglinide (Starlix)	Starting and maintenance dose alone or in combination therapy: 120 mg 3x/day before meals. Max dose 360 mg/day. If close to A1C target when starting, initiate at 60 mg 3x/day.	Take 1–30 min before a meal	Expected decrease in A1C: 0.5%–1%	No benefit on MACE No benefit on HF	Neutral effect on progression of CKD		

TABLE 14 continued

TABLE 14. continued Overview of Available Oral Antidiabetic Agents

Medication Class: ALPHA-GLUCOSIDASE INHIBITORS

Primary Mode of Action: *Reduce postprandial glucose absorption*

Note: Rarely used alternatives to other oral agents in PALTC

Agent(s)	Typical Dose	Meal Timing	Advantages	Use in CVD	Use in CKD	Precautions/ Potential Adverse Effects	Cost
Acarbose (Precose)	Initially, 25 mg 3 times daily (may decrease GI side effects). Max dose 300 mg/day if weight above 60 kg. Max dose 150 mg/day if older or if weight below 60 kg.	Give at first bite of each meal. Hold dose if meal is missed.	Expected decrease in A1C: 0.5%–1% No weight gain	No benefit on MACE No benefit on HF	Neutral effect on progression of CKD Avoid if serum creatinine is above 2 mg/dL (no data)	Poor overall option in older adults due to common GI issues. Flatulence very common. Titrate slowly to avoid GI effects.	$
Miglitol (Glyset)	Initially, 25 mg 3x/day (may decrease GI side effects). After 4–8 wk, titrate to 50 mg 3x/day. Max dose 100 mg 3x/day.		Expected decrease in A1C: 0.5%–1%	No benefit on MACE No benefit on HF	Neutral effect on progression of CKD Avoid if serum creatinine is above 2 mg/dL or CrCl, 25 ml/min (no data)		$$

Medication Class: THIAZOLIDINEDIONES

Primary Mode of Action: *Decrease hepatic output and increase insulin-dependent muscle glucose uptake (decreases insulin resistance)*

Agent(s)	Typical Dose	Meal Timing	Advantages	Use in CVD	Use in CKD	Precautions/ Potential Adverse Effects	Cost
Pioglitazone* (Actos)	Initially, 15 or 30 mg daily. Max dose 45 mg for monotherapy, 30 mg for combination therapy.	May be taken without regard to meals	Expected decrease in A1C: 1%–2% Hypoglycemia less common than with some other classes of oral agents	Potential benefit on MACE Increases risk of HF	Neutral effect on progression of CKD No dose adjustment required Generally not recommended in renal impairment due to potential for fluid retention	May be associated with onset or worsening of CHF symptoms. Worse with insulin. Clearance significantly lower in hepatic impairment. Do not initiate therapy if patient exhibits active liver disease (transaminases more than 2.5 times upper limit of normal) at baseline. .	$

TABLE 14 continued

TABLE 14. continued Overview of Available Oral Antidiabetic Agents

Medication Class: DIPEPTIDYL PEPTIDASE-4 INHIBITORS

Primary Mode of Action: *Prolong action of naturally occurring GLP1, increase pancreatic insulin output, slow glucose absorption in gut, increase satiety*

Agent(s)	Typical Dose	Meal Timing	Advantages	Use in CVD	Use in CKD	Precautions/ Potential Adverse Effects	Cost
Sitagliptin (Januvia)	100 mg daily eGFR 30–45: 50 mg daily eGFR below 30: 25 mg daily	May be taken without regard to meals	Low incidence of side effects, including hypoglycemia or GI symptoms (sitagliptin only) Expected decrease in A1C: 0.5%–1%	Neutral effect on MACE Neutral effect on HF	Neutral effect on progression of CKD Renal dose adjustment required; can be used in renal impairment	Linagliptin may be preferred in older adults due to dosing requirements May cause headache, nasopharyngitis, upper respiratory infection	$$$$
Linagliptin (Tradjenta)	5 mg daily No dosage adjustment required for renal or hepatic impairment	May be taken without regard to meals		Neutral effect on MACE Neutral effect on HF	Neutral effect on progression of CKD Can be used in renal impairment	Risk of hypersensitivity reactions (anaphylaxis, angioedema, exfoliative dermatitis/ Stevens-Johnson syndrome), arthralgia, acute pancreatitis, elevated hepatic enzymes Risk of hypoglycemia increased when given with sulfonylureas; consider dose reduction of sulfonylurea.	
Saxagliptin (Onglyza)	5 mg daily eGFR below 45: 2.5 mg daily	May be taken without regard to meals		Neutral effect on MACE Potential risk of hospitalization due to HF	Neutral effect on progression of CKD Renal dose adjustment required; can be used in renal impairment		
Alogliptin (Nesina)	12.5–25 mg/day CrCl 30–60 mL/min:12.5 mL once daily CrCl 15–30 mL/min or ESRD: 6.5 mg once daily	May be taken without regard to meals		Neutral effect on MACE Neutral effect on HF	Neutral effect on progression of CKD Renal dose adjustment required; can be used in renal impairment		$$$

TABLE 14 continued

TABLE 14. continued Overview of Available Oral Antidiabetic Agents

Medication Class: SODIUM-GLUCOSE CO-TRANSPORTER-2 INHIBITORS

Primary Mode of Action: *Block reabsorption of glucose by the kidney, resulting in increased glucose excretion*

Note: Beer's Criteria 2023 suggest using SGLT2s with caution in older adults and monitoring closely for urogenital infections and ketoacidosis

Agent(s)	Typical Dose	Meal Timing	Advantages	Use in CVD	Use in CKD	Precautions/ Potential Adverse Effects	Cost
Bexagliflozin (Brenzavvy)	20 mg once daily	Take in the morning with or without meals		No data	No data	May cause hypotension, osmotic diuresis, hyperkalemia, urinary tract infection, genital mycotic infections, diabetic lower limb amputation, bone fracture, diabetic ketoacidosis (rare)	$
Canagliflozin (Invokana)	Starting dose 100 mg daily eGFR above 60: Dose can be increased to 300 mg once daily eGFR 45–60: Limit dose to 100 mg once daily eGFR below 45: Do not initiate drug unless albuminuria above 300 mg/day	Give before first meal of day	Expected decrease in A1C: 0.5%–1%	Benefit on MACE Benefit on HF	Benefit on progression of CKD and ESRD Renal dose adjustment required; can be used in renal impairment	May cause hypotension, osmotic diuresis, hyperkalemia, urinary tract infection, genital mycotic infections, diabetic lower limb amputation, bone fracture, diabetic ketoacidosis (rare) Can cause hypoglycemia when combined with other agents Requires renal monitoring and attention to volume status Contraindicated if eGFR 30 or below, in ESRD, and in patients on dialysis	$$$$
Dapagliflozin (Farxiga)	Starting dose 5 mg daily eGFR 45 or above: Dose can be increased to 10 mg daily eGFR below 45: Do not initiate drug	Give in morning without regard to meals	Expected decrease in A1C: 0.5%–1%	Neutral effect on MACE Benefit on HF	Benefit on progression of CKD and ESRD Not recommended with moderate renal impairment	May cause hypotension, osmotic diuresis, hyperkalemia, urinary tract infection, genital mycotic infections, diabetic ketoacidosis (rare) Can cause hypoglycemia when combined with other agents Requires renal monitoring and attention to volume status Contraindicated if eGFR below 30	$$$$

TABLE 14 continued

TABLE 14. continued Overview of Available Oral Antidiabetic Agents

Medication Class: SODIUM-GLUCOSE CO-TRANSPORTER-2 INHIBITORS (continued)

Agent(s)	Typical Dose	Meal Timing	Advantages	Use in CVD	Use in CKD	Precautions/ Potential Adverse Effects	Cost
Empagliflozin (Jardiance)	Starting dose 10 mg daily eGFR 45 or above: Dose can be increased to 25 mg once daily eGFR below 45: Do not initiate drug	Give in morning without regard to meals	Expected decrease in A1C: 0.5%–1%	Benefit on MACE Benefit on HF	Benefit on progression of CKD and ESRD Endocrine Society does not recommend in older adults with eGFR below 45	May cause hypotension, osmotic diuresis, hyperkalemia, urinary tract infection, genital mycotic infections, diabetic ketoacidosis (rare) Can cause hypoglycemia when combined with other agents Requires renal monitoring and attention to volume status	$$$$
Ertugliflozin (Steglatro)	Starting dose 5 mg daily. eGFR above 60: Dose can be increased to 15 mg once daily eGFR 30–60: Do not initiate drug	Give in morning without regard to meals	Expected decrease in A1C: 0.5%–1%	Neutral effect on MACE Benefit on HF	Neutral effect on progression of CKD	May cause hypotension, osmotic diuresis, hyperkalemia, urinary tract infection, genital mycotic infections, diabetic ketoacidosis (rare) Can cause hypoglycemia when combined with other agents Requires renal monitoring and attention to volume status	$$$$

A1C, glycosylated hemoglobin; CHF, congestive heart failure; CKD, chronic kidney disease; CrCl, creatinine clearance; CV, cardiovascular; DPP, dipeptidyl peptidase; eGFR, estimated glomerular filtration rate; ESRD, end-stage renal disease; GI, gastrointestinal; GLP, glucagon-like peptide; HF, heart failure; MACE, major adverse cardiovascular events (MI cardiovascular death and nonfatal stroke); MI, myocardial infarction; NYHA, New York Heart Association; SC, subcutaneous

Goldberg RB, Orchard TJ, Crandall JP, et al. Effects of Long-term Metformin and Lifestyle Interventions on Cardiovascular Events in the Diabetes Prevention Program and Its Outcome Study. Circulation. 2022;145(22):1632-1641. doi:10.1161CIRCULATIONAHA.121.056756

Lee TTL, Hui JMH, Lee YHA, et al. Sulfonylurea is associated with high risks of ventricular arrhythmia or sudden cardiac death compared with metformin; a population-based cohort study. J Am Heart Assoc. 2022;11:e026289. doi:10.1161/JAHA.122.026289

Boxed Warnings

Metformin

Lactic acidosis is a rare but serious complication that can occur as a result of metformin accumulation (reported incidence approximately 0.03 cases/1000 patient-years; fatal in 50% of cases). Reported cases have occurred primarily in patients with significant renal insufficiency and multiple concomitant medical/surgical problems and medications. Patients with unstable or acute CHF are at increased risk for lactic acidosis. Regular monitoring of renal function and use of the minimum effective dose of metformin may decrease risk. Withhold metformin in the presence of any condition associated with hypoxemia, dehydration, or sepsis.

Pioglitazone

Thiazolidinediones (TZDs), including pioglitazone, may cause or exacerbate CHF. After initiating pioglitazone, and after dose increases, observe patients carefully for signs and symptoms of heart failure (e.g., excessive, rapid weight gain; dyspnea; edema). If heart failure develops, it should be managed according to current standards of care. Discontinuation or dose reduction of pioglitazone must be considered. Pioglitazone is not recommended in patients with symptomatic heart failure and are contraindicated in patients with established NYHA Class III or IV heart failure.

TABLE 15. Overview of Non-Insulin Injectable Antidiabetic Agents

Notes:
1. Asterisk next to agent name denotes **boxed warning** (see p. 34)
2. eGFR values are expressed in mL/min/1.73m^2

Medication Class: GLUCAGON-LIKE PEPTIDE-1 RECEPTOR AGONISTS

Primary Modes of Action: Stimulates insulin release in the presence of elevated glucose concentrations, decreases glucagon secretion, delays gastric emptying, increases satiety

Agent(s)	Typical Dose	Meal Timing	Advantages	Use in CVD	Use in CKD	Precautions/ Potential Adverse Effects	Cost
Exenatide (Byetta)	5–10 mcg SC twice a day for 1 mo, then 10 mcg twice a day	Inject within 60 min before morning and evening meals	Expected decrease in A1C: 1.5%	Neutral effect on MACE and HF	Neutral effect on progression of CKD Avoid use if eGFR below 30	May cause nausea, vomiting, diarrhea, shakes, dizziness headache, hypoglycemia Consider lowering dose of sulfonylurea when initiating therapy with exenatide May reduce rate of absorption of oral medications	$$$$
Exenatide extended release* (Bydureon BCise)	2 mg SC weekly	May be given at any time of day, without regard to meals	Expected decrease in A1C: 2%	Neutral effect on MACE and HF	Neutral effect on progression of CKD Avoid use with eGFR below 30	Do not use in patients with a family history of thyroid carcinoma or multiple endocrine neoplasia Indicated as an adjunct to diet and exercise Not recommended for first-line therapy	$$$$
Dulaglutide* (Trulicity)	Initially, 0.75 mg SC once weekly May increase dosage to 1.5 mg once weekly if glycemic response is inadequate May increase by 1.5 mg increments on previous dose once weekly after 4 wks to max of 4.5 mg once weekly	May be given at any time of day without regard to meals	Expected decrease in A1C: 0.7%–0.8%	Reduced risk of MACE in adults with T2DM and established CVD or multiple CV risk factors	Benefit for renal endpoints in CVOTs driven by albuminuria outcomes No dosage adjustment needed	May cause nausea, vomiting, diarrhea, abdominal pain, increased appetite Slows gastric emptying time	$$$$

TABLE 15 continued

TABLE 15. continued Overview of Non-Insulin Injectable Antidiabetic Agents

Medication Class: GLUCAGON-LIKE PEPTIDE-1 RECEPTOR AGONISTS (continued)

Agent(s)	Typical Dose	Meal Timing	Advantages	Use in CVD	Use in CKD	Precautions/ Potential Adverse Effects	Cost
Liraglutide* (Victoza)	0.6 mg SC once daily x 1 wk; increase to 1.2 mg once daily May increase to 1.8 mg once daily if glycemic control not achieved with 1.2 mg	May be taken without regard to meals	Expected decrease in A1C: 1%	Reduced risk of MACE in adults with T2DM and established CVD	Benefit for renal endpoints in CVOTs driven by albuminuria outcomes No dosage adjustment needed	0.6 mg not therapeutic, used only as titration therapy to avoid GI effects May cause nausea, vomiting, diarrhea, headache Consider reducing dose of sulfonylurea or meglitinide to avoid hypoglycemia Possible risk of thyroid C-cell tumors reported in animals (see boxed warning)	$$$$
Lixisenatide (Adlyxin)	Initially, 10 mcg SC once daily for 14 days On day 15 increase to 20 mcg once daily	Administer within 1 h before first meal of day, preferably same meal each day (and at same time each day)	Expected decrease in A1C: 1.0%–2.0%	Neutral effect on MACE and HF	Neutral effect on progression of CKD Limited experience with severe renal impairment. Avoid if eGFR below 15	May reduce rate of absorption of oral medications Use caution if combining with drugs with low therapeutic index	$$$$
Semaglutide* (Ozempic)	Initially, 0.25 mg SC once weekly for 4 wk (to reduce GI intolerance). Then 0.5 mg once weekly If needed for glycemic control, may increase to 1 mg after 4 wk, then to 2 mg Max dose 2 mg once weekly Patients taking 0.5 SC once weekly may switch to 7 or 14 mg PO once daily	Once weekly on same day every week, at any time of day, with or without meals	Expected decrease in A1C: 1.0%–2.0%	Reduced risk of MACE in adults with T2DM and established CVD (only Ozempic)	Benefit for renal endpoints in CVOTs driven by albuminuria outcomes No dosage adjustment needed	May cause nausea, vomiting, diarrhea, injection-site reactions, renal impairment, acute renal failure Possible risk of pancreatitis, thyroid C-cell tumors reported in animals (see boxed warning)	$$$$

TABLE 15 continued

TABLE 15. continued Overview of Non-Insulin Injectable Antidiabetic Agents

Medication Class: GLUCAGON-LIKE PEPTIDE-1 RECEPTOR AGONISTS (continued)

Agent(s)	Typical Dose	Meal Timing	Advantages	Use in CVD	Use in CKD	Precautions/ Potential Adverse Effects	Cost
Semaglutide* (Rybelsus)	Initially, 3 mg PO once daily for 30 days (to reduce GI intolerance) Then 7 mg daily for 30 days If needed, dose may be increased to 14 mg once daily Max dose 14 mg daily Patients taking 14 mg once daily may switch to 0.5 mg SC once weekly, starting on day after last PO dose	Should be taken on empty stomach when patient first wakes up After taking, wait 30 min before eating, drinking, or taking other oral medications	Expected decrease in A1C: 1.0%–2.0%	Neutral effect on MACE and HF	Neutral effect on progression of CKD No dosage adjustment needed	May cause nausea, vomiting, diarrhea, injection-site reactions, renal impairment, acute renal failure Possible risk of pancreatitis, thyroid C-cell tumors reported in animals (see boxed warning)	$$$$

Medication Class: GLUCAGON-LIKE PEPTIDE-1 RECEPTOR AGONIST + BASAL INSULIN

Primary Modes of Action: *Stimulates insulin release in presence of elevated glucose concentrations, decreases glucagon secretion, delays gastric emptying, increases satiety, provides low fixed-ratio combination*

Agent(s)	Typical Dose	Meal Timing	Advantages	Use in CVD	Use in CKD	Precautions/ Potential Adverse Effects	Cost
Insulin degludec/ liraglutide* (Xultophy) 100/3.6 fixed-dose combination	Naïve to insulin or GLP1: Initially, 10 units (10 units insulin degludec/0.36 units liraglutide) once daily Currently receiving basal insulin or GLP1: Initially, 16 units once daily Discontinue basal insulin or GLP1 prior to initiation Max 50 units daily	Same time each day without regard to meals	Lower rate of hypoglycemia compared to basal-bolus or other complex insulin regimens Increases satiety Provides low-dose basal insulin in a fixed-ratio combination	Neutral effect on MACE and HF	Neutral effect on progression of CKD Monitor renal function for possible dose adjustment.	May cause hypoglycemia, nasopharyngitis, headache, nausea, diarrhea, increased lipase concentrations, upper respiratory tract infection	$$

TABLE 15 continued

TABLE 15. continued Overview of Non-Insulin Injectable Antidiabetic Agents

Medication Class: GLUCAGON-LIKE PEPTIDE-1 RECEPTOR AGONIST + BASAL INSULIN (continued)

Agent(s)	Typical Dose	Meal Timing	Advantages	Use in CVD	Use in CKD	Precautions/ Potential Adverse Effects	Cost
Insulin glargine/ lixisenatide (Soliqua) 100/33 fixed-dose combination	Less than 30 units of basal insulin or lixisenatide: Initially, 15 units (15 units insulin glargine/10 mcg lixisenatide) once daily T2DM inadequately controlled on 30–60 units of basal insulin: Initially, 30 units once daily Discontinue basal insulin or GLP1 prior to initiating Titrate dose by 2–4 units weekly as needed Max 60 units daily	Within 1 h of first meal of day	Lower rate of hypoglycemia compared to basal-bolus or other complex insulin regimens	Neutral effect on MACE and HF	Neutral effect on progression of CKD Monitor renal function for possible dose adjustment	May cause hypoglycemia, nasopharyngitis, headache, nausea, diarrhea, upper respiratory tract infection	$$

TABLE 15 continued

TABLE 15. continued Overview of Non-Insulin Injectable Antidiabetic Agents

Medication Class: GLUCOSE-DEPENDENT INSULINOTROPIC POLYPEPTIDE (GIP) + GLUCAGON-LIKE PEPTIDE-1 RECEPTOR AGONIST

Primary Modes of Action: *Stimulates insulin release in the presence of elevated glucose concentrations, decreases glucagon secretion, delays gastric emptying, and increases satiety*

Agent(s)	Typical Dose	Meal Timing	Advantages	Use in CVD	Use in CKD	Precautions/ Potential Adverse Effects	Cost
Tirzepatide* (Mounjaro)	2.5 mg SC once weekly Increase to 5 mg SC once weekly after 4 wks Increase in 2.5 mg increments every 4 wks Max dose 15 mg SC once weekly	Once weekly, on same day every week, at any time of day, with or without meals	Expected decrease in A1C: 2.0– 2.5%	Neutral	Neutral	May cause nausea, diarrhea, decreased appetite, vomiting, constipation, dyspepsia, abdominal pain Possible risk of thyroid C-cell tumors reported in animals (see boxed warning)	$$$$

†Based on one 10 ml vial or 1 pen in lowest available combination. Source: Med Lett Drugs Ther. 2019 May (1571); 2022 July (1654)
CKD, chronic kidney disease; CV, cardiovascular; CVD, cardiovascular disease; CVOTs, cardiovascular outcomes trials; eGFR, estimated glomerular filtration rate; GI, gastrointestinal; HF, heart failure; mo, month; PO, by mouth; SC, subcutaneously; wk, week

Boxed Warnings

Dulaglutide
Dulaglutide causes dose- and treatment-dependent thyroid C-cell tumors (adenomas and carcinomas) in male and female rats after lifetime exposure. It is unknown whether dulaglutide causes thyroid C-cell tumors, including medullary thyroid carcinoma (MTC), in humans, as relevance to humans has not been determined. Dulaglutide is contraindicated in patients with a personal or family history of MTC and in patients with multiple endocrine neoplasia syndrome type 2.

Extended-release exenatide
Extended-release exenatide causes thyroid C-cell tumors at clinically relevant exposures in rats. Unknown whether the drug causes thyroid C-cell tumors, including medullary thyroid carcinoma (MTC), in humans, as relevance to humans has not been determined. Extended-release exenatide is contraindicated in patients with a personal or family history of MTC and in patients with multiple endocrine neoplasia syndrome type 2.

Liraglutide
Liraglutide, alone or in combination with insulin degludec (Xultophy), causes thyroid C-cell tumors at clinically relevant exposures in rodents. Studies have not determined whether liraglutide causes thyroid C-cell tumors, including medullary thyroid carcinoma (MTC), in humans. Liraglutide, alone or in combination with insulin degludec (Xultophy), is contraindicated in patients with a personal or family history of MTC or in patients with multiple endocrine neoplasia syndrome type 2.

Semaglutide
Semaglutide causes dose-dependent and treatment-duration-dependent thyroid C-cell tumors at clinically relevant exposures in rodents. Studies have not determined whether semaglutide causes thyroid C-cell tumors, including medullary thyroid carcinoma (MTC), in humans. Semaglutide is contraindicated in patients with a personal or family history of MTC or in patients with multiple endocrine neoplasia syndrome type 2.

Tirzepatide
Tirzepatide causes thyroid C-cell tumors in rats. It is unknown whether tirzepatide causes thyroid C-cell tumors, including medullary thyroid carcinoma (MTC), in humans as the human relevance of tirzepatide-induced rodent thyroid C-cell tumors has not been determined. Tirzepatide is contraindicated in patients with a personal or family history of MTC or in patients with multiple endocrine neoplasia syndrome type 2.

TABLE 16. Guidance on Optimal Medication Selection by Clinical Criteria

	eGFR <30 OR ESRD ON DIALYSIS		eGFR >30		HIGH HYPOGLYCEMIA RISK	END OF LIFE
Patient Characteristics	Normal appetite, no weight loss	Frail, anorexia, low body weight	Normal appetite, no weight loss	Frail, anorexia, low body weight	Multiple comorbidities. Tight glycemic control. Hypoglycemia or lack of awareness. Sulfonylurea or insulin. Cognitive impairment. Inconsistent meal intake.	Goals of comfort. Avoidance of hypoglycemia and hyperglycemia
Preferred Medications	DPP4 inhibitor (linagliptin) GLP1-RA Basal insulin*	DPP4 inhibitor Basal insulin*	Metformin ER DPP4 inhibitors SGLT2 inhibitors GLP1-RA Basal insulin*	DPP4 inhibitors Metfor-min ER basal insulin*	Metformin ER DPP4 inhibitors SGLT2 inhibitors GLP1-RA	DPP4 inhibitors Linagliptin Basal insulin**

* Use basal insulin if additional glucose lowering or long-term use of basal insulin is needed

** Use basal insulin with caution if patient has symptomatic hypoglycemia

DPP-4, dipeptyl peptidase 4; eGFR, estimated glomerular filtration rate; ER, extended release; ESRD, end-stage kidney disease; GLP1-RA, glucagon-like peptide-1 receptor agonist; SGLT2, sodium glucose transporter 2

TABLE 17. Additional Caveats and Cautions When Prescribing Diabetes Medications in PALTC

Medication	When to Avoid
Metformin	Decompensated HF eGFR less than 30 Hepatic disease Risk of dehydration If patient has diarrhea, consider ER formulation or alternative agent
GLP1-RA	Anorexia Chronic constipation Gastroparesis or other motility issues Unexplained GI symptoms Weight loss Preferred in presence of ASCVD or HF
SGLT2 inhibitor	Acute kidney injury Bedbound status Dehydration Dialysis Fractures Frequent UTI or genital yeast infection Inability to drink fluids independently Urinary incontinence Weight loss Stop 5 d prior to elective procedure Preferred in presence of CKD or HF
DPP-4 inhibitor	Severe anorexia Unexplained GI symptoms Do not use with concurrent GLP1-RA
Basal insulin	Hypoglycemia risk Injectable treatments not possible in care setting (e.g., some ALFs) Inconsistent BG monitoring Lack of caregiver support Stop sulfonylureas, SSI
Prandial insulin	Erratic meal consumption Hypoglycemia risk Injectable treatments not possible in care setting Inconsistent BG monitoring Lack of caregiver support Tube feeding Stop sulfonylureas, SSI
Sulfonylureas	Concurrent insulin use Dementia Hypoglycemia risk
TZDs	Bladder cancer HF or other edema Osteoporosis

ALF, assisted living facility; ASCVD, atherosclerotic cardiovascular disease; BG, blood glucose; CKD, chronic kidney disease; DPP-4, dipeptyl peptidase 4; eGFR, estimated glomerular filtration rate; ER, extended release; GI, gastrointestinal; GLP1-RA, glucagon-like peptide-1 receptor agonist; HF, heart failure; SGLT2, sodium glucose transporter 2; SSI, sliding-scale insulin; UTI, urinary tract infection

Hyperglycemia Management in Type 2 Diabetes: Focus on Cardiorenal Comorbidities

Asymptomatic Patients with Newly Diagnosed Type 2 Diabetes

- Metformin is a good starting option in the absence of specific contraindications (e.g., alcoholism, chronic liver disease, heart failure, renal insufficiency)
- Metformin is contraindicated in patients with an estimated glomerular filtration rate (eGFR) below 30 ml/min/1.73m2 and not recommended in patients with eGFR 30–45 ml/min/1.73m2
- For patients taking metformin whose eGFR falls below 45 ml/min/1.73m2, assess the benefits and risk of continuing treatment; discontinue metformin if the eGFR falls below 30 ml/min/1.73m2
- In asymptomatic patients with newly diagnosed T2DM and contraindications to metformin and patients who fail to respond to initial monotherapy (i.e., whose individualized glycemic treatment goal is not achieved within 3 months of using metformin in combination with lifestyle intervention), the choice of alternative agents (or second agents) is driven by comorbidities, preferences, and cost.

Patients with Cardiorenal Comorbidities

- Ascertained coronary artery disease or albuminuric diabetic kidney disease (DKD) with advanced renal dysfunction [eGFR below 30 ml/min/1.73m2]:
  - GLP1-RAs (e.g., subcutaneous dulaglutide, liraglutide, semaglutide) are preferred; in clinical trials, they demonstrated advantageous atherosclerotic cardiovascular disease and kidney outcomes, including a reduction in cardiovascular (CV) and overall mortality. Oral semaglutide is also an option.
- Systolic or diastolic heart failure, or albuminuric DKD with eGFR 25–60 ml/min/1.73m2:
  - SGLT2 inhibitors (e.g., canagliflozin, dapagliflozin, empagliflozin) are preferred, having demonstrated cardiorenal benefit (heart failure hospitalization, risk of kidney disease progression, CV and overall mortality).
  - Depending on the labeling of the specific agent, SGLT2 inhibitors should not be initiated for discrete hyperglycemia if eGFR is below 45 mL/min/1.73m2, as their glycemic efficacy is inversely proportional to eGFR. In this case, the use of an alternative or additional agent (commonly a GLP1-RA, whose glycemic benefit is unbound from kidney function) is indicated to achieve glycemic goals.
- Patients without established cardiorenal comorbidities and with A1C above 9%:
  - Main choices are insulin or a GLP1-RA
- Patients without established cardiorenal comorbidities and with A1C below 9:
  - Options besides metformin include DPP-4 inhibitors, SGLT2 inhibitors, pioglitazone, repaglinide, or sulfonylureas

Adapted from *ADA Standards of Care in Diabetes–2024 (Ch 10, 11)*

Insulin Therapy

As the disease progresses, many patients with diabetes in the PALTC setting may eventually require insulin therapy to manage their disease. Some patients will need insulin on a prolonged basis; for others, insulin may be necessary only during an intercurrent illness.

Insulin may be used in combination with one or more oral or injectable agents. A wide variety of insulins is available. Insulin may be rapid acting, short acting, intermediate acting, long acting or ultra-long acting (basal), or premixed in various combinations (Table 18).

The addition of basal insulin is usually effective when oral agents alone do not achieve target blood glucose levels. Basal insulin helps to maintain constant insulin levels and suppresses hepatic glucose production between meals. An intermediate-acting insulin may be used as an alternative to basal insulin. Basal insulin may be dosed empirically or by weight (e.g., 10 units per day or 0.1–0.2 units/kg/day). Titrate the dose slowly upward (e.g., by 2–3 units) approximately once per week until the desired fasting blood glucose (FBG) levels are obtained, monitoring appropriately to avoid hypoglycemic episodes between meals or late at night.

If FBG is adequately controlled but postprandial glucose levels are consistently elevated (e.g., over 200 mg/dL) or A1C is elevated, scheduled prandial insulin may be given to control postmeal hyperglycemia. Give 4 units or 0.1 units/kg of rapid-acting insulin before the largest meal of the day.

If SSI has been administered on an as-needed basis, one guide to identifying the appropriate amount by which to titrate basal insulin is to review the total amount of as-needed insulin given per day. An insulin dose that is 50% to 75% of the total average daily as-needed dose may be added to the pre-existing dose of basal insulin to yield the new dose of basal insulin.

As with oral therapy, treatment with insulin must be individualized based on the patient's blood glucose levels, prognosis, and treatment goals. Caregivers should routinely rotate insulin injection sites. The practitioner should document in the patient's chart the rationale for the chosen regimen and any significant subsequent changes in insulin regimens or types.

Table 19 provides guidance on when to use insulin; Figure 2 is a flowchart to help simplify complex insulin regimens.

TABLE 18. Types of Insulin and Their Pharmacokinetics

Category	Insulin Type	Onset of Action (h)	Peak Action (h)	Duration of Effect (h)	Comments
Rapid-acting	Insulin lispro (U-100, U-200) (Humalog; Lyumjev; Admelog)	within 0.25	0.5–1.5	4–6	Give within 15 min before or immediately after a meal
	Insulin aspart (Novolog; Flasp)	within 0.25	0.5–1.5	4–6	Give just before a meal
	Insulin glulisine (Apidra)	within 0.25	0.5–1.5	4–6	Give just before or within 20 min after starting a meal
Short-acting	Regular human insulin (U-100) (Humulin R; Novolin R)	0.5	1.5–2.5	8	Normally dosed 30 min before a meal Available in fixed combinations with NPH (e.g., 70/30 — see **Premixed Fixed-Dose Combination Insulins,** below)
	Regular human insulin (U-500) (Humulin R U-500)	0.5	4–8	13–24	
Intermediate-acting	NPH insulin (Humulin N; Novolin N)	2–4	4–10	12–18	Give 30–60 min before a meal May be given once daily; however, typically given twice daily
Long-acting	Insulin glargine (U-100) (Lantus, Basaglar, Semglee)	2–4	flat	20–24	Give once daily at same time each day
	Insulin detemir (Levemir)	2–4	flat	14–24	Give once or twice daily. If once daily, with evening meal or at bedtime. If twice daily, with evening dose, or at bedtime, or 12 h after morning dose.

TABLE 18 continued

TABLE 18. continued Types of Insulin and Their Pharmacokinetics

Category	Insulin Type	Onset of Action (h)	Peak Action (h)	Duration of Effect (h)	Comments
Ultra-long–acting	Insulin degludec (U-100, U-200) (Tresiba)	1	flat	More than 42	Give once daily at same time each day Titrate dose no more often than every 3–4 days
	Insulin glargine (U-300) (Toujeo)	6	flat	Up to 36	Give once daily at same time each day Titrate dose no more often than every 3–4 days
Premixed Fixed-Dose Combination Insulins					
Standard combinations	Regular human insulin (U-100) (Humulin 70/30) (Novolin 70/30)	0.5–1	2–12	12–24	Give 30–60 min before a meal
Analog combinations	Insulin lispro (Humalog 50/50) (Humalog 75/25) Insulin aspart (Novolog 70/30)	0.25	2–4	14–24	Give just before or after starting morning or evening meal In selected individuals with complex insulin regimens, number of injections may be reduced
Inhaled Insulin					
Inhalation powder (ultra-rapid acting)	Inhaled human insulin powder (Afrezza)	within 0.25	0.5–1	1.5–4.5	Give at beginning of a meal Dosage adjustment may be needed when switching from another insulin Not a substitute for long-acting insulin Most common adverse reactions in clinical trials: hypoglycemia, cough, throat irritation Not recommended in smokers or for treatment of diabetic ketoacidosis Contraindicated in chronic lung disease (e.g., asthma, COPD)

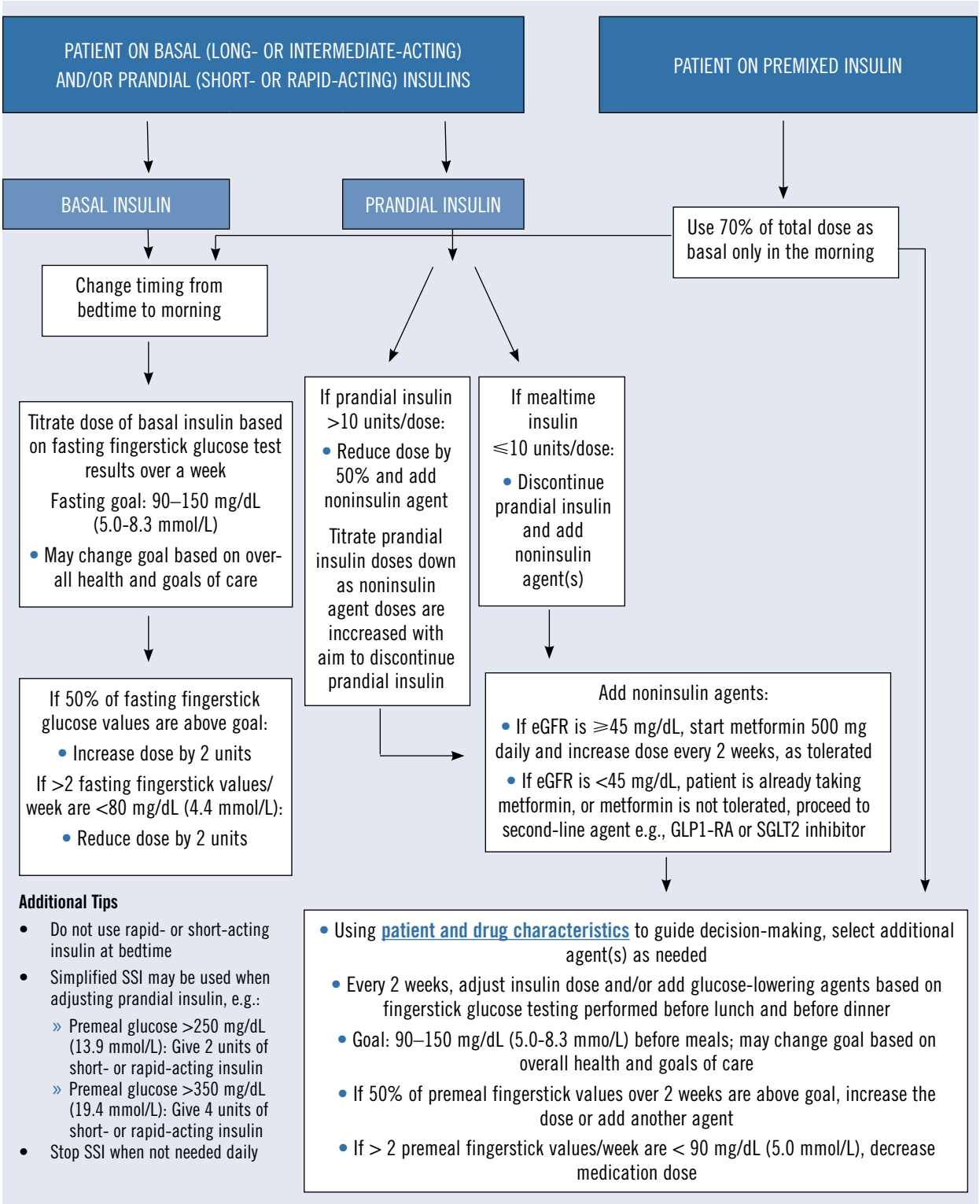
COPD, chronic obstructive pulmonary disease; NPH, neutral protamine Hagedorn

TABLE 19. When to Use Insulin

- Persistent hyperglycemia (random blood glucose consistently over 300 mg/dL for more than a week) despite other interventions (e.g., lifestyle modification, oral medications, non-insulin injectable agents)
- Chronic hyperglycemia leading to glucose toxicity (reduced insulin sensitivity resulting from marked hyperglycemia)
  - Severe hyperglycemia with ketonuria
  - Weight loss
- Increased insulin requirements resulting from severe chronic infection, stress, surgery, or injury
- Diabetic ketoacidosis or hyperosmolar state
- Oral agents contraindicated (renal or hepatic disease, medication allergy or adverse effects)

Adapted from ADA, 2024 (Ch 9)

FIGURE 2. Simplification of Complex Insulin Therapy



Source: ADA, 2024 (Ch 9)

Adapted with permission

Sliding-Scale Insulin: Not for Long-Term Glycemic Management

Although SSI has been widely used in hospitals and PALTC facilities, its routine use is ***not*** recommended as a primary or sole method of treatment. SSI is a reactive way of treating hyperglycemia and does not reduce glucose fluctuations. In addition, SSI regimens have been associated with poorer glycemic control. The rate of hypoglycemia with SSI regimens is similar to that of non-SSI regimens.

SSI may be ordered for short-term use (e.g., following a patient's admission to a PALTC facility or during an episode of acute illness); however, the order may remain in effect indefinitely after the reason for short-term use has ended, without any dose adjustment in the insulin regimen or other medications being used to treat hyperglycemia. In general, it is recommended that any patient on SSI be re-evaluated within 1 week and, if possible, converted to fixed daily insulin doses that minimize the need for correction doses. **Table 20** suggests strategies for replacing SSI in PALTC facilities.

Lastly, eliminating the use of SSI can not only decrease the nursing time needed for BGM and insulin administration, but it can also decrease patient discomfort from the multiple daily fingersticks that are typically associated with this complex insulin regimen.

TABLE 20. Strategies for Replacing Sliding-Scale Insulin in PALTC Facilities

Current Regimen or Clinical Scenario	Suggested Steps
SSI is sole mode of insulin treatment	■ Give 50%–75% of the average daily insulin requirement over 5–7 d as basal insulin ■ Stop SSI ■ Use non-insulin agents or fixed-dose meal-time insulin for PPG as needed ■ Consider giving basal insulin in morning to reduce PPG and nocturnal hypoglycemia
SSI is used in addition to scheduled basal insulin	■ Add 50%–75% of the average insulin requirement currently given as SSI to the existing basal dose ■ Use non-insulin agents or fixed-dose meal-time insulin for PPG as needed
SSI is used in addition to basal and scheduled mealtime insulin (i.e., correction dose insulin)	■ If a correction dose is frequently required, add the average correction dose before a meal to the scheduled mealtime insulin dose at the ***preceding*** meal ■ If BG is consistently elevated before breakfast, requiring correction doses, increase the scheduled basal insulin dose by the average correction dose used
SSI is used short term due to illness or irregular dietary intake	■ Short-term SSI use is ***appropriate*** in cases of acute illness and irregular dietary intake ■ As health and BG stabilize, stop SSI, return to previous regimen as tolerated, and reduce monitoring frequency
Patient with cognitive decline or irregular dietary intake has widely fluctuating BG levels	■ Use scheduled basal and meal-time insulin based on individual needs with the goal of avoiding low BG ■ Consider using a simple scale such as "Give 4 units of prandial insulin if BG is higher than 300 mg/dL" ■ Keep patients hydrated when glucose levels are higher than 300 mg/dL

BG, blood glucose; PPG, postprandial glucose; SSI, sliding-scale insulin

Adapted from Munshi, 2016

Correction-Dose Insulin

Correction-dose insulin is rapid- or short-acting insulin that is added to each scheduled prepran-dial dose. This is an acceptable addition to a scheduled regimen of basal and prandial insulin if

blood glucose levels are highly variable and the patient is medically unstable or has used this regimen in the community setting.

To accurately correct blood glucose levels using rapid-acting insulins, calculate the patient's insulin sensitivity (i.e., the estimated reduction in plasma glucose per unit of insulin provided) using an established formula (e.g., 1,700 divided by the patient's average total daily insulin dose), and order a patient-specific correction-dosing protocol.

Treating Hypoglycemia

Key Points

- Clinically significant hypoglycemia results in neuroglycopenic symptoms (e.g., confusion, anxiety, combative behavior) that require immediate action with a quick-acting carbohydrate to resolve
- Avoid overtreating patients with hypoglycemia. Overtreatment will ***not*** correct hypoglycemia more quickly and may result in significant hyperglycemia within the next 4 to 6 hours.
- Accepted optimal treatment is based on the **"Rule of 15"**
- Although hypoglycemia may be rapidly corrected, the effects of medication that cause hypoglycemia can be sustained and patients may need to be monitored closely and frequently for several hours. Patients with significant renal dysfunction in whom hypoglycemia is caused by a sulfonylurea with a long half-life may require frequent monitoring over several days.

The "Rule of 15"

Administer 15 g of carbohydrates and recheck the patient's blood glucose level in 15 minutes. If the glucose level is still below 70 mg/dL, administer another 15 g of carbohydrates and recheck again in 15 minutes. Repeat until the patient's blood glucose level increases to at least 70 mg/dL. Then offer the patient a meal or a snack consisting of both carbohydrate and protein.

Examples of 15 g of carbohydrates are

- Three 5 g glucose tablets
- Four 4 g glucose tablets
- 1 tube of glucose gel
- 4 oz of fruit juice
- 4 oz of regular soda containing sugar

Appropriate Use of Glucagon

Prescribe glucagon to all patients at increased risk for experiencing blood glucose levels below 54 mg/dL. Glucagon should also be used when a patient is obtunded or is unable or unwilling to consume oral glucose.

New glucagon formulas are now available to replace the older glucagon emergency kits that require manual reconstitution at the time of use and can be difficult for caregivers to use. One of the new formulas (Baqsimi) is delivered nasally in powdered form; another (Gvoke) is a premixed, solubilized liquid glucagon in an autoinjector or prefilled syringe that is administered subcutaneously.

Table 21 provides a protocol for treating hypoglycemia.

TABLE 21. Hypoglycemia Treatment Protocol

- Ongoing patient assessment and symptom monitoring are critical. If hypoglycemia is suspected, obtain a fingerstick blood glucose level unless the clinical situation requires immediate treatment.
- ***Immediate treatment is indicated if***
  - The patient's BG level is below 70 ***and***
  - The patient is unconscious or exhibits an acute change in behavior and cognition
- Be aware that some patients may exhibit symptoms of hypoglycemia at a fasting BG level higher than 70

Clinical Scenario	Hypoglycemia Treatment
Patient is on a subcutaneous insulin pump	Suspend insulin pump until BG is above 60 mg/dL. If the pump can't be stopped, pull it out of the infusion site.
Patient has swallowing precautions	Use 2 tbsp of thickener in 4 oz of juice
Patient is on Precose	Use glucose gel to treat (sucrose will not be effective)
Immediate action — unconscious patient	Give 1 mg of glucagon SC and, if possible, start intravenous access. **Glucagon reaches peak effect in about 30 min. Alternatively, use intravenous 50% dextrose instead of glucagon.** Recheck BG and retreat every 15 min until BG level is above 70 and/or patient is without symptoms. Use glucagon no more than twice. After recovery of consciousness, give patient a carbohydrate (e.g., 3 graham crackers, 6 saltine crackers, 8 oz of milk)
Immediate action — conscious patient	Give 15 g of carbohydrate (e.g., 8 oz of juice; 2 tbsp of jelly; 6 glucose tablets; 2 tubes of dextrose gel Recheck BG every 15 minutes until BG is below 70 or patient is without symptoms

BG, blood glucose

Adapted from ASCP *Hypoglycemia: Adult Management Protocol for Long-Term Care or Assisted Living* (undated)

When to Call the Practitioner

A systematic facility approach to diabetes management can streamline day-to-day care and reduce the frequency of episodes of hypoglycemia, hyperglycemia, and other acute metabolic complications. Facilities may consider implementing the following:

- **Protocols** that guide first-line caregivers (i.e., nurses, nursing assistants) in deciding when a prompt practitioner referral is necessary for a diabetes-related problem

- **Standing orders** for BGM and practitioner notification that are approved by the primary care practitioner when the patient is admitted

When patients who are extremely frail or cognitively impaired have poorly controlled blood glucose levels, the practitioner may wish to note specific individual blood glucose or symptom parameters in the orders.

In patients with diabetes, it is generally recommended that the practitioner be called ***immediately*** when the patient has a blood glucose level of less than 70 mg/dL ***and*** is unresponsive ***or*** has consecutive blood glucose readings of less than 70 mg/dL. **Do not delay treating symptomatic hypoglycemia while contacting the practitioner.**

The practitioner should be called ***as soon as possible*** when

- The patient has 2 or more blood glucose readings higher than 250 mg/dL within a 24-hour period ***if*** this is accompanied by a new medical problem or a change in condition or functional status ***and*** the patient's treatment has not already been initiated or modified
- The patient has blood glucose readings higher than 300 mg/dL during all or part of 2 consecutive days (unless this represents an improvement from a recently measured value ***or*** existing orders specify how the patient's hyperglycemia should be managed)
- The patient is not eating well ***or*** is vomiting, ***or*** an antidiabetic medication has been held
- The patient is not eating well or consuming sufficient fluids ***and*** has 1 or more additional symptoms suggesting an acute illness (e.g., fever, hypotension, lethargy, respiratory distress, vomiting)

Reporting Abnormal Glucose Levels to Practitioners: Guidance for PALTC Staff

The following guidance adapted from PALTmed's "Know-It-All™ Before You Call" resource for abnormal glucose reporting may be useful for staff when contacting practitioners.

- Physical data
  - Vital signs and current blood glucose levels
  - Any symptoms of a change in cognition or current acute illness, including infection
  - Signs and symptoms of hypoglycemia
- Medical history
  - Blood glucose trends over past week (if available)
  - Changes in food and fluid intake and urine output over past week
  - Recent changes in medications
  - Doses and times of most recent glucose-lowering medication given

Facilities may find helpful a free, downloadable communication checklist for signs or symptoms of hyper- or hypoglycemia with diabetes that was developed for the Centers for Medicare & Medicaid Services and is available at: **https://quality.allianthealth.org/wp-content/uploads/2023/08/Communication-Checklist-Signs-and-Symptoms-of-Hyper-or-Hypoglycemia-with-Diabetes_508.pdf**

STEP 8 – Prevent and treat selected complications of diabetes

The following measures are suggested to detect, treat, and prevent or slow the progression of diabetic complications affecting the mouth and the feet, which are common complications seen in the PALTC setting. Vascular complications can also cause significant morbidity and mortality in patients with diabetes. However, this CPG is not intended to be an exhaustive guide to the prevention and treatment of all diabetic complications.

Oral Care

Poor oral hygiene and sustained hyperglycemia increase risk for infection, periodontal disease, tooth loss, xerostomia (dry mouth), burning mouth, and altered taste sensation. Tooth decay and loss adversely affect nutritional status by interfering with eating habits and food choices, thus reducing quality of life. Oral complications, though not life threatening, can undermine good metabolic control.

Maintaining Oral Health in Patients With Diabetes

- **For patients who are independent,** remind them to do oral care twice a day and set them up appropriately to do so
- **For cognitively impaired patients who resist oral care,** the short video at https://functionfocusedcare.wordpress.com/tips-for-oral-care/ provides helpful tips
- Refer the patient to a dentist or hygienist if significant gingivitis, oral infection, or loose teeth are noted, or if the patient complains of oral pain

It is recommended that oral care be provided at least twice a day. Nursing assistants (who are usually the primary providers of oral care) should promptly report to a supervisor persistent mouth pain, eating difficulties, or (if trained to do so) signs of a possible mouth infection.

Facilities have a responsibility to provide patients with access to dental services when indicated, especially in the case of severe periodontal disease, caries, or loose teeth.

Maintaining Foot Health in Patients With Diabetes

- Think prevention!
- At least weekly
  - Encourage and assist patients to soak their feet in warm soapy water with a little lotion added, then dry the feet thoroughly, especially between the toes. Daily applications of petroleum jelly can help prevent fissures and open areas from occurring.
  - While providing foot care, inspect the feet for redness or warmth, wounds, calluses, or evidence of fungal infection.

Foot Care

Diabetes is a leading cause of foot ulcers and nontraumatic limb amputations. A retrospective chart review conducted in 3 PALTC facilities in southern Florida found that almost 70% of patients with diabetes had foot problems of some type. Both peripheral neuropathy and peripheral vascular disease increase risk for foot complications.

Treatment of foot problems in patients with diabetes is generally stratified into 3 broad risk categories:

- At-risk foot
- Current mild foot, ankle, or heel infection or ulcer
- Limb-threatening foot, ankle, or heel infection or ulcer

Prompt evaluation of ulcerated or infected feet may reduce risk for limb loss in certain individuals. Patients with diabetes should receive a foot evaluation upon admission and regular follow-up visits by a podiatrist every 3 months or as needed to monitor any acute foot problems and prevent future foot-related morbidity caused by diabetes. Patients with peripheral vascular disease or peripheral neuropathy will usually need more-frequent foot assessments.

Initial Assessment

Caregivers and practitioners should assess the patient for

- Foot hygiene, skin dryness, calluses, nail abnormalities (e.g., onychomycosis), and foot deformities (e.g., hammer toes)
- Active foot infection or ulceration
- Neuropathy and loss of protective sensation. This assessment may be performed by the practitioner using a 10-g monofilament.
- Signs of vascular insufficiency (e.g., coolness of the extremity, loss of leg hair, discoloration, absent or weak pedal pulses)
- Gait impairment and difficulty walking
- Abnormal foot shape, poorly fitting shoes and socks

Patients with diabetes, neuropathy, vascular insufficiency or foot deformity (e.g., Charcot foot), or a history of foot ulceration or partial or complete foot amputation are eligible for protective footwear with accommodative insoles under Medicare Part B.

If vascular insufficiency is present and the patient has foot pain or nonhealing wounds, consider using the ankle/brachial index or other noninvasive tools to assess vascular status. If consistent with the patient's overall goals of care, also consider prompt referral to a specialist for a consultation about vascularization.

Treatment

When foot ulcers are present, the practitioner should attempt to determine whether they are predominantly caused by diabetes (leading to vascular or neurovascular ulcers) or are pressure-related (see PALTmed's clinical practice guideline, ***Pressure Ulcers and Other Wounds***).

STEP 9 – Optimize transitions of care

Transitions of care – e.g., from hospital or home to a PALTC setting or across care settings within the PALTC continuum – are high-risk situations for patients with diabetes. Medical directors and directors of nursing or other nursing leaders should work together to

- Develop and implement basic policies to improve care transitions, and
- Engage with the appropriate local hospital personnel (e.g., emergency department lead physician, director of nursing, diabetes educator, wound care nurse) to develop consistent and effective processes for transitioning patients to and from PALTC facilities

Use the checklists in Table 22 to ensure that the appropriate information is provided and reviewed at the time of admission to the PALTC facility or when a patient is transferring from a skilled nursing facility to an assisted living facility (ALF) or home.

TABLE 22. Checklists for Patient Transitions of Care

Transferring From Hospital to PALTC/Skilled Nursing Facility for Rehabilitation

- History and physical exam, progress notes, and consultation reports
- Laboratory test results and key imaging studies
- Current medication list (reconciled before hospital discharge)
- Time of last basal and or prandial insulin dose
- Hypoglycemia episodes noted
- Approximate recent meal consumption (i.e., percentage of meal consumed)
- Tube feeding formula and infusion rate, if applicable
- CGM and insulin pump (if used by patient)

Transferring From Skilled Nursing Facility to Assisted Living Facility or Home

- Treatment goals and suggested blood glucose target range
- Medication reconciliation with written reasons for each medication
- Instructions on how and when to take diabetes medications
- Instructions on how often to monitor blood glucose
- Education on treating hypoglycemia (training of caregivers on use of glucagon)
- Recommendations for healthful eating
- Advice on when to call the long-term care (LTC) facility and primary care practitioner, with contact information
- Requests for home health services
- Follow-up appointment details with primary care practitioners or specialists

Tube Feeding of Patients with Diabetes

Glucose control in patients receiving enteral nutrition may be affected by alteration in absorption, delayed gastric emptying, and changes in secretion of incretin hormones. In general, patients with diabetes do not require special diabetic tube-feeding formulas. Glycemic control can usually be accomplished with insulin or with oral agents administered via the feeding tube. When controlling blood glucose in patients with diabetes who are being tube fed, the practitioner should be guided by the timing of feedings (continuous, bolus, nocturnal; Table 23), consumption of additional oral nutrition, hypoglycemia risk, the benefits of insulin therapy, and the patient's prognosis and expressed preferences.

TABLE 23. Guidance for Tube Feeding of Patients with Diabetes

Continuous Tube Feeding

- Give basal insulin (e.g., degludec, detemir, glargine) once daily ***and*** regular insulin every 6 hours
- If tube feedings are held, also hold all regular insulin

Bolus Tube Feeding

- Give regular insulin q6h if tube feeding is q3h, ***or***
- Give rapid-acting insulin (lispro, aspart, glulisine) with every 3-4 h feeding

Nocturnal Tube Feeding (usually 14-h schedule)

- Ascertain prior TDD insulin if known
- Give ¼ (25%) of TDD as regular insulin (X units) at start of tube-feeding period
- Give ½ (50%) of X units plus 2X units as NPH 4 h later
- Give X units NPH at end of tube-feeding period
- Check BG q4h, then at end of feeding period and at midday till BG is at target. Then decrease monitoring frequency (e.g., to twice daily, before the start of feeding and at the end) to allow for uninterrupted sleep.

NPH, neutral protamine Hagedorn; TDD, total daily dose

Care of Terminally Ill Patients with Diabetes

In a patient with diabetes who is terminally ill or has limited life expectancy, the most appropriate goals of treatment are symptom management and maintenance of comfort. Limiting hyperglycemia, hypoglycemia, pain, and dehydration should be the primary goals, in addition to reducing unnecessary hospitalizations. Simplify treatment and monitoring regimens to help preserve quality of life and patient autonomy by

- Reducing the frequency of BGM and insulin administration
- Allowing blood glucose levels to remain in range of 200 to 300 mg/dL

Communicate consistently with healthcare staff and other providers such as members of the hospice care team and palliative care providers. Talk with the patient and family members about treatment and monitoring changes and what to expect. For patients receiving palliative care, management approaches can be based on their current medical situation.

- For ***stable patients,*** discuss and begin deintensification of glycemic control
- For ***patients with organ failure,*** focus on preventing hypoglycemia
- For ***dying patients with T2DM,*** discontinue oral agents and insulin
- For ***dying patients with T1DM,*** focus on comfort care; there is no consensus on when to de-intensify treatment

MONITORING

STEP 10 — Re-evaluate the patient periodically

For a ***new patient with diabetes***, reassess when medically necessary and within 30 days of admission. For an ***established patient with diabetes***, reassess when medically necessary and within 30 days of the last practitioner visit. Pay particular attention to the following:

- Overall medical stability
- Glycemic control
- Hypoglycemic episodes
- Medication side effects
- Renal function
- Management of comorbidities
- Loss of skin integrity or development of wounds
- Results of any consultations or referrals

STEP 11 — Monitor the patient's blood glucose levels

Little evidence exists concerning the optimal frequency and timing of BGM in the PALTC setting. In general, monitoring should be more frequent when

- Glucose is poorly controlled
- The patient is receiving multiple doses of insulin or insulin plus oral agents
- The patient is at high risk for hypoglycemia
- The patient has an acute infection or is medically unstable

The optimal frequency of BGM for patients treated with oral agents alone is not known. The frequency and timing of BGM should be individualized according to patients' needs and goals.

Postprandial glucose levels are believed to contribute more than FBG to A1C levels. Monitoring of postprandial glucose levels (e.g., 2 hours after lunch or supper) is appropriate if a patient's A1C levels are high despite well-controlled FBG levels. In such situations, the dose of an oral agent may be increased or the dose of short- or rapid-acting insulin may be increased slightly before the meal associated with elevated postprandial glucose levels; postprandial monitoring would be of a short duration.

Expert opinion recommends A1C testing at least twice a year in patients who are meeting treatment goals and have stable glycemic control and quarterly in patients whose treatment has changed or who are not meeting glycemic goals. (See **Table 8** for conditions that can affect the accuracy of the A1C test).

Suggested elements of comprehensive monitoring for the patient with diabetes who has minimal physical and cognitive impairments are shown in **Table 24**. Comprehensive monitoring may be inappropriate for all patients in the PALTC setting. For example, in the **patient who is terminally ill or has limited life expectancy**, comfort measures and avoidance of severe hypoglycemic and hyperglycemic symptoms should be emphasized.

TABLE 24. Suggested Elements of Comprehensive Monitoring for Patients with Diabetes Who Have Minimal Physical and Cognitive Impairments

Indicator	Suggested Monitoring Interval
Blood glucose levels	Individualize according to the patient's needs and goals
Blood pressure	■ Monthly ■ More frequently if poor control or medication dose change
A1C	■ Every 6 mo if well controlled ■ Every 3 mo if poorly controlled
Electrolytes and eGFR	■ Annually ■ More frequently in patients with pre-existing chronic kidney disease or who are on a nephrotoxic medication
24-h urine protein/ creatinine clearance	■ If significant decline in renal function (as clinically indicated) ■ If nephrotic syndrome suspected
Lipid profile	■ Annually (if appropriate) ■ 6 wk after initiating or changing medical treatment
Foot care	■ Daily inspection by patient if able ■ Weekly inspection by caregivers ■ Annual comprehensive foot examination by practitioner (inspection, evaluation of foot pulses and loss of protective sensation)
Pain control	As clinically indicated
Depression	Annually or as clinically indicated
Cognition	Annually or as clinically indicated
Weight	■ Monthly ■ More frequently if more than 5% change (gain or loss)

Continuous Glucose Monitoring

The use of CGM technology offers several potential advantages in the PALTC setting, including

- Reducing staff time spent monitoring patients' blood glucose levels
- Detecting hypoglycemia (especially nocturnal hypoglycemia)
- Detecting glucose variability (i.e., fluctuations in blood glucose control throughout the day)
- Enabling online monitoring of the blood glucose levels of multiple patients in different parts of the facility
- Facilitating close monitoring of glucose levels in very sick patients on room isolation
- Reducing the burden of fingersticks in patients at the end of life

However, facilities' ability to use this technology depends on factors such as

- Facility characteristics (e.g., level of care, staff clinical competency, staffing shortages)
- Clinician knowledge of and familiarity with diabetes technology
- Insurance coverage for CGM
- Patients' overall and glycemic-specific goals of care
- Presence of comorbidities and diabetes complications

Although studies of CGM in PALTC settings are scant, data from the few studies that have been conducted suggest that the technology can identify previously unrecognized hypoglycemia and may improve the detection of both hypo- and hyperglycemic events compared with point-of-care testing.

STEP 12 — Monitor the patient who is at high risk for diabetes

Patients with IFG or IGT (i.e., prediabetes) and other risk factors for developing diabetes should be monitored for the development of T2DM with an annual FBG or A1C test. Those with signs and symptoms of hyperglycemia (see **Table 6**) should have an FBG at the time of presentation if diabetes is suspected.

STEP 13 — Monitor the facility's management of diabetes

Diabetes is a complex and progressive disease that causes or contributes to much of the medical morbidity and functional impairment evident in many patients who reside in PALTC facilities. Systematic approaches and ongoing monitoring of practices, processes, and outcomes facilitate the successful implementation of diabetes care protocols. The intent of such a systematic approach is to bring about systemic change and promote improvement in the care of patients with diabetes.

Facilities may wish to select performance indicators that are most relevant to their patient population and staff for inclusion in their quality improvement processes. (See examples in **Role of the Medical Director in Diabetes Management**.) Sharing data on patient outcomes for a selected indictor with all department heads and relevant staff at a quality improvement meeting could be the basis for a performance improvement project to examine and improve any identified issues or problems in care or services related to diabetes management.

MANAGING DIABETES IN ASSISTED LIVING COMMUNITIES — SPECIAL CONSIDERATIONS

Although the description of ALFs varies by state, this term generally refers to residences that provide housing and supportive services, 24-hour supervision, and at least 2 meals a day to meet residents' individual needs. Care for residents with disabilities or chronic illnesses is provided by direct-care workers, who may be referred to as *medication technicians* or *med techs*. Direct-care workers often, but not always, are supervised by licensed nurses, who may or may not be regularly present in the ALF. In general, direct-care workers may or may not have specialized training, depending on state regulations, the size of the facility, and the type of care the facility provides.

Diabetes care for ALF residents encompasses 4 major components:

- **Dietary management.** Unlike acute care or LTC facilities, ALFs do not provide specialized diets. Residents are encouraged to self-select food choices based on what is offered. Although this is generally what older adults prefer from a quality-of-life perspective, it may be challenging for residents who would prefer a more-restricted diet to optimally manage their diabetes.
- **Medication management.** Medication management is one of the biggest challenges in ALFs because the scope of what medication technicians are permitted to do varies by state. Some states permit trained medication technicians to administer insulin when this task is delegated to them by a registered nurse. In other states, medication technicians are only permitted to administer oral medications. It is important that practitioners and ALF coordinators understand both state regulations and the resources available within the community to ensure that appropriate clinical decisions are made that enable patients to remain in the ALF if medically feasible. Current information about state regulations can be found at **https://www.ahcancal.org/Assisted-Living/Policy/Pages/state-regulations.aspx**.
- **Treatment response.** Direct-care workers commonly handle the monitoring of treatment response in ALFs. Some states allow direct-care workers to perform BGM and document and

report the results to the practitioner, while other states do not. Direct-care worker may not always be qualified to perform these assessments.

Finally, because no specific requirement exists that direct-care workers in ALFs receive diabetes education, staff knowledge of the signs and symptoms of diabetes and of the methods of action and effects of diabetes medications will vary based on individual workers' exposure to residents with the condition. For this reason, consideration should be given to providing education for direct-care workers on important issues in the care of patients with diabetes, such as

- Signs and symptoms of hypo- and hyperglycemia
- Newer medication options for diabetes management
- Avoiding the use of SSI
- Importance of heightened monitoring during transitions of care (e.g., initial admission, hospital readmissions)
- Acceptance of more-liberal A1C goals for ALF residents

Summary

Type 2 diabetes is a chronic metabolic condition that increases in prevalence with age. Metabolic, vascular, and other complications of diabetes can cause serious morbidity and mortality. Factors often seen in patients in the PALTC setting (e.g., functional and cognitive disabilities, multimorbidity) increase the complexity of care and often complicate diabetes management.

A comprehensive approach to diabetes management can improve glycemic control, reduce the occurrence of hypoglycemia, and may reduce the risk of some complications. This CPG has described the components of such a comprehensive approach while emphasizing the need to individualize therapeutic interventions and monitoring approaches. To improve quality of life, diagnostic and therapeutic decisions should take into account diverse factors, including the patient's cognitive and functional status, severity of disease, expressed preferences, and life expectancy.

APPENDIX 1

Case Study: A Successful Intervention in the Assisted Living Setting

Mary, a new patient referred to your practice, is a 66-year-old Black female who lives in an ALF due to significant functional impairment secondary to degenerative joint disease and obesity. In addition, she also has a history of anemia (cause unknown), lymphedema, T2DM, essential hypertension, hyperlipidemia, peripheral vascular disease, and gastroesophageal reflux. Her self-monitored blood glucose levels range from 180 to 300 mg/dL. Her last recorded A1C level was 11.5%.

Her current medications consist of: aspirin, 81 mg qd; atorvastatin, 80 mg qd; ferrous sulfate, 324 mg qid; vitamin D, 1000 units qd; furosemide, 20 mg qd; metformin, 1000 mg bid; pregabalin, 150 mg tid; sertraline, 100 mg qd; losartan, 100 mg qd; and amlodipine, 5 mg qd.

She eats what is offered in the facility as well as snacks she receives from her sister. Visible snacks in her room consist of crackers, fruit, peanut butter, and dry cereal. Before moving into the ALF she was taking long-acting insulin, but due to several episodes of hypoglycemia this was stopped. She does not recall what the insulin dose was. Since moving into the facility about 4 months ago she has not checked her blood glucose.

Her goals are to lose weight and improve her physical activity and endurance so she can easily go up and down the stairs in the facility. Given her goals, and knowing that adding insulin to her medication regimen would increase her risk for weight gain and that insulin may not be readily administered in the ALF, you suggest the addition of empagliflozin, an SGLT2 inhibitor, to her medications and dietary interventions focused on avoiding high-carbohydrate snacks.

Recent labs indicate that Mary's eGFR level is above 30 mL/min/1.73m^2 and there is no evidence of anorexia, low body weight, or weight loss. She is started on empagliflozin 10 mg daily and is going to self-monitor her blood glucose once a day.

A month later, she reports to ALF staff that her blood glucose levels are now consistently in the mid-100s and she is tolerating the medication without any noted symptoms. A follow-up visit is scheduled with your practice.

APPENDIX 2.

Checklist for Quality Improvement Project to Implement the PALTmed Diabetes Management Clinical Practice Guideline

Implementation Steps	Target Date	Process Owner(s)
Access Current Practice – Gap Analysis		
Share *Diabetes Management* CPG with facility clinical team and request feedback on gaps between guideline and current practice		
Meet with facility educator to review training needs with current onboarding and annual competency trainings		
Secure Support for QAPI Project		
Present gap analysis to QAPI committee		
Create project charter		
Align with *4Ms Framework of Age-Friendly Health Systems*		
Technology		
Review current order sets		
Assess need for additional documentation templates for assessments, foot, skin, nail, and oral care		
Train staff in use of CGM		
Train staff in use of subcutaneous insulin pumps		
Supply Management		
Inventory BG monitors, CGM devices, and manufacturer guidelines for each brand used in the facility		
Review facility formulary		
Contracts		
Review existing provider contracts (i.e., podiatry, optician, psychosocial support)		

APPENDIX 2 continued

APPENDIX 2. continued

Quality Improvement Project to Implement the PALTmed Diabetes Management Clinical Practice Guideline

Implementation Steps	Target Date	Process Owner(s)
Policies and Procedures		
Engage patients and families		
Establish physician notification parameters		
Establish lab monitoring protocol		
Document patient goals, preferences, and priorities		
Develop clinical pathways		
Education Plan		
Educate staff		
Educate patients and families		
Review patient discharge instructions		

BG, blood glucose; CPG, clinical practice guideline; QAPI, Quality Assessment and Performance Improvement

APPENDIX 3.

Correlation of A1C Levels with Mean Blood Glucose Levels

A1C (%)	Mean Blood Glucose Level	
	mg/dL	mmol/L
6	126	7.0
7	154	8.6
8	183	10.2
9	212	11.8
10	240	13.4
11	269	14.9
12	298	16.5

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