

NYUPN
CLINICALLY INTEGRATED NETWORK

CLINICAL GUIDELINE NUMBER: CG025

TITLE: Diabetes with Alzheimer's Disease and Related Dementia

EFFECTIVE: 1/23/19

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Appendix A: Diabetes mellitus (DM) with Alzheimer's disease and Related Dementia Care (ADRD) in Older Adults– Executive Summary

A1. Screening

Patient with DM: How to screen for ADRD - Refer to [Appendix B](#) for details

- Annually for DM patients 65 and older
- When DM patient and/or care partner expresses concern about patient cognitive abilities
- When a patient seems confused about their history, medications, or is forgetful about appointments
- Use a validated clinical screening instrument:
 - [Mini-Cog](#)
 - [GPCOG](#)
 - [AD8](#)
 - [Short IQ-CODE](#) from care partner if patient unable to answer

Patient with ADRD: How to screen for DM - Refer to [Appendix C](#) for details

- Every 3 years for patients 65 and older with no risk factors
- Annually if they have any of the risk factors below:
 - Prediabetes
 - BMI ≥ 25 AND any CVD related risk factors (details in [Appendix C](#))
 - High risk medications including: glucocorticoids, atypical antipsychotics and thiazide diuretics. Click to [view list](#) of medications affecting glycemic control.

A2. Evaluation and Diagnosis

Diagnosing ADRD in patients with DM - Refer to [Appendix B](#) for details

- Conduct a thorough workup to rule out exacerbating causes:
- Evaluate delirium as cause of impairment, including [medications](#), and address accordingly
 - Screen for depression with [PHQ-2](#)
 - Screen for Alcohol or Substance Use Disorder
 - Laboratory screen includes CBC, TSH, vitamin B12, liver and kidney disease
 - Even without clinical suspicion, consider screen for HIV/Syphilis
 - Perform neuroimaging if presentation is unusual, onset seems rapid, or focal neurological findings and strongly consider referral to geriatrics or neurology
 - Screen for vision and hearing loss, consider referral to audiology and/or optometry

Diagnosing DM in patients with ADRD – Refer to [Appendix C](#) for details

If screen is positive, follow ADA guidelines to diagnose DM:

- Refer to [NYU Guideline for Diabetes Care in Non-Pregnant Adults](#) for further detail.

A3. Management of patients with DM-ADRD

General Principles - Refer to [Appendix D](#) for details

- Individualize care (consider disease duration, comorbidities, and patient function)
- Encourage care partner or family informant to co-attend clinical visits
- Provide patient and care partner with support and referrals to community and medical support resources as appropriate
- For both DM and ADRD, if pharmacotherapy is indicated, choose those with benign side effect profiles, start low and go slow and strive for a simplified regime
- Involve patients when able and care partners in pharmacotherapy decisions
- Determine HCP and discuss advance care planning as appropriate to patient's health status

DM Management - Refer to [Appendix G](#) for details

a. Target:

- Individualize based on health status, time to benefit, and patient goals and preferences. Avoid using medications other than metformin to achieve hemoglobin A1c < 7.5% in most older adults
- HgbA1c goal for patients with mild ADRD - 7% to 7.5%; moderate ADRD – 7.5% to 8%; advanced ADRD - 8% to 8.5%; end stage disease – up to 9%

b. Pharmacologic Intervention:

- In general, the simplest regimen is preferred. Metformin is first line therapy.

ADRD Management - Refer to [Appendix F](#) for details

a. Care Partner Support:

- Assess care partner stress with stress thermometer. Other possible tools include the [Short Version of Burden Scale for Family Care Partners](#) or the [Short Form Zarit Burden Interview](#). These tools provide the content needed for inquiry and answers to individual items may be more important than the total score.
- Provide access to resources that are available both at NYU Langone Health and in the community. Refer to [resource list](#) for additional tools.

b. Cognitive Pharmacologic Intervention:

- *Alzheimer's Dementia* – Consider acetyl-cholinesterase inhibitors (AChEI) for mild-moderate dementia, memantine can be considered for severe dementia. Combined therapy is not more effective than use of single class. Treatment is often ineffective and a plan for when to stop medication should be part of the treatment discussion. Treatment may have greatest benefit when used for target symptoms of apathy or agitation.
- Do not use AChEIs in the setting of bradycardia, weight loss, GI symptoms, or diminished appetite. May cause sleep disruption if given at night.
- *Vascular Dementia* – Treat vascular risk factors, weak evidence for AChEIs and memantine
- *Dementia with Lewy bodies* – Consider AChEIs (Effectiveness likely ≤ six months)
- *Parkinson Disease Associated Dementia* – Consider AChEIs
- *Frontotemporal Dementia* – No evidence for any pharmacologic interventions

c. Behavioral and Psychological Symptoms of Dementia:

- Counsel care partner on behavioral management and provide referrals to resources such as Caring Kind, Barlow Clinic, and others as in [resource list](#)
- Consider non-pharmacological interventions such as music and/or massage therapy
- If behavioral management is ineffective or with immediate and serious safety concerns, strongly consider referral to neurology, geriatrics, or psychiatry. If considering medication management of behavioral symptoms, atypical antipsychotics are preferred, but all antipsychotics have increased mortality in elderly with dementia related psychosis.

Lipid Management - Refer to [Appendix H](#) for details

Lipid Target:	To reduce cardiovascular risk use:
Targets should be individualized based on CVD presence, time to benefit vs life expectancy, and patient tolerance of treatment.	Statins (high or moderate intensity, based on Clinical ASCVD (any age) or diabetes (40-75 years), reasonable to continue > 75 years as tolerated
Usual risk models do not go over 79 and do not include dementia patients explicitly.	

Blood Pressure Management - Refer to [Appendix H](#) for details

BP Target:	To help meet targets use:
<140/90 mmHg if able to achieve and orthostatic hypotension is not present Refer to NYU Guideline for Diabetes Care in Non-Pregnant Adults and NYU Hypertension Guideline	<ul style="list-style-type: none"> ● ACEI (first line) ● ARB (alternative) ● Other meds as necessary

Prevention

- Influenza vaccine yearly
- Pneumococcal and Hepatitis B vaccine. Refer to [NYUPN Adult Immunization Guideline](#)
- Aspirin therapy for primary prevention should be individualized based on risk vs. benefit; indicated for secondary prevention

Medical Comorbidities

- Older adults with diabetes and dementia are likely to have multiple other chronic conditions and well as complications of DM: CAD, heart failure, COPD, obesity, osteoporosis peripheral neuropathy, foot problems, chronic kidney disease, visual disturbance, and others.
- Individualize management of their multi-morbidity based on evidence when available.

Geriatric Conditions - Refer to [Appendix H](#) for details

- Screen for vision impairment – same management as with all diabetes patients
- Evaluate for neuropathy, impaired circulation, calluses, previous infection or ulceration, foot deformities. If present, consider appropriate referral
- Assess for falls and gait disorder. If present, consider PT and/or geriatrics referral
- Assess for urinary incontinence. If present, non-pharmacologic approaches are preferred or consider referral to geriatrics or urology
- Continuously reassess for ADL/IADL disabilities. Consider PT/OT, care partner and

psychosocial support per resources above, and geriatrics evaluation

I. PURPOSE:

The goal of management of people with diabetes and dementia is to improve the quality of care for both conditions by supporting patients and their care partners. Care quality involves managing both conditions based on current available evidence including individualizing management of both conditions, risk factors and relevant comorbidities, based on the patient's health status and the patients' and care partners care goals and preferences.

II. DEFINITIONS and ACRONYMS:

Acetyl-cholinesterase inhibitors (AChEI)

Alzheimer's disease and related dementia (ADRD)

American Association of Clinical Endocrinologists (AACE/ACE)

American Diabetes Association (ADA)

Angiotensin converting enzyme (ACE inhibitor)

Angiotensin II receptor blocker (ARB)

Ascertain Dementia 8-Item Informant Questionnaire (AD8)

Beats per minute (BPM)

Behavioral and Psychological Symptoms of Dementia (BPSD)

Blood glucose (BG)

Cardiovascular Disease (CVD)

Diabetes mellitus (DM) Dietary Approaches to Stop Hypertension (DASH) – diet features low sodium menus with plenty of vegetables, fruits, low-fat dairy, whole grains, fish, poultry and nuts.

Dipeptidyl peptidase enzyme inhibitor (DPP4) – Incretin class.

Estimated glomerular filtration rate (eGFR)

Fasting blood glucose (FBG)

General Practitioner Assessment of Cognition (GPCOG)

Geriatric Depression Scale (GDS)

Glucagon-like-peptide-1 agonist (GLP1) – Incretin class.

Glycated Hemoglobin (HbA1c)

Heart rate (HR)

Mediterranean diet (MeDi) – diet features fruits, vegetables, whole grains, fish, nuts, and heart healthy fats

Mediterranean-DASH Intervention for Neurodegenerative Delay (MIND) – diet features many elements of the Mediterranean diet and DASH but with modifications that reflect current evidence for brain neuroprotection

Metformin (MET)

Mild Cognitive Impairment (MCI)

Mini-Mental State Examination (MMSE)

Montreal Cognitive Assessment (MoCA)

Oral glucose tolerance test (OGTT)

Patient Health Questionnaire (PHQ)

Pneumococcal 13-valent conjugate vaccine (PCV13) - Prevnar 13^R

Pneumococcal 23-valent polysaccharide vaccine (PPSV23) - Pneumovax 23^R

Point of Care (POC)

Sulfonylurea (SU)

Thiazolidinediones (TZD)

Total Daily Dose (TDD) – refers to insulin therapy

Type II diabetes, diabetes mellitus type 2 (DM)

Urine Albumin Creatinine Ratio (UACR)

III. SUPPORTIVE INFORMATION:

Diabetes is a complex, chronic illness requiring continuous medical care and multifactorial risk-reduction strategies beyond glycemic control alone. DM management includes attention and management of co-existing risks, complications and related diseases (hypertension, cardiovascular and microvascular disease). Thus, continuous patient self-management education and support are critical elements of successful medical care.

Patients with cognitive impairment likely face challenges in diabetic self-management, placing responsibility and additional stress on care partners. Management complexity requires logistical skills, complex decision-making and understanding of risks and disease trajectories, requiring care partners to be deeply involved in managing DM in dementia patients.

While the linear increase in prevalence of Alzheimer's disease and related dementias associated with increasing age is well known, diabetic patients of similar ages may have as much as a two-fold risk of developing cognitive impairment and ADRD.³⁻⁶ Systematic review and meta-analyses of up to 15 studies found that dementia was more likely in persons with DM and suggested that DM was associated with faster cognitive decline in older adults.^{9, 10, 11}

Some patients with DM and ADRD are not diagnosed and/or recognized as cognitively impaired⁹ and their care partners may be insufficiently involved, unaware of cognitive issues or be unsupported, further challenging DM management. Over and under treatment of DM and its medical complications in some ADRD patients,¹⁰ increased hypoglycemic risk,^{6, 11} and care partner burden are well documented.^{4, 12} Adding to the complexity of the co-occurrence of DM and ADRD is the heterogeneity of patients in age, ADRD and DM severity, race/ethnicity, health status, and life expectancy.¹³

Given this heterogeneity, consensus on best management of DM in ADRD patients is lacking. High quality DM care in people ≥ 75 in general is undefined, although there is consensus that DM management must be individualized in such patients. These decisional guidelines are aimed at helping physicians navigate both DM and ADRD care in this complex patient group.

IV. CLINICAL GUIDELINE:

1. Screening and Diagnosis of Alzheimer's Disease and Related Dementia

- All older patients with DM should be screened for early detection of MCI or ADRD at the initial visit and annually using either the [AD8](#), [GPCOG](#), [Mini-Cog](#) or [Short IQ-CODE](#) from care partner if patient unable to answer. Further information obtained from an informant history is needed.
- Diagnosis includes a full workup to exclude delirium, depression or other exacerbating causes.
 - Evaluate delirium as cause of the impairment and address accordingly

- Alcohol or Substance Use Disorder
- List of [medications](#). Can also refer to review article on: [An approach to drug induced delirium in the elderly](#).
- Screen for depression with [PHQ-2](#) or [5-item GDS](#)
- Laboratory screen including anemia, hypothyroidism, vitamin B12 deficiency, liver and kidney disease; HIV/Syphilis testing should be considered
- If clinical suspicion, screen CSF for infectious/prion disease
- Structural neuroimaging should be performed if presentation is unusual, onset seems rapid, or focal neurological findings are present. The preferred imaging tool is MRI.
- Dementia diagnosis requires a clinical history and best completed with an informant interview.

2. Screening and Diagnosis of Diabetes

- All older patients with ADRD should be screened for pre-diabetes and diabetes at the initial visit, and every three years thereafter.
- Annually if BMI >25 AND any of the risk factors below:
 - CVD
 - First degree relative with diabetes
 - Hypertension (BP >140/90 or currently on therapy for hypertension)
 - HDL < 35 mg/dL and/or triglycerides > 250 mg/dL
 - High-risk ethnicity i.e. African American, Hispanic/Latino, Native American, Asian American, Pacific Islander (BMI cutoff \geq 23)
 - Women with polycystic ovary syndrome
 - Physical inactivity
 - Physically inactive or sedentary lifestyle
 - History of vascular disease
- Annually for any of the risk factors below:
 - Prediabetes
 - Women diagnosed with gestational diabetes (at least every 3 years)
 - High risk medications including: glucocorticoids, atypical antipsychotics and thiazide diuretics. Click to [view list](#) of medications affecting glycemic control.

Patients may be identified by any of the following criteria:

Table 1: Diagnostic tests and reference ranges for the diagnosis of diabetes

Diagnostic Test	Normal	Pre-diabetes	Diabetes
A1c	\leq 5.7%	5.7-6.4%	\geq 6.5% ^a
Fasting plasma glucose	<100mg/dL	100-125mg/dL	\geq 126mg/dL ^a
Random plasma glucose	<130mg/dL	130-199mg/dL	\geq 200mg/dL ^b
2 hour, 75G oral glucose tolerance test	<140mg/dL	140-199mg/dL	\geq 200mg/dL

^amust be confirmed by a second abnormal test: either a fasting BG \geq 126mg/dL, A1C \geq 6.5%, or a 75G OGTT 2 hour BG \geq 200mg/dL

^ba single POC BG ≥ 200 mg/dL can confirm diabetes if present in the appropriate clinical setting of weight loss, thirst, increased urination and other convincing symptoms of hypoglycemia

3. General Principles of Management

Tailor Care to the Individual

- Consider medical, psychological, functional, and social geriatric domains in order to focus on individual therapeutic goals.
- Focus on maintenance of autonomy while regularly reassessing capacity for self-management. Ensure appropriate transition of responsibility to care partners when necessary.
- Determine HCP and discuss advance care planning as appropriate to patient's health status.

Care Partners are Integral Members of the Care Team

- Support the care partner, establish therapeutic relationship and provide resources and referrals to community and medical support resources as appropriate.
- Coordinate care with care partners, including tracking medical records and any medical interventions.
- Provide information to patient and care partner about community and medical resources for both DM and ADRD.

Be Wary of Pharmacotherapy and Polypharmacy

- Encourage maintenance of updated medication list while also reviewing for potential drug-drug interactions and side effects.
- Involve patients when able and care partners in pharmacotherapy decisions
- For both DM and ADRD, if pharmacotherapy is indicated, use sparingly, and choose those with benign side effect profiles.
- Refer to AGS Beers Criteria for potentially inappropriate medications in older adults: <https://onlinelibrary.wiley.com/doi/epdf/10.1111/jgs.15767>
- Start low and go slow!

Protect Individual and Public Safety

- Be aware of the risk of abuse and report as required by law.
- Evaluate driving ability upon diagnosis of ADRD and report accordingly.

4. Modifiable Risk Factors

See Appendix E for further risk reduction discussion. Detailed lifestyle modifications can be referenced in the [NYUPN Guideline for Diabetes Care in Non-Pregnant Adults](#).

Medical Nutrition

- Meal planning should involve a personalized plan developed collaboratively between the individual, care partner/s and a registered dietitian.
- Proper nutrition is best accomplished when meals are not eaten alone

Weight Management

- Weight reduction should be done under medical supervision but may not be an appropriate goal in all cases.⁶ Reference to [NYU Guideline for Diabetes Care in Non-Pregnant Adults](#) for further detail.

Physical Activity

- Unless there are contraindications, older adults with DM and ADRD should be advised to perform aerobic and resistance exercises to the best of their ability under the direction of their healthcare provider.⁶
- Older adults with DM and ADRD and their care partners should also receive structured lifestyle counseling based on the Diabetes Prevention Program strategies and should be urged to engage in physical activity at least 3 days per week.¹³

Tobacco Cessation

- Advise patients not to use cigarettes, other tobacco products, or e-cigarettes.
- Reference to [NYUPN Tobacco Control](#) for further detail.

5. ADRD Management

Regularly re-evaluate disease progression in a comprehensive manner. Encourage participation in programs aimed at cognitive stimulation.

Standardized and validated scales that can be used to better characterize the dementia are listed below:

- [7-stages of Alzheimer's: FAST scale](#)
- [Clinical Dementia Rating Scale \(CDR\)](#)
- [Dementia Severity Rating Scale \(DSRS\)](#)

Pharmacologic Intervention

- Alzheimer's Dementia
 - Consider AChEIs for mild-moderate dementia, memantine can be considered for severe dementia. Combined therapy is not more effective than use of single class. Treatment is often ineffective and a plan for when to stop medication should be part of the treatment discussion. Treatment may have greatest benefit when used for target symptoms of apathy or agitation.⁴⁹
 - Do not use AChEIs in the setting of bradycardia, weight loss, GI symptoms, or diminished appetite. May cause sleep disruption if given at night.
- Vascular Dementia
 - Identify and treat vascular risk factors. AChEIs and memantine can be considered for use in vascular dementia, but evidence is weak.²¹
- Dementia with Lewy Bodies
 - AChEIs should be considered to manage cognitive symptoms but effectiveness may be short-lived (six months).²¹
- Parkinson Disease-Associated Dementia
 - AChEIs can be considered with a careful risk-benefit analysis.²¹

- Frontotemporal Dementia
 - Neither AChEIs nor memantine is recommended.²¹

Behavioral and Psychological Symptoms of Dementia (BPSD)

Assess for BPSD at the time of diagnosis and at regular intervals (i.e. 3 months) thereafter. There is a lack of consensus for using anticonvulsants, mood stabilizers and SSRIs in persons with DM and ADRD who demonstrate typical BPSD symptoms.²¹

- Behavioral strategies and environmental modifications (e.g., covering mirrors) are often effective (may require care partner training and support from Community-Based Organization such as CaringKind)
- Consider music therapy, massage therapy, and reminiscence²¹
- Utilizing meaningful daytime activities (sleep avoidance) and daily exercise may be helpful
- Benzodiazepine or other sedative-hypnotics are not recommended⁵⁸
- Atypical antipsychotics are preferred over typical antipsychotics; only consider if other steps have failed and the patient is severely distressed and/or is in danger to him- or herself, or others (Consider referral to neurology, geriatrics or geriatric psychiatry). Important to note that antipsychotics have increased mortality in elderly with dementia related psychosis.²¹
- Individualized tapering of medications

6. Diabetes Management

Considerations include: efficacy, cost, potential side effects, weight, comorbidities, hypoglycemia risk, and patient preferences.

Treatment Goals

Refer to Appendix G for complete discussion of treatment targets in this section.

HbA1c*

Mild ADRD	7% to 7.5%
Moderate ADRD	7.5% to 8%
Advanced ADRD	8% to 8.5%

- * Goal is to prevent unnecessary hypo- and hyperglycemia
- * Avoid using medications other than metformin to achieve HbA1C<7.5% in most older adults

Blood Pressure*

Systolic:	<140mmHg
Diastolic:	<90 mmHg

*Given high risk of falls, patient should be monitored closely for hypotension. If patient is unable to tolerate <140/90 mmHg, a higher blood pressure should be set as a goal.

Lipids*

- Statin therapy should be individualized based on CVD presence, time to benefit vs life expectancy, and patient tolerance of treatment.
- High or moderate intensity statin therapy can be used based on clinical ASCVD (any age) or diabetes (40-75 years), reasonable to continue > 75 years, as tolerated

Self-Monitoring of Blood Glucose

Patient characteristics/health status	Rationale	Reasonable A1C goal‡	Fasting or preprandial glucose	Bedtime glucose
Healthy (few coexisting chronic illnesses, intact cognitive and functional status)	Longer remaining life expectancy	<7.5% (58 mmol/mol)	90–130 mg/dL (5.0–7.2 mmol/L)	90–150 mg/dL (5.0–8.3 mmol/L)
Complex/intermediate (multiple coexisting chronic illnesses* or 2+ instrumental ADL impairments or mild-to-moderate cognitive impairment)	Intermediate remaining life expectancy, high treatment burden, hypoglycemia vulnerability, fall risk	<8.0% (64 mmol/mol)	90–150 mg/dL (5.0–8.3 mmol/L)	100–180 mg/dL (5.6–10.0 mmol/L)
Very complex/poor health (LTC or end-stage chronic illnesses** or moderate-to-severe cognitive impairment or 2+ ADL dependencies)	Limited remaining life expectancy makes benefit uncertain	<8.5%† (69 mmol/mol)	100–180 mg/dL (5.6–10.0 mmol/L)	110–200 mg/dL (6.1–11.1 mmol/L)

Pharmacologic Intervention:

- Consider costs of care and insurance coverage rules when developing treatment plans in order to reduce risk of cost-related nonadherence.
- Metformin, if not contraindicated and if tolerated, is the preferred initial pharmacological agent for T2D
- If noninsulin monotherapy at maximum tolerated dose does not achieve/maintain the A1C target over 3 months, adding anti-hyperglycemic medication class with low risk of hypoglycemia is preferred.
- Consider initiating insulin therapy in healthy older adults with careful monitoring and ongoing cognitive assessment.
- Refer to endocrine/diabetologist if evidence of poor control despite these efforts, if regimen is getting complex, or if clinical uncertainty is present.

7. Management and Prevention of Complications

Considerations for well-rounded care for older patients with dual diagnosis of DM and ADRD are listed below. Refer to Appendix F for full details and explanation of all items in this section. Additional information specific to diabetes related complications can be found in the [NYUPN Guideline for Diabetes Care in Non-Pregnant Adults](#).

Psychosocial Factors

- Routinely screen patient for psychosocial problems such as depression, diabetes-related distress, worsening cognitive impairment, capacity, anxiety, and malnutrition.
- Routinely evaluate the needs of care partners particularly caregiver stress, and provide access to support and/or increased patient care as needed. Refer to the [resource list](#) for available community resources.
- Stress thermometer may be useful to assess caregiver stress.

Urinary Incontinence

- Patients should be evaluated for symptoms of urinary incontinence during annual screening as it is often under-diagnosed and undertreated.
- A basic evaluation includes history, physical examination, measurement of post-void residual volume, and urinalysis.
- Non-pharmacologic approaches such as pelvic floor exercises, scheduled toileting and prompted voiding are preferred for first line treatment in older persons with ADRD.
- Typical pharmacologic interventions such as anticholinergics may have a higher risk of adverse side effects. The anticholinergics add to the anticholinergic cognitive burden and have been linked to dementia, making their use in the older population cautionary. Mirabegron reduces incontinence without anticholinergic side effects.
- Refer to geriatrics or urology if troublesome incontinence persists despite these efforts

Falls

- Patients should be asked about falls every 12 months or more frequently if needed.
- A thorough investigation may include: medication review and management, exercise, assessments of instrumental activities of daily living, orthostatic blood pressure measurement, vision assessment, gait and balance evaluation, cognitive evaluation, and assessment of environmental hazards. Refer to NYUPN Ambulatory Falls Screening & Prevention Guideline
- Consider referral to geriatrics for assessment and management of falls.
- Exercise is generally recommended to prevent falls, if the patient is able. Multifactorial interventions must be individualized per patient to ensure the benefits outweigh the risks.
- Consider PT if apparent weakness or poor balance; patient should be able to follow directions and care partner must be willing to accompany patient during at-home exercises
- TZD and SGLT2i should be used with caution in those at high risk for falls or fractures.

Pain

- Patients should be assessed during the initial evaluation period for persistent pain as neuropathic pain may occur in as many as 50% of individuals with DM. Pharmacological and non-pharmacological treatments are available and should be individualized based on cost, patient preferences, goals of treatment, potential drug–drug interactions, comorbidities, and common side effects. Bedtime low-dose gabapentin therapy or low dose tricyclic antidepressant (low anticholinergic choice - nortriptyline) can be utilized.

Hypoglycemia

- Individuals should be screened for symptomatic and/or asymptomatic hypoglycemia at each encounter.
- Patients on glycemic control agents that can cause hypoglycemia should have medications re-evaluated and glycemic control relaxed. Consider diabetologist referral. Regular blood glucose monitoring (at least once or twice daily)²⁴ can be considered if caregiver and patient are willing and able to do it.

Cardiovascular Disease Risk Reduction

- Treatment of other cardiovascular risk factors should be individualized in older adults with DM and ADRD considering the time frame of benefit.
- If known cardiovascular disease, daily aspirin therapy is recommended, unless contraindicated or the patient is taking other anticoagulant therapy.

Eye Exam

- Establish baseline dilated exam by optometrist or ophthalmologist at the time of diagnosis for diabetes.
- High risk individuals should have annual screenings.
- Low risk individuals may have an examination every two years.

Hearing Assessment

- Hearing loss is common (70% or more among those 75 years and older), may be more common in DM, and exacerbates cognitive impairment increasing communication challenges
- Can use a simple screener: [Hearing Handicap Inventory of Elderly](#) (HHIE) or informant-based face valid questions:
 1. Has anyone ever diagnosed hearing loss or tried hearing aids in the past?
 2. Do you find the care recipient has the TV or radio too loud?
 3. Do you have to repeat yourself multiple times to be understood?
- Have and use a PockeTalker ready during office visits
- Examine the ears for excessive cerumen, which should be removed if found
- If PockeTalker appears to improve communication, recommend purchase for home use and or audiological referral

Diabetic Kidney Disease Screening

- Perform urine microalbuminuria screening and estimated GFR testing
 - A normal urine albumin/creatinine ratio is ≤ 30 mg albumin per gram of creatinine
 - Normal estimated glomerular filtration rate is > 60 mL/min/1.73m²
- Often patients with ADRD and DM have impaired kidney function.
 - Insulin half-life is prolonged in patients with reduced kidney function and thus a decrease in insulin requirements. Patients should be monitored closely for hypoglycemia
 - Metformin should be used with a dose reduction for eGFR between 30-44 mL/min/1.73m². It should be stopped with eGFR <30 mL/min/1.73m².
 - Refer to table for Drug-Specific Patient Factors to determine agents should be avoided or dose adjusted based on renal impairment

Foot Care

- Examine feet for wounds, impaired circulation, and the presence of diabetic neuropathy.
- Educate patient and care partners about risk factors and treatment for foot ulcers and amputation, as well as orthotic footwear.
- If neuropathy is present, visual foot examination is required at all follow up visits. If neuropathy is not present, foot examination should be performed at least annually.

8. Referrals

- If severe or frequent hypoglycemia, or poor control of hyperglycemia, or complex regimen, the management plan should be reevaluated. The patient and care partner should be offered a referral to a DM educator, endocrinologist, or diabetologist.
- Nutritionist referral for detailed diet and nutritional care that is culturally appropriate.
- Consider geriatrics referral for medically complex patients, or patients with falls, incontinence and/or frailty
- Consider neurologist referral if concerned for worsening ADRD, memory impairment, function, or safety. A referral may also be necessary for subtype dementia diagnosis.
- Consider referral to geriatrics or urology if troublesome incontinence
- Consider physical therapy referral if patient and care partner are willing to engage in at-home exercises
- Referrals to community based resources for the patient and care partner are available in the [resource list](#).

9. Immunizations

- All patients with DM-ADRD should be given yearly influenza vaccines.
- Pneumococcal vaccines should be administered according to the guidelines. Refer to [NYUPN Adult Immunization Guideline](#) for detail.

10. Concise Ambulatory Summary Guideline for Recurring and Annual Clinical Visits

Routine screening of the following benchmarks should be performed in the recommended timeframes below. Identified complications should be treated promptly. All screening and goals of care discussions should begin at the time of diagnosis of T2D.

Goals of Care for All Office Visits	Annual Clinical Targets
<ul style="list-style-type: none"> • Discuss with patient and care partner management goals, diet, exercise, medication regime, additional stressors. • Simplify pharmacologic management if appropriate • Blood pressure measured and controlled to individualized goal • A1c monitored and individualized goal established: <ul style="list-style-type: none"> • Every 3 months or less if uncontrolled diabetes • Every 6 months for glycaemia at individualized target with lifestyle modification or oral agents • Evaluate for worsening cognitive function, motor function, and BPSD • Visual foot inspection if neuropathy present • Inquire about hearing loss, urinary incontinence, falls, and persistent pain • Check weight, calculate BMI – check for unintended weight loss in frail elders • Provide smoking cessation counseling to all tobacco users 	<ul style="list-style-type: none"> • Dilated eye exam by ophthalmologist or optometrist <ul style="list-style-type: none"> • If 1 or more normal exams, may consider surveillance once every 2 years • If high risk of eye disease, assess annually or more frequently • Neuropathy evaluation, see Appendix F • Screen for microalbuminuria with random urine micro albumin/creatinine ratio • Serum Creatinine and eGFR • Lipid profile • Assess smoking status • Vaccinations <ul style="list-style-type: none"> • Influenza vaccination (annual) • Confirm or give Pneumococcal and Hepatitis B vaccine

V. ACCOUNTABILITIES & MONITORING:

HEDIS requires compliance with the following diabetes measures and quality gaps in care will be monitored by the NYUPN CIN Quality Team.

Measure	Description	Threshold
Screening & Monitoring		
HbA1c Testing	Adult diabetics (age 18-75 years) with annual testing	≥ 93 %
HbA1c Control	Adult diabetics (age 18-75 years) with HbA1c < 8%	≥ 87 %

Measure	Description	Threshold
Retinal Eye Exam	Adult diabetics (age 18-75 years) received: <ul style="list-style-type: none"> • a retinal or dilated eye exam annually or • a normal/negative retinal or dilated eye exam in the last 2 years 	≥ 85%
Nephropathy Screening	Adult diabetics (age 18-75 years) who annually had: <ul style="list-style-type: none"> • urine microalbumin testing or • evidence of nephropathy or • nephrologist visit or • ACEI/ARB prescription 	≥ 99 %
Adult BMI Assessment	Document annually for age 18-74 years	≥ 98 %
Controlling High Blood Pressure	Adult diabetic (age 18-85 years) BP goal < 140/90 mmHg	≥ 90 %
ACEI/ARB monitoring	Annual monitoring of serum potassium and serum creatinine	≥ 92 %
Smoking Cessation	Screened for smoking status and advise to quit	≥ 96 %
Medication Management		
Statin adherence	% Patients with good adherence based on prescription refills	≥ 91 %
Diabetes adherence	% Patients with good adherence based on prescription refills	≥ 88 %
ACEI/ARB adherence	% Patients with good adherence based on prescription refills	≥ 91 %
Statin Therapy Indicated for Patients with Diabetes	Diabetics (age 40-75 years) without ASCVD should be prescribed statins unless contraindicated	≥ 86 %
Statin Therapy Indicated for Patients with CVD	Initiation of statin therapy (males age 21-75 years and females age 40-75)	≥ 91 %
Avoid High-Risk Medications	Avoid chlorpropamide, or glyburide if ≥ 66 years	< 6%

VI. EXCEPTIONS:

The management of patients younger than 65 and/or without dual diagnosis of ADRD and DM are not included.

VII. DOCUMENTATION OF COMPLIANCE:

Confirmation of claim by health plan. Documentation of evidence in the medical record shall include: payer prescription claims, report/results of laboratory testing, dilated retinal exam, BP, BMI, and referral for smoking cessation.

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IX. APPROVAL:

Clinical Practice Committee on 2/26/19, 6/12/20
 NYUPN Board of Managers on 3/11/19, 10/9/20

X. DISTRIBUTION:

NYUPN Portal

XI. APPENDICES:

Appendix A: Clinical Guidelines for older adults with ADRD and DM – Executive Summary
Appendix B: Screening and Diagnosis of Alzheimer's Disease and Related Dementias
Appendix C: Screening and Diagnosis of Diabetes Mellitus Type 2
Appendix D: General Principles of Management
Appendix E: Modifiable Risk Factors
Appendix F: Alzheimer's Disease and Related Dementias Management
Appendix G: Diabetes Mellitus Type 2 Management & Drug-Specific Patient Factors to Consider when Selecting Type 2 Diabetes Medications
Appendix H: Prevention, Screening, and treatment of Complications in Patients with ADRD and DM
Appendix I: Resources
Appendix J: Care Partner Stress Thermometer

XII. RELATED DOCUMENTS:

CG007: Diabetes Care in Non-Pregnant Adults
CG010: Ambulatory Falls Screening & Prevention
CG015: Tobacco Control
CG018: Atherosclerotic Cardiovascular Disease
CG020: Hypertension Management
CG023: Immunizations-Adult

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XV. REVISION HISTORY:

Prepared By: Mariel Shull PharmD, Esther Miller Pharmacy Intern Approved By: Caroline Blaum MD Summary of changes: Updated tables and revised management to reflect 2020 ADA Guideline. Added details for the screening of diabetic complications, continuous glucose monitoring, and oral semaglutide. Provided information on treatment of diabetes mellitus type 1 in older adults.	Date: 03/24/20 Date: 6/10/20
Prepared By: Approved By: Summary of changes:	Date: Date:
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Prepared By: Approved By: Summary of changes:	Date: Date:

Appendix A: Clinical Guidelines for Diabetes and Alzheimer’s disease and Related Dementia Care in Older Adults– Executive Summary

Appendix B: Screening and Diagnosis of Alzheimer's disease and related dementias

Screening of ADRD

All patients with DM should be screened for early detection of MCI or ADRD at the initial visit, annually, and at any time point the patient or care partner expresses concern regarding the patient’s cognitive function.¹

A variety of brief, standardized screening instruments can be used:

- [Mini-Cog](#)
- [GPCOG](#)
- [AD8](#)
- [Short IQ-CODE](#) from care partner if patient unable to answer

If results are abnormal or clinical suspicion remains, further evaluation with in-depth tools can be used. Further characterization of the cognitive impairment is recommended at either the initial evaluation or subsequent evaluations.¹³

- MOCA (high sensitivity and specificity in patients who perform in normal range of MMSE) and more likely to detect cognitive impairment when cerebrovascular disease is a concern.^{2,8}

Diagnosis of ADRD

- All geriatric patients suspected of having ADRD should undergo a full workup to rule out other exacerbating etiologies. A clinical diagnosis of mild cognitive impairment or ADRD should be made only after completing comprehensive evaluation. Subtype dementia diagnoses should be made by clinicians with experience in the differential diagnoses and familiarity with the DSM diagnostic criteria.
 - Many general providers can make a diagnosis of Major Neurocognitive Disorder (NCD) when a patient has significant Cognitive Decline in 1 or more domains including - complex attention, executive function, working memory, language, perceptual motor, or social cognition
 - Based on: Concern of an individual, informant, or a clinician - of significant decline
 - AND substantial impairment in cognitive performance, preferably documented by neuropsychological testing or, in its absence, another qualified clinical assessment
 - The cognitive deficits should interfere with independence in everyday activity
 - Delirium should be assessed and ruled out.

- The cognitive deficits should not be explained by other mental health conditions. All patients should be screened for anemia, alcohol or substance use disorder, vitamin B12 deficiency, hypothyroidism, liver and kidney disease. Screening for HIV and Syphilis should be considered even when suspicion is low.
- Patients should have their list of [medications](#) screened. Can also refer to review article for: [An approach to drug induced delirium in the elderly.](#)
- If risk factors or clinical suspicion is present particularly when there is an atypical presentation, neurology consult should be obtained. Prion disease, and/or infectious screen is indicated with CSF examination. Structural neuroimaging to identify lesions should also be performed (MRI without contrast is the preferred imaging test) if the presentation is unusual, onset is rapid, or focal neurological findings are present. Genetic testing for apolipoprotein E4 is not recommended.
- Depression – Older persons with DM should be screened within the first 3 months after a positive screen for cognitive impairment. The Geriatric Depression Scale (GDS) or Patient Health Questionnaire ([PHQ-9](#)) are validated screening tools. The [PHQ-2](#) or [5-item GDS](#) are brief and reasonable initial screeners that do not require clinician administration.

For those with a positive GDS or PHQ-9:

- Non pharmacologic intervention is recommended as first-line. Options include cognitive behavioral therapy or psychotherapy and reminiscence therapy. ²¹ Persons treated with therapy should be reevaluated for improvement within 6 weeks of initiation.
- For persons who demonstrate severe depression or have failed non-pharmacologic therapies, antidepressants can be considered. SSRIs are recommended as first-line pharmacotherapy for depression, while tricyclic antidepressants should be avoided due to their anticholinergic properties. ²¹

Appendix C: Screening and Diagnosis of Diabetes Mellitus Type 2

Screening of DM

- All older patients with ADRD should be screened for pre-diabetes and diabetes at the initial visit, and every three years thereafter.²¹
- Annually if BMI >25 AND any of the risk factors below:
 - CVD
 - Family history of DM
 - Hypertension
 - HDL < 35 mg/dL and/or triglycerides > 250 mg/dL
 - High-risk ethnicity i.e. African American, Hispanic/Latino, Native American, Asian American (BMI cutoff \geq 23)
 - Women with polycystic ovary syndrome
 - Physical inactivity
 - Physically inactive or sedentary lifestyle
 - History of vascular disease
- Annually for any of the risk factors below:
 - Prediabetes
 - Women diagnosed with gestational diabetes
 - High risk medications including: glucocorticoids, atypical antipsychotics and thiazide diuretics. Click to [view list](#) of medications affecting glycemic control.

Diagnosis of DM

The criteria for diabetes diagnosis is constant across all ages according to the recommendations below. Diagnosis requires two abnormal test results from the same sample or in two separate test samples unless unequivocal symptoms of hyperglycemia are present.

- Fasting Blood Glucose \geq 126 mg/dL.
- HbA1c \geq 6.5%
- OGTT 2h \geq 200 mg/dL
- A random plasma glucose greater than or equal to 200mg/dL if presenting with classic symptoms of hyperglycemia or hyperglycemic crisis.

Prediabetes is defined according to the recommendations below.

- Fasting Blood Glucose 100-125 mg/dl
- Hgb A1c 5.7-6.4%
- GTT 2h 140-199 mg/dL

Appendix D: General Principles of Management

- Tailor Care To The Individual
 - Consider medical, psychological, functional, and social geriatric domains in order to focus on individual therapeutic goals^{21, 25, 26}
 - Focus on maintenance of autonomy while regularly reassessing capacity for self-management. Ensure appropriate transition of responsibility to care partners when necessary.
 - Avoid additional stressors or negative outcomes such as unnecessary hospitalization and/or institutionalization. Aim for early detection of additional diagnoses.
 - Involve patients when able and care partners in pharmacotherapy decisions.
 - Determine HCP and discuss advance care planning as appropriate to patient's health status.
- Care Partners Are Integral Members Of The Care Team
 - Support the care partner, establish therapeutic relationship and provide resources and referrals to community and medical support resources as appropriate.
 - Medical interventions should be planned in close coordination with care partners
 - Coordinate care with care partners, including tracking medical records and any medical interventions.
 - Routinely evaluate needs of care partners, with increased awareness for psychological morbidity.
 - Provide information to patient and care partner about community and medical resources for both DM and ADRD.
- Be Wary Of Pharmacotherapy And Polypharmacy
 - Advise patients and their care partners to maintain an updated medication list. Review the medication list with special attention to potential drug-drug interactions, agents on the AGS Beers Criteria, anticholinergic burden, and age- and system-appropriate dosing.⁶ <https://dcri.org/beers-criteria-medication-list/>
 - Involve both patients and their care partners in pharmacotherapy decision, including discussion of the purpose of the medication, how to take it, risks, benefits and side-effects.^{6,21}
 - For both DM and ADRD, if pharmacotherapy is indicated, use sparingly, and choose those with benign side effect profiles. Start low and go slow.
 - Refer to NYUPN Ambulatory Falls, Screening & Prevention Guideline for information on deprescribing.
- Protect Individual And Public Safety
 - Be aware of the risk of abuse and report as required by law
 - Evaluate driving ability upon diagnosis of ADRD, advise and report accordingly.
 - It is important for clinicians and patients to recognize that a diagnosis of dementia does not mean that they automatically need to stop driving.²¹ Cognitive testing can help to determine dementia severity

and dementia subtype, and both will have a bearing on whether an individual is safe to drive.

- If doubt remains, an assessment of driving ability is helpful. Performance on the modified MMSE has emerged as a significant predictor of driving independence in this sample of older patients with heart failure.²⁷
- Where a person is deemed fit to drive, the risks associated with driving need to be reviewed annually.

Appendix E: Modifiable Risk Factors

Lifestyle interventions such as diet/nutrition, weight management, physical activity, and tobacco cessation are effective tools in the management of patients with ADRD and DM. These lifestyle-related factors as well have been strongly associated with the risk of AD, dementia and the rate of cognitive decline.⁴⁰

Medical Nutrition

Meal planning should involve a personalized plan developed collaboratively between the individual, care partner/s and a registered dietitian as part of medical nutrition therapy counseling. The patient should be evaluated regularly for diet and nutritional status in order to individualize meal plans.

- Healthy older persons with ADRD and DM should adhere to a DASH, MIND, or MeDi diet, all of which, studies suggest, may be more effective than single nutrient intervention strategies.^{38, 39, 40}
- In older persons with ADRD and DM, saturated fatty acids and high intake of high-cholesterol foods should be avoided. Appropriate intake of carbohydrates and fish consumption is encouraged.

Weight Management

Weight reduction should be done under medical supervision but may not be an appropriate goal in all cases.⁶ Reference to NYUPN Guideline for Diabetes Care in Non-Pregnant Adults for further detail.

Physical Activity

Physical activity is a major contributor to successful “healthy aging,” encompassing clinical, psychological, and social benefits. For those of our patients with diagnosed AD, exercise appears to have potential benefits. Systematic reviews and meta-analysis do show possible improvement in cognitive function, decreased neuropsychiatric symptoms, and a slower decline in ADL^(10,12,22).

- Unless there are contraindications, older adults with DM and ADRD should be advised to perform aerobic and resistance exercises to the best of their ability under the direction of their healthcare provider.⁶
- Older adults with DM and ADRD and their care partners should also receive structured lifestyle counseling based on the Diabetes Prevention Program strategies and should be urged to engage in physical activity at least 3 days per week.¹³

Tobacco Cessation

Older adults with DM and ADRD who smoke should be assessed for readiness to quit and should be ordered counseling and pharmacologic interventions to assist with smoking cessation.⁶ Reference to NYUPN Guideline for Tobacco Control for further detail.

Appendix F: Alzheimer's Disease and Related Dementias Management

For patients with ADRD and DM, regularly re-evaluate disease progression in a comprehensive manner. Encourage participation in programs aimed at cognitive stimulation.

Standardized and validated scales that can be used to better characterize dementia severity are listed below:

- [7-stages of Alzheimer's: FAST scale](#)
- [Clinical Dementia Rating Scale \(CDR\)](#)
- [Dementia Severity Rating Scale \(DSRS\)](#)

ADRD Pharmacologic Intervention

- Alzheimer's Dementia
 - Consider AChEIs or memantine for mild–moderate dementia. Evidence does not support an advantage for dual therapy and benefits of either is small. Establish criteria for stopping these medications prior to initiation. Medications are best utilized when used for target symptoms, e.g., apathy or agitation. Adverse effects/symptoms are frequent.²¹
- Vascular Dementia
 - Identify and treat vascular risk factors. AChEIs are not indicated in VD.²¹
- Dementia with Lewy Bodies
 - AChEIs can be used to manage cognitive symptoms.²¹
- Parkinson Disease-Associated Dementia
 - AChEIs can be considered with a careful risk-benefit analysis, as there is risk for worsening motor features and adverse drug reactions.²¹
Rivastigmine is approved for treatment of cognitive impairment.
- Frontotemporal Dementia
 - Neither AChEIs nor memantine is recommended.²¹

Behavioral and Psychological Symptoms of Dementia (BPSD)

In patients with ADRD and DM, assess for BPSD at the time of diagnosis and at regular intervals (i.e. 3 months) thereafter. Be sure to evaluate for other causes that may be confounding or contributing to these symptoms (i.e. delirium, pain, depression, etc.). Behavioral strategies that may require care partner training from a community organization such as CaringKind is recommended. Meaningful daytime activities and exercise are important strategies. Strategies also include attention to sleep habits with avoidance of daytime sleeping. Music therapy, massage therapy, and reminiscence in persons with BPSD is recommended and may be helpful in improved quality of life in all patients.

BPSD Pharmacologic Intervention:

There is a lack of consensus for using anticonvulsants, mood stabilizers and SSRIs in persons and DM and ADRD who demonstrate typical BPSD symptoms.⁵⁸

- Benzodiazepine or other sedative-hypnotics should be avoided.

- Only consider antipsychotic medicines if other steps have failed, there is severe distress and/or significant safety concerns.²¹
- Atypical antipsychotics are preferred although all antipsychotics have increased mortality in elderly with dementia related psychosis.
- Start low and go slow
- De-prescribe when possible in a carefully tapered fashion. For patients with BPSD treated with antipsychotics for at least 3 months, taper and stop antipsychotics slowly in collaboration with the patient and care partners: e.g., 25%-50% dose reduction every 1-2wk (strong recommendation, moderate-quality evidence).⁶⁰
- Tapering might need to be individualized depending on the starting dose, available dosage forms, and how tapering is tolerated

Appendix G: Diabetes Mellitus Type 2 Management

Overtreatment of diabetes is common in older adults and should be avoided. Persons with limited life expectancy or extensive comorbid conditions, and others in whom the risks of intensive glycemic control appear to outweigh the potential benefits, a less-stringent target is appropriate. [Choosing Wisely](#) provides a rough guide to diabetes management in the older person. The goals of treatment for older persons with ADRD and DM include:

- Prevent unnecessary hypo- and hyperglycemia. Avoid using medications other than metformin to achieve hemoglobin A1c < 7.5% in most older adults
- For patients with mild ADRD - target HbA1c between 7% to 7.5%
- For patients with moderate ADRD - target HbA1c between 7.5% to 8%
- For patients with advanced ADRD - target HbA1c between 8% to 8.5%

Monitoring HbA1c levels for older adults with DM and ADRD depends on whether individual targets are being met.

- If targets not being met, their HbA1c levels should be measured at least every 6 months and more frequently as needed or indicated.
- For older adults with stable HbA1c over several years, measurement every 12 months may be appropriate.
- A schedule for self- or care partner-monitoring of blood glucose should be established based on the goals of care, target HbA1c levels, potential for modifying therapy, and risk of hypoglycemia.

DM Pharmacologic Intervention

If an older adult with DM and ADRD is to be prescribed an oral antidiabetic agent, metformin, unless contraindicated, is the preferred first-line agent in combination with continued lifestyle therapy

- Use eGFR to guide metformin use. Do not use metformin in patients with an eGFR of less than 30 mL/min

There is no clear second-line oral anti-hyperglycemic after metformin for older persons with DM and ADRD. After metformin, anti-hyperglycemic agents should be chosen based on efficacy, comorbidities (CV, CKD), side effect avoidance and cost. Anti-hyperglycemic medication classes with low risk of hypoglycemia are preferred.

- Sulfonylureas have been associated with greater risk of hypoglycemia, and the risk increases with age.
- Insulin use in healthy older adults with DM education, careful monitoring, and ongoing cognitive assessment is also an acceptable option. Studies have shown that the use of rapid- and long-acting insulin analogs was associated with a lower probability of experiencing a severe hypoglycemic event.⁶⁷
- A guide to pharmacotherapy in adults is provided below, and is a new guideline from ADA. However, this has not been modified for older adults or people with DM-ADRD.
- Many older adults may have problems with SGLT-2 inhibitors and may get urinary tract infections, perineal skin infections, and other local problems. Evidence is limited regarding the prevalence of this issue but expert opinion

suggests these medications should be avoided in older patients with risk or presence of urinary frequency or incontinence.⁷⁵

- A guide to simplification of Complex Insulin Therapy is provided below.

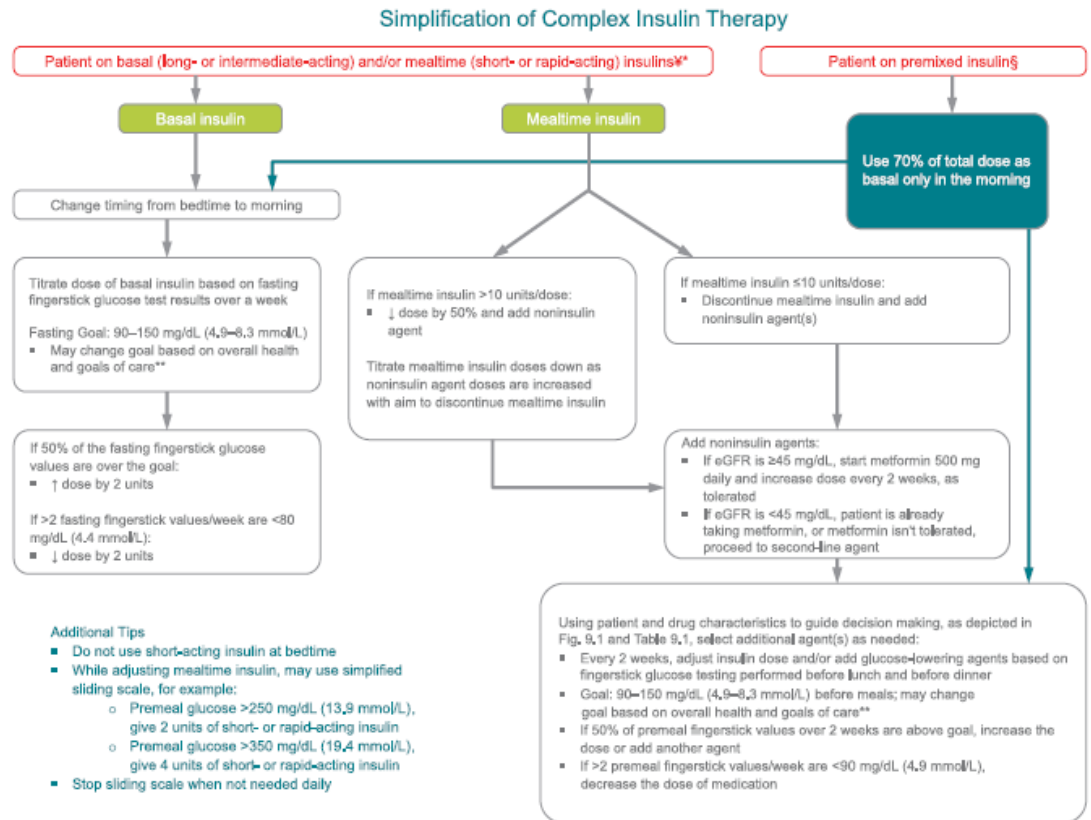


Fig. 12.1—Algorithm to simplify insulin regimen for older patients with type 2 diabetes. eGFR, estimated glomerular filtration rate. *Basal insulins: glargine U-100 and U-300, detemir, degludec, and human NPH. **See Table 12.1. †Mealtime insulins: short-acting (regular human insulin) or rapid-acting (lispro, aspart, and glulisine). §Premixed insulins: 70/30, 75/25, and 50/50 products. Adapted with permission from Munshi and colleagues (39,55,56).

FIRST-LINE Therapy is Metformin and Comprehensive Lifestyle (including weight management and physical activity)



INDICATORS OF HIGH-RISK OR ESTABLISHED ASCVD, CKD, OR HF†

NO

CONSIDER INDEPENDENTLY OF BASELINE A1C OR INDIVIDUALIZED A1C TARGET

IF A1C ABOVE INDIVIDUALIZED TARGET PROCEED AS BELOW

ASCVD PREDOMINATES

- Established ASCVD
- Indicators of high ASCVD risk (age ≥55 years with coronary, carotid or lower extremity artery stenosis >50%, or LVH)

PREFERABLY

GLP-1 RA with proven CVD benefit¹

OR

SGLT2i with proven CVD benefit¹ if eGFR adequate²

If A1C above target

If further intensification is required or patient is now unable to tolerate GLP-1 RA and/or SGLT2i, choose agents demonstrating CV safety:

- For patients on a GLP-1 RA, consider adding SGLT2i with proven CVD benefit¹
- DPP-4i if not on GLP-1 RA
- Basal insulin⁴
- TZD⁵
- SU⁶

HF OR CKD PREDOMINATES

- Particularly HFrEF (LVEF <45%)
- CKD: Specifically eGFR 30-60 mL/min/1.73 m² or UACR >30 mg/g, particularly UACR >300 mg/g

PREFERABLY

SGLT2i with evidence of reducing HF and/or CKD progression in CVOts if eGFR adequate²

OR

If SGLT2i not tolerated or contraindicated or if eGFR less than adequate² add GLP-1 RA with proven CVD benefit¹

If A1C above target

- Avoid TZD in the setting of HF
- Choose agents demonstrating CV safety:
- For patients on a SGLT2i, consider adding GLP-1 RA with proven CVD benefit¹
- DPP-4i (not saxagliptin) in the setting of HF (if not on GLP-1 RA)
- Basal insulin⁴
- SU⁶

COMPELLING NEED TO MINIMIZE HYPOGLYCEMIA

DPP-4i	GLP-1 RA	SGLT2 ²	TZD
If A1C above target	If A1C above target	If A1C above target	If A1C above target
SGLT2 ²	SGLT2 ²	GLP-1 RA OR DPP-4i OR TZD	SGLT2 ² OR DPP-4i OR GLP-1 RA
OR	OR	OR	OR
TZD	TZD		

If A1C above target

Continue with addition of other agents as outlined above

If A1C above target

Consider the addition of SU⁶ OR basal insulin:

- Choose later generation SU with lower risk of hypoglycemia
- Consider basal insulin with lower risk of hypoglycemia⁷

COMPELLING NEED TO MINIMIZE WEIGHT GAIN OR PROMOTE WEIGHT LOSS

GLP-1 RA with good efficacy for weight loss⁸ **ETHER/ OR** SGLT2²

If A1C above target

SGLT2² OR GLP-1 RA with good efficacy for weight loss⁸

If A1C above target

If quadruple therapy required, or SGLT2i and/or GLP-1 RA not tolerated or contraindicated, use regimen with lowest risk of weight gain

PREFERABLY

DPP-4i (if not on GLP-1 RA) based on weight neutrality

If DPP-4i not tolerated or contraindicated or patient already on GLP-1 RA, cautious addition of:

- SU⁶ • TZD⁵ • Basal insulin

COST IS A MAJOR ISSUE⁹⁻¹⁰

SU⁶ OR TZD⁵

If A1C above target

TZD⁵ OR SU⁶

If A1C above target

- Insulin therapy basal insulin with lowest acquisition cost
- OR
- Consider DPP-4i OR SGLT2i with lowest acquisition cost¹⁰

1. Proven CVD benefit means it has label indication of reducing CVD events
 2. Be aware that SGLT2i labelling varies by region and individual agent with regard to indicated level of eGFR for initiation and continued use
 3. Empagliflozin, canagliflozin and dapagliflozin have shown reduction in HF and to reduce CKD progression in CVOts. Canagliflozin has primary renal outcome data from CREDENCE. Dapagliflozin has primary heart failure outcome data from DAPA-HF
 4. Degludec or U100 glargine have demonstrated CVD safety
 5. Low dose may be better tolerated though less well studied for CVD effects

6. Choose later generation SU to lower risk of hypoglycemia, Glimepiride has shown similar CV safety to DPP-4i
 7. Degludec / glargine U300 < glargine U100 / detemir < NPH insulin
 8. Semaglutide > liraglutide > dulaglutide > exenatide > lixisenatide
 9. If no specific comorbidities (i.e. no established CVD, low risk of hypoglycemia and lower priority to avoid weight gain or no weight-related comorbidities)
 10. Consider country- and region-specific cost of drugs. In some countries TZDs relatively more expensive and DPP-4i relatively cheaper

LVH = Left Ventricular Hypertrophy; HFREF = Heart Failure reduced Ejection Fraction
 UACR = Urine Albumin-to-Creatinine Ratio; LVEF = Left Ventricular Ejection Fraction

† Acted upon whenever these become new clinical considerations regardless of background glucose-lowering medications.

Drug-Specific Patient Factors to Consider when Selecting Type 2 Diabetes Medications

Medications	Efficacy	Hypo-glycemia	Weight Change	CV effects		Cost	Oral/S Q	Renal Effects		Additional Considerations
				ASCVD	CHF			Progression of CKD	Dosing Considerations	
Biguanides -metformin	High	No	Neutral (potential for modest loss)	Potential benefit	Neutral	Low	Oral	Neutral	Contraindicated with eGFR < 30	<ul style="list-style-type: none"> GI side effects common Potential for B12 deficiency
Sulfonylureas -glipizide	High	Yes	Gain	Neutral	Neutral	Low	Oral	Neutral	<ul style="list-style-type: none"> Glimepiride and glyburide: not recommended Glipizide: initiate conservatively to avoid hypoglycemia 	<ul style="list-style-type: none"> Beers criteria recommends avoiding glimepiride and glyburide in the elderly
Thiazolidinediones -pioglitazone -rosiglitazone	High	No	Gain	Potential benefit: pioglitazone	Increased risk	Low	Oral	Neutral	<ul style="list-style-type: none"> Generally not recommended in renal impairment due to potential for fluid retention 	<ul style="list-style-type: none"> FDA Black Box: HF Fluid retention (edema, HF) Benefit in NASH Risk of bone fractures Bladder cancer (pioglitazone) ↑ LDL (rosiglitazone)
DPP-4 inhibitors -sitagliptin -saxagliptin -linagliptin	Intermediate	No	Neutral	Neutral	Potential risk: saxagliptin, alogliptin	High	Oral	Neutral	<ul style="list-style-type: none"> Renal dose adjustment required except for linagliptin 	<ul style="list-style-type: none"> Potential risk of acute pancreatitis Joint pain
SGLT-2i -canagliflozin -dapagliflozin -empagliflozin -ertugliflozin	Intermediate	No	Loss	Benefit: empagliflozin > canagliflozin Dapagliflozin	Benefit: empagliflozin > canagliflozin	High	Oral	Benefit: canagliflozin, empagliflozin	Renal dose adjustment required	<ul style="list-style-type: none"> FDA Black box: risk of amputation (canagliflozin) Risk of bone fractures (canagliflozin) Genitourinary infections Fournier's gangrene Risk of volume depletion, hypotension ↑ LDL cholesterol
GLP-1 RAs -dulaglutide -exenatide, ER -liraglutide -lixisenatide -semaglutide	High	No	Loss	Neutral: lixisenatide Benefit: liraglutide > semaglutide > exenatide ER	Neutral	High	SQ, Oral (semaglutide)	Benefit: liraglutide	<ul style="list-style-type: none"> Renal dose adjustment (exenatide, lixisenatide) Caution when initiating or increasing dose due to potential risk of AKI 	<ul style="list-style-type: none"> FDA Black Box: Risk of thyroid C-cell tumors (liraglutide, albiglutide, dulaglutide, exenatide ER) GI side effects common Injection site reactions ? Acute pancreatitis
Insulin	Human	Yes	Gain	Neutral	Neutral	Low	SQ	Neutral	<ul style="list-style-type: none"> Reduce dose required w/ decrease in eGFR; titrate per clinical response 	<ul style="list-style-type: none"> Injection site reactions Higher risk of hypoglycemia with human insulin (NPH or premixed) vs. analogs
	Analog					High				

Given expected metabolic, exercise, and dietary changes with advancing ADRD, DM medication regimens should be regularly reviewed and de-intensified, as permitting, to prevent hypoglycemic events.

- De-intensification opportunities are missed in about 20% of older patients with tight glycemic control putting them at increased risk of adverse outcomes.⁷⁴ This is particularly important in older persons as when life expectancy shortens, the benefits from long term prevention therapy diminishes.²⁶
- Another example is the development of weight loss, frailty and malnutrition, as an end stage complication of chronic diseases, which will lead to reduced need for DM medications thus increasing the risk for hypoglycemic events.

Hypoglycemia

Hypoglycemia is defined as any blood glucose less than 70mg/dL. For detailed hypoglycemia definitions, risk, and management, refer to the NYU Guideline for Diabetes Care in Non-Pregnant Adults.

Recurrent or Severe Hypoglycemia

- Severe hypoglycemia is defined as blood glucose resulting in loss of consciousness, or requiring assistance of another individual to administer carbohydrates or glucagon, is significantly more serious.
- Older persons with ADRD and DM are at an increased risk of severe hypoglycemia. In the ADVANCE trial, severe cognitive dysfunction was associated with increased risk of severe hypoglycemia (hazard ratio, 2.10; 95% confidence interval [CI], and 1.14–3.87).¹⁵ The post hoc analysis of the ACCORD trial concluded that poor cognitive function increases the risk of severe hypoglycemia in patients with T2DM.⁵⁶ However, the mechanisms by which mild to moderate hypoglycemia affect cognitive decline and dementia remain unclear.
- The management plan for older adults with ADRD and DM with severe or frequent hypoglycemia should be evaluated thoroughly. The patient and care partners should be offered referral to a DM educator, endocrinologist, or diabetologist.
- The patient and care partner should also have increased healthcare contact either with physicians, pharmacists, case managers, or certified DM during management changes given the high risk of hypoglycemia.
- A patient may have hypoglycemic episodes even in the setting of a high HbA1c if they have frequent glycemic swings and are “brittle.”⁸⁵ Note that there are older adults with type 1 diabetes. Patients with glycemic swings, or with type 1 diabetes, should be referred to a diabetologist.

Patient and Care Partner Education

All older persons with ADRD and DM, and their care partners should be educated regarding the increased risk of severe hypoglycemic events. It should be emphasized which medications increase the risk of hypoglycemia, as well as the importance of appropriate timing of medication and food.

- The common signs and symptoms of hypoglycemia such as sweating, pallor, tremor, and hunger are also important to discuss. But ensure patient and care partner are aware that not all people with DM have warning signs of hypoglycemia, particularly if the patient is on medication that may mask the symptoms.
- Additional signs unique to older persons with DM and ADRD, include worsening confusion and irritability.²⁴

Concrete Steps to Reduce Hypoglycemic Risk

- Older persons with DM and ADRD who are on glycemic control agents that can cause hypoglycemia should have regular blood glucose monitoring (at least once or twice daily).²⁴
- Use of continuous glucose monitoring technology can be utilized.
- Ensure that treatments for hypoglycemia are readily available to persons with DM and ADRD and their care partners.²⁴

Cardiovascular Disease Risk Reduction

Treatment of other cardiovascular risk factors should be individualized in older adults with DM and ADRD considering the time frame of benefit.

- If an older adult has ADRD, DM, and known cardiovascular disease, daily aspirin therapy is recommended, unless contraindicated or the patient is taking other anticoagulant therapy.

Hypertension

Treatment of hypertension to individualized target levels is indicated in older adults with DM and ADRD. Refer to the NYUPN Guideline for Hypertension Management for details on medication management.

- For persons with ADRD, DM, and hypertension, the goal of therapeutic intervention should be to lower blood pressure within 3 months if systolic blood pressure is 140 to 160 mmHg or diastolic blood pressure is 90 to 100 mmHg or within 1 month if blood pressure is greater than 160/100 mmHg.
- For patients with diabetes and hypertension and ASCVD risk \geq 15%, the target blood pressure should be less than 130/80 mmHg, if tolerated.
- For patients with diabetes and hypertension and ASCVD risk $<$ 15%, the target blood pressure should be less than 140/90 mmHg, if tolerated.
- There is potential harm in lowering systolic blood pressure to less than 120 mmHg in older adults with ADRD and DM. Increased attention should be paid to symptoms of orthostatic hypotension.
- First line therapy includes thiazide diuretics, angiotensin-converting-enzyme inhibitors, angiotensin receptor blockers, or calcium channel blockers.

Hyperlipidemia

For older adults with DM, ADRD, and dyslipidemia, efforts should be made to correct the lipid abnormalities if feasible after overall health status is considered. It should be noted that evidence on the effects of lipid-lowering treatment on cognitive decline and prevention of dementia is scant and inconclusive. Refer to the NYUPN Guideline for Diabetes Care in Non-Pregnant Adult and Atherosclerotic Cardiovascular Disease for detailed medication management

- Evidence for specific LDL target levels is limited. Moderate-high intensity statin therapy is indicated based on clinical ASCVD (any age) or Diabetes (40-75 years). It is reasonable to continue $>$ 75 years if tolerated.
- Moderate-intensity statin in patients aged 40-75 years without ASCVD (primary prevention)
- High-intensity statin in patients of all ages with diabetes and ASCVD (secondary prevention)

- Patients with ASCVD and diabetes with LDL \geq 70 mg/dL on maximally tolerated statin dose may benefit with additional LDL-lowering therapy such as PCSK9 inhibitor or ezetimibe
- In patients with ASCVD or other CV risk factors on statin therapy with controlled LDL level but elevated triglyceride levels of 135-499 mg/dL, consider adding icosapent ethyl to reduce CV risk.
- Older persons with DM, ADRD, and low-risk lipid values (LDL-C <100 mg/dL; HDL-C >50 mg/dL, triglycerides <150 mg/dL) on initial assessment may have lipids checked every 2 years.
- However, in most patients in this population, measurement of a fasting lipid profile is recommended at least annually and more frequently if targets are not being met.
- Older adults with DM and ADRD who are newly prescribed a statin should have alanine aminotransferase level measured before treatment with the new medication begins and as clinically indicated thereafter.

Retinopathy

- High risk individuals should have annual dilated-eye examinations, including those with: symptoms of eye disease present; evidence of retinopathy, glaucoma, or cataracts on an initial dilated-eye examination or subsequent examinations during the prior 2 years; HbA1c \geq 8.0%; or blood pressure \geq 140/90 mmHg.
- Persons at lower risk or after one or more normal eye examinations may have a dilated-eye examination at least every 2 years.⁶
- Retinal photography or use of valid assessment tool to improve access to screening are appropriate but timely referrals for comprehensive eye exams must be provided when indicated.

Neuropathy

- Older adults with DM and ADRD should have a careful history and foot examination at least annually to check for skin integrity, loss of sensation, or decreased perfusion. If any of these are found, examinations should be performed more frequently.
- Patients and care partners should receive education about risk for foot ulcers and amputation.
- Physical ability to provide proper foot care should be evaluated, with reassessment and reinforcement periodically as needed.⁶
- For detailed instructions on monofilament foot exam, refer to NYUPN Guideline for Diabetes Care in Non-Pregnant Adults.

Diabetic Kidney Disease

- A test for the presence of albuminuria should be performed in individuals at diagnosis of type 2 DM. The general recommendations are to perform annual screening for microalbuminuria, directions of which can be found in the NYUPN Guideline for Diabetes Care in Non-Pregnant Adults.

- However, there is little evidence to support this practice. For older adults 75 and older, or with limited life expectancy and/or patients on ACE inhibitors/ARBs there may be no need for screening.⁶
- In the absence of volume depletion, do not discontinue ACEI/ARB for minor increases in serum creatinine (<30%).
- For patients with T2D concurrent with diabetic kidney disease and an eGFR ≥ 30 mL/min/1.73m² and UACR >30 mg/g, consider use of SGLT2i to reduce risk of CKD progression, CV events, or both.

Hearing Loss

- Hearing loss is common (70% or more among those 75 years and older), may be more common in DM, and exacerbates cognitive impairment increasing communication challenges
- Can use a simple screener: [Hearing Handicap Inventory of Elderly](#) or informant-based face valid questions:
 1. Has anyone ever diagnosed hearing loss or tried hearing aids in the past?
 2. Do you find the care recipient has the TV or radio too loud?
 3. Do you have to repeat yourself multiple times to be understood?
- Have and use a PockeTalker ready during office visits
- Examine the ears for excessive cerumen, which should be removed if found
- If PockeTalker appears to improve communication, recommend purchase for home use and or audiological referral

Urinary Incontinence

Older adults with DM and ADRD should be evaluated for symptoms of urinary incontinence during annual screening.⁷⁵ Individuals commonly do not report urinary incontinence, and healthcare providers often do not detect it, but its effects may be profound, and it may be associated with social isolation, depression, falls, and fractures.

- Although the evidence supporting this recommendation is Level III (expert opinion), because of the profound negative effect of under-diagnosis and under treatment of this condition on quality of life, it is given an importance rating of A.⁶
- If there is evidence of urinary incontinence in the evaluation of an older adult with DM and ADRD, then further steps to identify treatable causes should be pursued. Consider referral to geriatrics, gynecology or urology.
- The American Urological Association recommends that for patients with concern for urinary incontinence, a basic evaluation including history, physical examination, measurement of post-void residual volume, and urinalysis should be performed (Level C). Health care providers should be able to initiate evaluation and treatment of UI basing their judgment on the results of this workup.
- Genital infections are a class effect with SGLT-2 inhibitors. Given the older persons may often have urinary incontinence, it is not generally recommended to start on SGLT-2 inhibitors if there are concerns about polyuria, volume depletion or postural hypotension.⁷⁵

Falls

Falls are frequently unreported and undetected and may be associated with reversible factors. Older adults with DM and ADRD should be asked about falls every 12 months or more frequently if needed.

- If an older adult with DM and ADRD presents with evidence of falls, the clinician should perform a basic falls evaluation that includes assessment of injuries and examination of potentially reversible causes. Consider referral to geriatrics and/or to PT if falls are frequent or injurious.
- Common risk factors for falls include balance disorders, functional impairment, visual deficits, cognitive impairment, and certain types of medications.^{30, 31}
- A multifactorial intervention includes medication review and management, exercise, assessments of instrumental activities of daily living, orthostatic blood pressure measurement, vision assessment, gait and balance evaluation, cognitive evaluation, and assessment of environmental hazards.
- Exercise is generally recommended to prevent falls, if the patient is able. Multifactorial interventions must be individualized per patient to ensure the benefits outweigh the risks. Physicians should consider history of prior falls, comorbid conditions, and the patient's values.

Pain

Persons with DM and ADRD should be assessed during the initial evaluation period for evidence of persistent pain. Neuropathic pain may occur in as many as 50% of individuals with DM, but it is often underreported and undertreated in this population.

- Pharmacological and non-pharmacological treatments are available and should be individualized based on cost, patient preferences, goals of treatment, potential drug–drug interactions, comorbidities, and common side effects.^{32, 33}
- Bedtime low-dose gabapentin therapy or low dose tricyclic antidepressant (low anticholinergic choice - nortriptyline) can be utilized.

Appendix I: Resource List

- General Information
 - **National Institutes of Aging** - Educational pamphlets and resources for professionals, patients, and caregivers
 - Patients/Caregivers - <https://www.nia.nih.gov/health/alzheimers>
 - Providers - <https://www.nia.nih.gov/health/alzheimers-dementia-resources-for-professionals>
 - **New York City Department for the Aging** - General case management services, food assistance, transportation, senior centers, caregiver resources
 - <https://www1.nyc.gov/site/dfta/index.page>
 - Patient or caregiver can enter patient zip code which will tabulate list of community resources
- Diabetes Related
 - **NYU Center for Diabetes & Metabolic Health** – Endocrinology, nutritionists, diabetes educators, and support services
 - <https://nyulangone.org/locations/center-for-diabetes-metabolic-health>
- Dementia Related
 - **CaringKind** – Social work services, financial and legal planning, support groups, education and caregiver training, workshops, and safety program
 - 24/7 Hotline available: 646-744-2900
 - **Alzheimer’s Association** - education, support groups, and community resources
 - https://www.alz.org/nyc/helping_you
 - Phone: 1-800-272-3900
 - **NYU Barlow Center for Memory Evaluation and Treatment** – Neurology, psychology, geriatrics, social workers, and support services
 - Providers should provide referral
 - Phone: 212-263-3210
 - Website: <https://nyulangone.org/locations/pearl-i-barlow-center-for-memory-evaluation-treatment>
 - **NYU Alzheimer’s Disease & Related Dementias Family Support Program** – Education, support groups, and community resources
 - Email: family.support@nyumc.org
 - Phone: 646-754-2277
 - Website: <https://nyulangone.org/locations/alzheimers-disease-related-dementias-family-support-program>



Diabetes Mellitus Type I Management

- Insulin is an essential life-preserving therapy for patients with type 1 diabetes, unlike for those with type 2 diabetes. In order to avoid diabetic ketoacidosis, older adults with type 1 diabetes need some form of basal insulin even when they are unable to ingest meals.
- Insulin may be delivered through insulin pump or injections. Continuous glucose monitoring (CGM) is approved for use by Medicare and can play a critical role in improving A1C, reducing glycemic variability, and reducing risk of hypoglycemia.
- In the older patient with type 1 diabetes, administration of insulin may become more difficult as complications, cognitive impairment, and functional impairment arise. This increases the importance of caregivers in the lives of these patients.