Diabetes Mellitus in the older patients

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References

UpToDate
American Diabetes Association

Congress of diagnosis and treatment of diseases in the elderly

INTRODUCTION

The prevalence of type 2 diabetes continues to increase

Older adults (>65 years) with diabetes

similar spectrum of microvascular complications as their younger counterparts

risk for macrovascular complications is higher

at high risk for common geriatric syndromes

Goals for glycemic control

should be based upon the individual's overall health

Avoidance of hypoglycemia, hypotension, and drug interactions due to polypharmacy are of greater concern in elderly

management of coexisting medical conditions is important

Framework for considering treatment goals for glycemia, blood pressure, and dyslipidemia in older adults with diabetes[1]

Patient characteristics/health status	Rationale	Reasonable A1C goal*	Fasting or preprandial glucose	Bedtime glucose	Blood pressure	Lipids
Healthy (few coexisting chronic illnesses, intact cognitive and functional status)	Longer remaining life expectancy	<7.5% (58 mmol/mol)	90 to 130 mg/dL (5.0 to 7.2 mmol/L)	90 to 150 mg/dL (5.0 to 8.3 mmol/L)	<140/90 mmHg	Statin unless contraindicated or not tolerated
Complex/intermediate (multiple coexisting chronic illnesses¶ or 2+ instrumental ADL impairments or mild-to-moderate cognitive impairment)	Intermediate remaining life expectancy, high treatment burden, hypoglycemia vulnerability, fall risk	<8.0% (64 mmol/mol)	90 to 150 mg/dL (5.0 to 8.3 mmol/L)	100 to 180 mg/dL (5.6 to 10 mmol/L)	<140/90 mmHg	Statin unless contraindicated or not tolerated
Very complex/poor health (LTC or end-stage chronic illnesses$^{\Delta}$ or moderate-to-severe cognitive impairment or 2+ ADL dependencies)	Limited remaining life expectancy makes benefit uncertain	<8.5%$^{\diamond}$ (69 mmol/mol)	100 to 180 mg/dL (5.6 to 10 mmol/L)	110 to 200 mg/dL (6.1 to 11.1 mmol/L)	<150/90 mmHg	Consider likelihood of benefit with statin (secondary prevention more so than primary)

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

A1C: glycated hemoglobin; ADL: activities of daily living; LTC: long-term care.
* A lower A1C goal may be set for an individual if achievable without recurrent or severe hypoglycemia or undue treatment burden.
¶ Coexisting chronic illnesses are conditions serious enough to require medications or lifestyle management and may include arthritis, cancer, congestive heart failure, depression, emphysema, falls, hypertension, incontinence, stage 3 or worse chronic kidney disease, myocardial infarction, and stroke. By "multiple," we mean at least 3, but many patients may have 5 or more[2].
Δ The presence of a single end-stage chronic illness, such as stage 3-4 congestive heart failure or oxygen-dependent lung disease, chronic kidney disease requiring dialysis, or uncontrolled metastatic cancer, may cause significant symptoms or impairment of functional status and significantly reduce life expectancy.
◇ A1C of 8.5% (69 mmol/mol) equates to an estimated average glucose of approximately 200 mg/dL (11.1 mmol/L). Looser A1C targets above 8.5% (69 mmol/mol) are not recommended, as they may expose patients to more frequent higher glucose values and the acute risks from glycosuria, dehydration, hyperglycemic hyperosmolar syndrome, and poor wound healing.

Reference:
1. *Kirkman MS, Briscoe VJ, Clark N, et al. Diabetes in older adults. Diabetes Care 2012; 35:2650.*
2. *Laiteerapong N, Iveniuk J, John PM, et al. Classification of older adults who have diabetes by comorbid conditions, United States, 2005-2006. Prev Chronic Dis 2012; 9:E100.*
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Limitations of A1C measurements

Anemia

chronic kidney disease

recent transfusions and erythropoietin infusions

recent acute illness or hospitalizations

chronic liver diseases

glucose monitoring with fingersticks or continuous glucose monitoring (CGM), may be used

Avoiding hypoglycemia

poor outcomes such as:

adverse cardiovascular events

cardiac autonomic dysfunction

increased risk of dementia

increased risk of falls and fractures

Sulfonylurea, meglitinides and insulin should be used with caution

more neuroglycopenic manifestations (dizziness, weakness, delirium, confusion) compared with adrenergic manifestations (tremors, sweating)

Cardiovascular risk reduction

Smoking cessation

Treatment of hypertension

Treatment of dyslipidemia

Aspirin therapy (when tolerated)

Exercise

LIFESTYLE MODIFICATION

Physical activity

Functionally independent adults : 30 minutes of moderate-intensity aerobic activity at least five days per week

In sedentary individuals : walking inside the house five minutes, one to three times a day

Medical nutrition therapy

overweight older adults with high functional status :

caloric restriction

increase in physical activity,

weight loss goal of approximately 5 to 7 percent of body weight

Normal-weight older adults : regular diet with preferred food items may improve quality of life and prevent weight loss

Older patients with **severe comorbidities** and/or cognitive or functional disability :

spreading carbohydrates across the day

avoid strict dietary restrictions for such individuals

PHARMACOLOGIC THERAPY

Summary of glucose-lowering interventions

Intervention	Expected decrease in A1C with monotherapy (%)	Advantages	Disadvantages
Initial therapy			
Lifestyle change to decrease weight and increase activity	1.0 to 2.0	Broad benefits	Insufficient for most within first year owing to inadequate weight loss and weight regain
Metformin	1.0 to 2.0	Weight neutral	GI side effects, contraindicated with renal insufficiency (eGFR <30 mL/min/1.73 m^2)*
Additional therapy¶			
Insulin (usually with a single daily injection of intermediate- or long-acting insulin initially)	1.5 to 3.5	No dose limit, rapidly effective, improved lipid profile	1 to 4 injections daily, monitoring, weight gain, hypoglycemia, analogs are expensive
Sulfonylurea (shorter-acting agents preferred)	1.0 to 2.0	Rapidly effective	Weight gain, hypoglycemia (especially with glibenclamide or chlorpropamide)
GLP-1 receptor agonist (daily to weekly injections)	0.5 to 1.5	Weight loss, reduction in major adverse cardiovascular events (liraglutide, semaglutide, dulaglutide) in patients with established CVD and potentially for those at high risk for CVD	Requires injection, frequent GI side effects, expensive
Thiazolidinedione	0.5 to 1.4	Improved lipid profile (pioglitazone), potential decrease in MI (pioglitazone)	Fluid retention, HF, weight gain, bone fractures, potential increase in MI (rosiglitazone) and bladder cancer (pioglitazone)
Glinide	0.5 to 1.5Δ	Rapidly effective	Weight gain, 3 times/day dosing, hypoglycemia
SGLT2 inhibitor	0.5 to 0.7	Weight loss, reduction in systolic blood pressure, reduced cardiovascular mortality in patients with established CVD, improved renal outcomes in patients with nephropathy	Vulvovaginal candidiasis, urinary tract infections, bone fractures, lower limb amputations, DKA
DPP-4 inhibitor	0.5 to 0.8	Weight neutral	Possible increased risk of HF with saxagliptin, expensive
Alpha-glucosidase inhibitor	0.5 to 0.8	Weight neutral	Frequent GI side effects, 3 times/day dosing
Pramlintide	0.5 to 1.0	Weight loss	3 injections daily, frequent GI side effects, long-term safety not established, expensive

A1C: glycated hemoglobin; GI: gastrointestinal; eGFR: estimated glomerular filtration rate; GLP-1: glucagon-like peptide-1; CVD: cardiovascular disease; MI: myocardial infarction HF: heart failure; SGLT: sodium-glucose co-transporter 2; DKA: diabetic ketoacidosis; DPP-4: dipeptidyl peptidase 4.

Metformin

For most older adults as initial therapy

begin with 500 mg daily and increase the dose slowly to minimize gastrointestinal side effects

eGFR ≥45 mL/min/1.73 m : full dose

eGFR of 30 to 45 mL/min/1.73 m : 1000 mg per day

stop taking if become seriously ill or undergo a procedure requiring the use of iodinated contrast material

eGFR should be monitored every three to six months

Contraindications to metformin

eGFR reaches 30 mL/min/1.73 m or less

seriously ill

use of iodinated contrast material

unstable or acute heart failure

Choice of second drug

The choice of a second agent should be individualized based upon :

efficacy

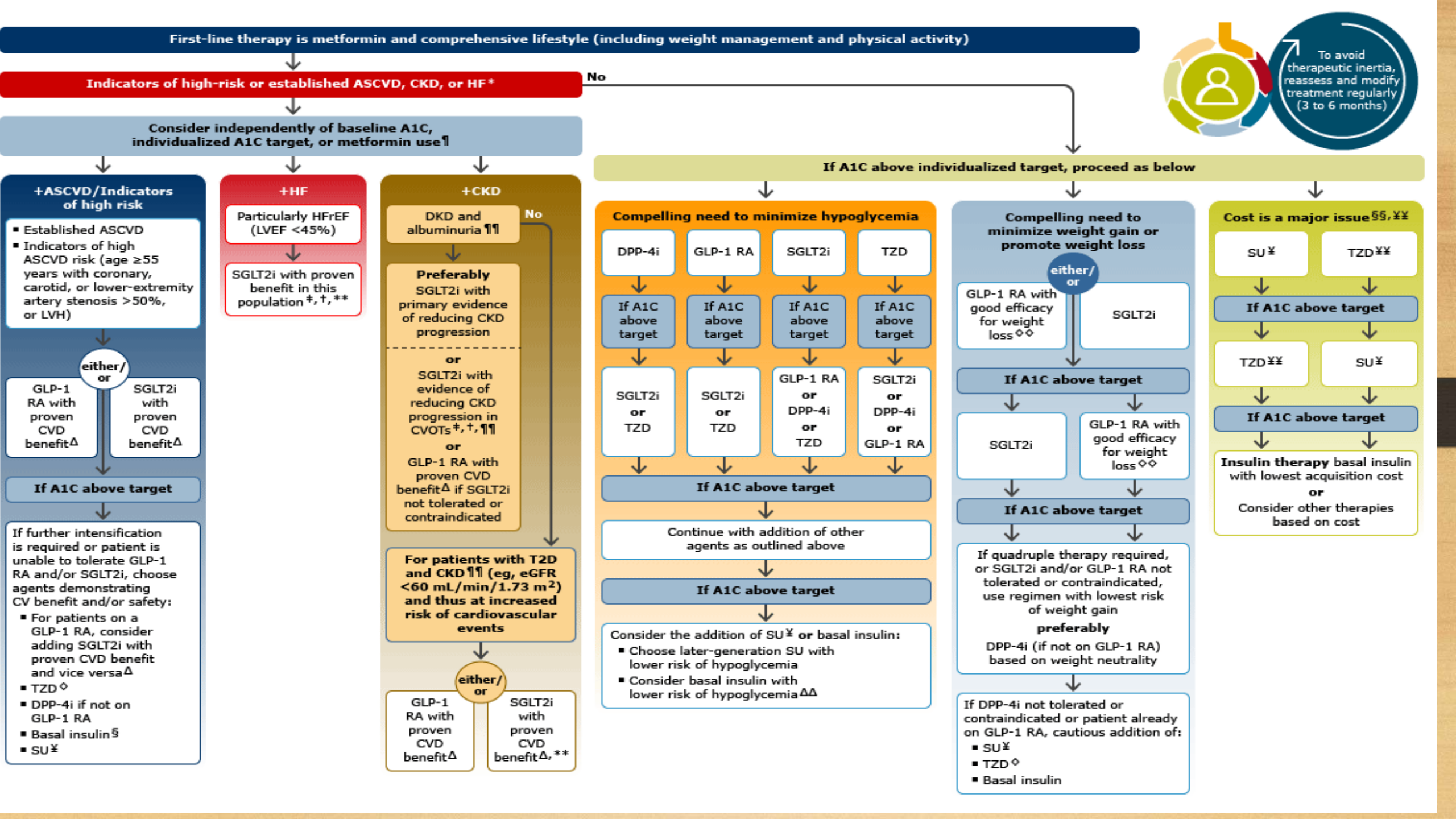
comorbidities

risk of hypoglycemia

impact on weight

side effects

cost


First-line therapy is metformin and comprehensive lifestyle (including weight management and physical activity)
To avoid therapeutic inertia, reassess and modify treatment regularly (3 to 6 months)
Indicators of high-risk or established ASCVD, CKD, or HF*
No
Consider independently of baseline A1C, individualized A1C target, or metformin use¶
If A1C above individualized target, proceed as below
+ASCVD/Indicators of high risk
Established ASCVD
Indicators of high ASCVD risk (age ≥55 years with coronary, carotid, or lower-extremity artery stenosis >50%, or LVH)
either/or
GLP-1 RA with proven CVD benefitΔ
SGLT2i with proven CVD benefitΔ
If A1C above target
If further intensification is required or patient is unable to tolerate GLP-1 RA and/or SGLT2i, choose agents demonstrating CV benefit and/or safety:
For patients on a GLP-1 RA, consider adding SGLT2i with proven CVD benefit and vice versaΔ
TZD◇
DPP-4i if not on GLP-1 RA
Basal insulin§
SU¥
+HF
Particularly HFrEF (LVEF <45%)
SGLT2i with proven benefit in this population‡,†,**
+CKD
DKD and albuminuria ¶¶
No
Preferably SGLT2i with primary evidence of reducing CKD progression
or
SGLT2i with evidence of reducing CKD progression in CVOTs‡,†,¶¶
or
GLP-1 RA with proven CVD benefitΔ if SGLT2i not tolerated or contraindicated
For patients with T2D and CKD¶¶ (eg, eGFR <60 mL/min/1.73 m²) and thus at increased risk of cardiovascular events
either/or
GLP-1 RA with proven CVD benefitΔ
SGLT2i with proven CVD benefitΔ,**
Compelling need to minimize hypoglycemia
DPP-4i
GLP-1 RA
SGLT2i
TZD
If A1C above target
SGLT2i or TZD
SGLT2i or TZD
GLP-1 RA or DPP-4i or TZD
SGLT2i or DPP-4i or GLP-1 RA
If A1C above target
Continue with addition of other agents as outlined above
If A1C above target
Consider the addition of SU¥ or basal insulin:
Choose later-generation SU with lower risk of hypoglycemia
Consider basal insulin with lower risk of hypoglycemiaΔΔ
Compelling need to minimize weight gain or promote weight loss
either/or
GLP-1 RA with good efficacy for weight loss◇◇
SGLT2i
If A1C above target
SGLT2i
GLP-1 RA with good efficacy for weight loss◇◇
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:
SU¥
TZD◇
Basal insulin
Cost is a major issue§§,¥¥
SU¥
TZD¥¥
If A1C above target
TZD¥¥
SU¥
If A1C above target
Insulin therapy basal insulin with lowest acquisition cost
or
Consider other therapies based on cost

Severe or symptomatic hyperglycemia

Insulin is often preferred in those with A1C >9 percent

once-daily basal insulin lower risk of hypoglycemia compared with regimens using multiple insulin doses

start with long-acting insulin (10 units or 0.2 units per kg) in the morning

adjusted once weekly

carefully titrated to avoid hypoglycemia

less insulin is needed when the glomerular filtration rate (GFR) is below 50 mL/min/1.73 m

History of cardiorenal disease

(SGLT2) inhibitors and (GLP-1) receptor agonists

low risk of hypoglycemia

avoid SGLT2 inhibitors :

in frequent bacterial urinary tract infections or genitourinary yeast infections, low bone density and high risk for falls and fractures

foot ulceration

factors predisposing to diabetic ketoacidosis

Avoidance of hypoglycemia

GLP-1 receptor agonists

SGLT2 inhibitors

(DPP-4) inhibitors; weak agents

Avoidance of weight gain

GLP-1 receptor agonists

SGLT2 inhibitors; dehydration, falls, fractures may outweigh the benefits in the absence of cardiovascular disease

DPP-4 inhibitors

Cost concerns

short- or intermediate-acting **sulfonylurea** with a relatively lower rate of hypoglycemia :

Glipizide

Glimepiride

Gliclazide

It is best to **avoid** the use of **long-acting** sulfonylureas (glyburide)

after exercise or missed meals

alcohol abuse

impaired kidney or cardiac function

gastrointestinal disease

During therapy with salicylates, sulfonamides, gemfibrozil and warfarin

being in the hospital

Pioglitazone is inexpensive : tend not to use pioglitazone in older adults :

risks of fluid retention; weight gain

increased risks of heart failure

macular edema

osteoporotic fracture

Dual agent failure

starting insulin therapy; sulfonylureas are discontinued

two oral agents and a GLP-1 receptor agonist

Polypharmacy

medication list should be reviewed at each visit

MONITORING OF GLYCEMIA

Glycated hemoglobin **(A1C)** :

twice yearly in whom are meeting treatment goals

quarterly in patients who are not meeting their glycemic goals

Self-monitoring of blood glucose **(SMBG) :**

who take **medications** that can cause **hypoglycemia**

treated with **complex insulin regimens**

who would take action to **modify eating patterns or exercise**

SCREENING FOR MICROVASCULAR COMPLICATIONS

Monitoring in patients with diabetes mellitus

Intervention	Frequency	Notes
History and physical examination		
Height, weight, and BMI	Every visit	
Smoking cessation counseling	Every visit	For smokers only.
Blood pressure	Every visit	Goal systolic pressure 125 to 130 mmHg.*
Dilated eye examination	Annually¶	Begin at onset of type 2 diabetes, 3 to 5 years after onset of type 1 diabetes. Examine yearly (or more frequently) if retinopathy present, every 2 to 3 years if there is no evidence of retinopathy.
Comprehensive foot examination	Annually	Every visit if peripheral vascular disease or neuropathy.
Dental examination	Annually	Periodontal disease is more severe but not necessarily more prevalent in patients with diabetes.
Laboratory studies		
Lipid profile	Initially, as indicated	In people without dyslipidemia and not on cholesterol-lowering therapy, testing may be infrequent.
A1C	Every 3 to 6 months	Goal ≤7% (may be lower or higher in selected patients).
Urinary albumin-to-creatinine ratio	Annually	Begin 3 to 5 years after onset of type 1 diabetes and at diagnosis in patients with type 2 diabetes; protein excretion should also be monitored if persistent albuminuria is present.
Serum creatinine	Initially, as indicated	Typically annually; more often in the presence of chronic kidney disease.
Vaccinations		
Pneumococcus		
▪ PPSV23	1 dose, ages 19 to 64 years	Once the patient is ≥65 years (and ≥1 year after PCV13 and >5 years after previous dose of PPSV23), give a second dose of PPSV23. Revaccinate every 10 years.
▪ PCV13	1 dose at age ≥65 years	Once the patient is ≥65 years (and ≥1 year after PPSV23), give PCV13.
Influenza	Annually	
Hepatitis B	3-dose series	Administer to unvaccinated adults who are ages 19 to 59 years. For older patients, administer based upon risk of acquiring hepatitis B, including the need for assisted blood glucose monitoring and the likelihood of an adequate immune response to vaccination.
Provide other routine vaccinations for adults with diabetes according to age-related recommendations.		
Education, self-management review		
	Annually	More often at onset of diabetes and when there is a change in regimen.

BMI: body mass index; A1C: glycated hemoglobin.
* When manual auscultatory method is used to measure blood pressure.
¶ Less frequent screening (every 2 to 3 years) may be appropriate for some patients (eg, patients with little or no retinopathy and near-normal A1C levels).

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THANKS FOR YOUR ATTENTION