2015 American Diabetes Association (ADA) Diabetes Guidelines Summary Recommendations from NDEI

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1. Diabetes Diagnosis

Criteria for Diabetes Diagnosis: 4 options
A1C ≥6.5%*   Perform in lab using NGSP-certified method and standardized to DCCT assay
FPG ≥126 mg/dL (7.0 mmol/L)*   Fasting defined as no caloric intake for ≥8 hrs
2-hr PG ≥200 mg/dL (11.1 mmol/L) during OGTT (75-g)*   Performed as described by the WHO, using glucose load containing the equlivalent of 75g anhydrous glucose dissolved in water
Random PG ≥200 mg/dL (11.1 mmol/L)   In persons with symptoms of hyperglycemia or hyperglycemic crisis
*In the absence of unequivocal hyperglycemia results should be confirmed using repeat testing
• Unless clinical diagnosis is clear, same test to be repeated using a new blood sample for confirmation   • 2 discordant results? Result above cutpoint should be repeated

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Testing for Type 2 Diabetes and Prediabetes in Asymptomatic Adults

Type 2 diabetes testing should be done in all adults who are overweight or obese (BMI ≥25 or ≥23 in Asian Americans) who have ≥1 diabetes risk factor (*see box*):

Diabetes Risk Factors

- Physical inactivity
- First-degree relative with diabetes
- High-risk race/ethnicity
- Women who delivered a baby >9 lb or were diagnosed with GDM
- HDL-C <35 mg/dL ± TG >250 mg/dL
- Hypertension (≥140/90 mm Hg or on therapy)
- A1C ≥5.7%, IGT, or IFG on previous testing
- Conditions associated with insulin resistance: severe obesity, acanthosis nigricans, PCOS
- CVD history

Testing should begin at age 45, especially if the individual is overweight or obese

If normal results: repeat testing in ≥3-yr intervals

Prediabetes testing can be done using A1C, FPG, or 2-h PG after 75-g OGTT.

Identify and treat (if appropriate) other CVD risk factors

Prediabetes testing should be considered in children and adolescents who are overweight/obese and have ≥2 diabetes risk factors (*see box above*)

Frequency of A1C Testing	
Perform A1C test	
At least *2 times each year* in individuals who are meeting treatment targets and have stable glycemic control	*Quarterly* in individuals whose therapy has changed or who are not meeting glycemic targets
Point-of-care A1C testing allows for more timely treatment changes	

BMI=body mass index; CVD=cardiovascular diseaseDCCT=Diabetes Control and Complications Trial; FPG=fasting plasma glucose; GDM=gestational diabetes mellitus; HDL-C=high-density lipoprotein cholesterol; IFG=impaired fasting glucose; IGT=impaired glucose tolerance; NGSP=national glycohemoglobin standardization program; OGTT=oral glucose tolerance test; PCOS=polycystic ovarian syndrome; PG=plasma glucose; TG=triglycerides; WHO=World Health Organization

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Visit NDEI.org for interactive summary recommendations & downloadable slides on the ADA 2015 guidelines.

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2. Glycemic Targets

Glycemic Targets for Nonpregnant Adults With Diabetes	
A1C	<7.0% Lowering A1C below or around 7.0% has been shown to reduce: • Microvascular complications • Macrovascular disease*
Preprandial capillary PG	80-130 mg/dL (4.1-7.2 mmol/L)
Peak postprandial capillary PG	<180 mg/dL (<10.0 mmol/L) Postprandial glucose measurements should be made 1-2 hours after the beginning of the meal
Individualize targets based on:	• Age/life expectancy • Comorbid conditions • Diabetes duration • Hypoglycemia status • Individual patient considerations • Known CVD/advanced microvascular complications
More or less stringent targets may be appropriate if can be achieved without significant hypoglycemia or adverse events	
<u>More stringent target (<6.5%)</u>	**<u>Less stringent target (<8%)</u>**

• Short diabetes duration • Long life expectancy • No significant CVD/vascular complications	• Severe hypoglycemia history • Limited life expectancy • Advanced microvascular or macrovascular complications • Extensive comorbidities • Long-term diabetes in whom general A1C target difficult to attain
Targets shown are for nonpregnant adults *If implemented soon after diagnosis	

Managing Hypoglycemia	
At-risk individuals	Ask about symptomatic and asymptomatic hypoglycemia at each encounter
Preferred treatment: glucose (15-20 g)* • After 15 mins of treatment, repeat if SMBG shows continued hypoglycemia • When SMBG is normal, patient should consume meal or snack to prevent hypoglycemia recurrence	
Hypoglycemia unawareness or episode of severe hypoglycemia	• Reevaluate treatment regimen • Insulin-treated patients: raise glycemic targets for several weeks to partially reverse hypoglycemia unawareness and reduce recurrence
Low or declining cognition	Continually assess cognitive function with increased vigilance for hypoglycemia
*Any form of glucose-containing carbohydrate can be used	

CVD=cardiovascular disease; PG=plasma glucose; SMBG=self-monitoring of blood glucose

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3. Strategies for Preventing or Delaying Type 2 Diabetes

Prevention/Delay of Type 2 Diabetes	
Patients with IGT, IFG, or A1C 5.7%-6.4%	Refer to intensive and diet and physical activity (lifestyle) behavior counseling • Weight loss (7% of body weight) • Increased physical activity (≥150 min/week moderate activity)
Consider metformin therapy for type 2 diabetes prevention in patients with IGT, IFG, or A1C 5.7%-6.4%	Especially in the presence of: • BMI >35 kg/m^2 • Age <60 years • Women with prior GDM
Annual monitoring of individuals with prediabetes	
Screening for and treatment of modifiable CVD risk factors (obesity, hypertension, and dyslipidemia) suggested	
DSME and DSMS are appropriate for prediabetes to receive education and support to develop and maintain behaviors that can prevent and delay type 2 diabetes	

Diabetes Self-Management Education and Support
Provide at diabetes diagnosis and as needed thereafter
Measure and monitor effectiveness of self-management and quality of life as part of overall care
Programs should: • Address psychosocial issues • Provide education and support to persons with prediabetes to encourage behaviors that may prevent or delay diabetes onset

BMI=body mass index; CVD=cardiovascular disease; DSME=diabetes self-management education; DSMS=diabetes self-management education and support; IFG=impaired fasting glucose; IGT=impaired glucose tolerance

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4. Pharmacologic Therapy for Type 2 Diabetes

Medications for Hyperglycemia in Type 2 Diabetes	
Metformin	Preferred initial therapy (if tolerated and not contraindicated) when lifestyle changes alone have not achieved or maintained glycemic goals
Consider insulin therapy with or without other agents	At outset in newly diagnosed patients with markedly symptomatic and/or elevated blood glucose levels or A1C
Add 2nd oral agent, GLP-1 receptor agonist, or insulin	If noninsulin monotherapy at maximal tolerated dose does not achieve or maintain A1C target over 3 months
Choice of pharmacologic therapy should be based on patient-centered approach, considering • Efficacy • Cost • Potential side effects • Effects on weight • Comorbidities • Hypoglycemia risk • Patient preferences	
Insulin is eventually needed for many patients due to the progressive nature of type 2 diabetes	

Bariatric Surgery in Type 2 Diabetes	
Consider for adults with BMI >35 kg/m^2	In particular, if diabetes or associated comorbidities are difficult to control with lifestyle and pharmacologic therapy
Lifelong lifestyle support and medical monitoring are necessary post-surgery	
Insufficient evidence to recommend surgery with BMI <35 kg/m^2 outside of a research protocol	
<u>Advantages</u> • Achieves near or complete normalization of glycemia 2 years after surgery • Youth, shorter diabetes duration, lower A1C, higher insulin levels lead to higher post-surgery type 2 diabetes remission rates	<u>Disadvantages</u> • Costly • Variable outcomes depending on procedure • Long term vitamin/mineral deficiencies • Osteoporosis • Severe hypoglycemia from insulin

BMI=body mass index; GLP-1=glucagon-like peptide-1

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5. Pharmacologic Therapy for Type 1 Diabetes

<table>
<tr><th colspan="2">Insulin Therapy Is Recommended for Most Individuals With Type 1 Diabetes</th></tr>
<tr><td colspan="2">• Treat with multiple-dose insulin injections (3-4 injections/day of basal and prandial insulin) or continuous subcutaneous insulin infusion
• Match prandial insulin dose to carbohydrate intake, premeal blood glucose, and anticipated activity
• Use insulin analogs to reduce risk of hypoglycemia
• Consider using sensor-augmented low glucose suspend threshold pump in patients with frequent nocturnal hypoglycemia and/or hypoglycemia unawareness</td></tr>
<tr><td><u>Other Agents</u>
Pramlinitide (amylin analog)

• Delays gastric emptying
• Blunts pancreatic secretion of glucagon
• Enhances satiety
• Induces weight loss
• Lowers insulin dose
• Use only in adults</td><td><u>Investigational Agents</u>
Metformin + insulin

• Reduces insulin requirements and improves metabolic control in obese/overweight subjects with poor glycemic control

Incretins

• GLP-1 receptor agonists
• DPP-4 inhibitors

SGLT-2 inhibitors</td></tr>
</table>

Type 1 Diabetes Screening
Inform individuals with type 1 diabetes of the opportunity to have relatives screened for risk of type 1 diabetes in the clinical research setting • Early diagnosis may limit complications, extend long-term endogenous insulin productio
Widespread testing of asymptomatic low-risk persons: not recommended
Screen high-risk persons only in clinical research setting

DPP-4=dipeptidyl peptidase-4; GLP-1=glucagon-like peptide-1; SGLT2=sodium glucose co-transporter 2

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6. Insulin & Glucose Monitoring

Self-Monitoring of Blood Glucose (SMBG)
Encourage for patients receiving multiple dose insulin or insulin pump therapy: • Prior to meals and snacks • Occasionally postprandially • At bedtime • Prior to exercise • When low blood glucose is suspected • After treating low blood glucose until normoglycemic • Prior to critical tasks (eg, driving)
Results may be useful for guiding treatment and/or self-management for patients using less frequent insulin injections or noninsulin therapies • Provide ongoing instruction and regular evaluation of SMBG technique and results and patient's ability to use data to adjust therapy

Continuous Glucose Monitoring (CGM)	
Useful for A1C lowering in select adults (aged ≥25 yrs) with type 1 diabetes requiring intensive insulin regimens • May be useful among children, teens, and younger adults* • Success related to adherence to ongoing use	
May be a useful supplement to SMBG among patients with • Hypoglycemia unawareness and/or • Frequent hypoglycemic episodes	
Variable adherence to CGM?	• Assess individual readiness for continuing prior to prescribing • Robust diabetes education, training, and support critical for optimal CGM implementation
*Evidence for A1C lowering less strong in these populations	

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7. Lifestyle Changes

Medical Nutrition Therapy (MNT)
The ADA acknowledges that there is no one-size-fits-all eating pattern for individuals with type 2 diabetes Medical nutrition therapy is recommended for all patients with type 1 and type 2 diabetes as part of an overall treatment plan, preferably provided by a registered dietition skilled in diabetes MNT
Goals of MNT: • Healthful eating pattern to improve overall health • Attain individualized glycemic, BP, and lipid goals • Achieve and maintain body weight goals • Delay or prevent diabetes complications

Physical Activity
Adults with diabetes
Exercise programs should include • ≥150 min/wk moderate-intensity aerobic activity (50%-70% max heart rate), spread over ≥3 days/wk with no more than 2 consecutive days without exercise • Resistance training ≥2 times/wk (in absence of contraindications)*

• Reduce sedentary time = break up >90 minutes spent sitting
Evaluate patients for contraindications prohibiting certain types of exercise before recommending exercise program[†]
Consider age and previous level of physical activity
Children with diabetes or prediabetes
≥60 min physical activity/day
*Adults with type 2 diabetes [†]Eg, uncontrolled hypertension, severe autonomic or peripheral neuropathy, history of foot lesions, unstable proliferative retinopathy

Physical Activity In Patients With Nonoptimal Glycemic Control	
Hyperglycemia	
Avoid vigorous activity with ketosis	When individuals with type 1 diabetes are deprived of insulin for 12-28 hours and are ketotic, exercise can worsen hyperglycemia and ketosis
Hypoglycemia	
If taking insulin secretagogues, physical activity can cause hypoglycemia if medication dose or carb consumption is not altered	Added carbohydrates should be ingested when pre-exercise glucose is <100 mg/dL (5.6 mmol/L)

Physical Activity Considerations for Patients With Diabetes Complications	
Retinopathy	
If proliferative diabetic retinopathy or severe nonproliferative diabetic retinopathy present	Vigorous aerobic or resistance exercise may be contraindicated
Peripheral Neuropathy	
Decreased pain sensation and a higher pain threshold in the extremities cause increased risk of skin breakdown	All individuals with neuropathy should wear proper footwear and examine feet daily for lesions Foot injury or open sore: restricted to non-weight-bearing activity
Autonomic Neuropathy	

Physical activity can acutely increase urinary protein excretion	No evidence that vigorous exercise increases rate of progression of diabetic kidney disease Exercise restrictions not required

Smoking Cessation
Advise patients with diabetes not to smoke or use tobacco products
Counsel on smoking prevention and cessation as part of routine care
Assess level of nicotine dependence
Offer pharmacologic therapy as appropriate • Adding pharmacologic therapy to counseling is more effective than either treatment alone
No evidence that e-cigarettes are a healthy alternative to smoking • Nor can they facilitate smoking cessation

BP=blood pressure

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8. Cardiovascular Disease (CVD) & Diabetes

Management of Blood Pressure (Hypertension)	
Screening	Measure BP at every visit; confirm elevated BP at separate visit
Treatment targets	Diabetes and hypertension: SBP <140 mm Hg • Lower SBP targets (eg, <130 mm Hg) may be appropriate in certain individuals if can be achieved without treatment burden Diabetes: DBP <90 mm Hg • Lower DBP (eg, 80 mm Hg) may be appropriate in certain individuals if can be achieved without treatment burden
Treatment	BP >120/80 mm Hg: lifestyle changes • Weight loss (if overweight) • DASH-style diet including sodium restriction and potassium increase • Moderate alcohol intake • Increased physical activity

	BP >140/90 mm Hg: lifestyle changes + pharmacologic therapy • Diabetes and hypertension: ACEI or ARB* • ≥2 agents at max doses, including thiazide-type diuretic, ACEI, or ARB, usually required to achieve targets • Administer ≥1 agent at bedtime • ACEI, ARB, diuretic: monitor serum creatinine/eGFR and serum potassium
Treatment and targets for pregnant women	Diabetes and hypertension: 110-129/65-79 mm Hg target ACEI, ARB contraindicated
*If one class not tolerated, substitute other class	

Management of Lipids (Dyslipidemia)			
Treatment initiation and initial dose driven by risk status—not LDL-C level			
Age	**Risk factors**	**Statin intensity**	**Monitoring**
<40	0 CVD risk factors Overt CVD	N/A Moderate or high High	Annually or as needed to check adherence
40-75	0 CVD risk factors Overt CVD	N/A Moderate or high High	As needed to check adherence
>75	0 CVD risk factors Overt CVD	N/A Moderate or high High	As needed to check adherence
Screening at diabetes diagnosis, initial medical evaluation, and/or at age 40 Every 1-2 years thereafter			
CVD risk factors: LDL-C ≥100 mg/dL (2.6 mmol/L), high blood pressure, smoking, overweight/obesity Overt CVD: Invidivuals with prior cardiovascular events or acute coronary syndrome At time of publication, combination therapy (statin + non-statin) for lipid lowering was not shown to provide incremental			

CVD benefit. Results from IMPROVE-IT[1] have since shown a 2% CV risk reduction with ezetimibe/statin vs statin alone.

1. Cannon CP, et al. Presented at the American Heart Association Scientific Sessions 2014; Chicago, Illinois.

Antiplatelet Therapy	
Aspirin: Primary prevention	75-162 mg/day: type 1 and type 2 diabetes at increased CVD risk (10-yr risk >10%)*
	Low-risk patients (10-yr risk <5%):† not recommended; potential for bleeds likely offsets potential benefits
	Men <50 yrs, women <60 yrs with multiple other risk factors (10-yr risk 5%-10%): use clinical judgment
Aspirin: Secondary prevention	75-162 mg/day: diabetes and CVD history
CVD and aspirin allergy	Clopidogrel 75 mg/day
Dual antiplatelet therapy	Reasonable for ≤1 year after ACS

*Includes most men aged >50 yrs or women aged >60 yrs with ≥1 add'l major risk factor: family history of CVD, hypertension, smoking, dyslipidemia, or albuminuria
†Men aged <50 yrs and women aged >60 yrs with no major additional CVD risk factors

CVD Screening and Treatment	
Screening	Routine CAD screening in asymptomatic patients not recommended • Does not improve outcomes as long as CVD risk factors are treated
Treatment	Lifestyle • Focus on weight loss (decreased calorie intake, increased physical activity • Improves glycemic control, fitness, some CVD risk factors
	Overt CVD: consider ACEI, and use aspirin and statin to reduce CV event risk If hypertensive with overt CVD: Aspirin, statin, ACEI or ARB unless contraindications
	Prior MI: continue use of beta-blockers for ≥2 yrs after event
	Symptomatic heart failure: avoid TZDs

	Metformin • Stable heart failure: may use metformin in presence of normal renal function • Avoid metformin in unstable or hospitalized heart failure patients

ACEI=angiotensin-converting enzyme inhibitor; ACS=acute coronary syndrome; ARB=angiotensin receptor blocker; BP=blood pressure; CAD=coronary artery disease; CVD=cardiovascular disease; DASH=Dietary Approaches to Stop Hypertension; DBP=diastolic blood pressure; eGFR=estimated glomerular filtration rate; LDL-C=low-density lipoprotein cholesterol; MI=myocardial infarction; SBP=systolic blood pressure; TZDs=thiazolidinediones

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9. Microvascular Complications & Foot Care

Nephropathy Screening and Treatment	
Optimize glucose and BP control to reduce the risk for or slow the progression of nephropathy	
Screening	Annually measure urine albumin excretion in type 1 patients with ≥5-yr diabetes duration, and all type 2 patients starting at diagnosis
Treatment	
Normal BP and albumin excretion <30 mg/g	ACEI or ARB for primary prevention of kidney disease not recommended
Nonpregnant with modest elevations (30-299 mg/24 h) or higher levels (≥300 mg/24 h) of urinary albumin excretion	Use ACEI or ARB (*but not in combination*)
When using ACEI, ARB, diuretic	Monitor creatinine and potassium levels
Monitor urine albumin excretion continually to assess therapeutic response and disease progression	
If eGFR <60 mL/min/1.73 m^2	Evaluate and manage CKD complications
Consider specialist referral	Conditions of uncertainty regarding kidney disease etiology, difficult management issues, advanced kidney disease
Avoid combined use of different inhibitors of the renin-angiotensin system (RAS)	

Retinopathy Screening and Treatment	
Optimize glucose and BP control to reduce the risk for or slow the progression of retinopathy	
Screening	Initial dilated and comprehensive eye exam by an ophthalmologist or optometrist • Adults with type 1 diabetes: within 5 yrs after diabetes onset • Patients with type 2 diabetes: shortly after diagnosis
	• If no retinopathy for ≥1 eye exam: consider exams every 2 yrs • If retinopathy: annual exam • Retinopathy progressing or sight threatening: more frequent exams
	Fundus photographs should be considered a screening tool, not a substitute for comprehensive exam
	Pregnant women or women planning pregnancy with preexisting diabetes • Retinopathy counseling, eye exam in first trimester • Close follow-up throughout pregnancy and 1 yr postpartum
Treatment	
Macular edema, severe NPDR, any PDR	Refer to ophthalmologist specializing in retinopathy
Laser photocoagulation therapy	Indicated to reduce risk of vision loss for high-risk PDR, clinically significant macular edema, some cases of severe NPDR
Anti-VEGF therapy	Indicated for diabetic macular edema
Retinopathy not a contraindication to aspirin therapy for cardioprotection	

Neuropathy Screening and Treatment	
Screening	Screen all patients for distal symmetric polyneuropathy • Type 2 diabetes: at diagnosis • Type 1 diabetes: 5 yrs after diagnosis and at least annually thereafter •
	• Consider screening for signs/symptoms of cardiovascular autonomic neuropathy (CAN) with advanced disease
	Screening for cardiovascular autonomic neuropathy Type 2 diabetes: at diagnosis Type 1 diabetes: 5 yrs after diagnosis
	• Tight glycemic control is the only method shown to prevent or delay the development of DPN and CAN in type 1, and to slow neuropathy progression in type 2
Treatment	Assess and treat to reduce DPN-related pain and symptoms of autonomic neuropathy

Foot Care	
All individuals with diabetes	• Annual foot exam to identify risk factors predictive of ulcers and amputations • Assessment of foot pulses, loss of protective sensation (LOPS) testing • Provide foot self-care education

Patients with foot ulcers, high-risk feet (previous ulcer or amputation)	Use multidisciplinary approach
All individuals with insensate feet, foot deformities, or history of foot ulcers	Examine feet every visit
Refer to foot care specialist	• People who smoke • LOPS and structural abnormalities • History of prior lower-extremity complications
Include in initial PAD screening	• History for claudication and assessment of pedal pulses • Obtain ankle-brachial index (ABI)
Refer for further vascular assessment	• Patients with positive ABI, significant claudication • Consider exercise, medications, surgical options

ACEI=angiotensin-converting enzyme inhibitor; BP=blood pressure; ARB=angiotensin receptor blocker; CKD=chronic kidney disease; DPN=diabetic peripheral neuropathy; eGFR=estimated glomerular filtration rate; NDPR=nonproliferative diabetic retinopathy; PAD=peripheral artery disease; PDR=proliferative diabetic retinopathy; VEGF=vascular endothelia growth factor

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10. Diabetes in Pregnancy (Gestational Diabetes—GDM)

Managing Diabetes in Pregnancy	
Maintain A1C levels as close to <7.0% as possible before attempting conception	
All women of childbearing potential	Provide preconception counseling starting at puberty
Evaluate and treat (if necessary) in women contemplating pregnancy	• Retinopathy • Nephropathy • Neuropathy • CVD
Avoid teratogenic medications in sexually active women of child-bearing potential	Contraindicated/not recommended in pregnancy • Statins • ACEIs • ARBs • Most noninsulin therapies
Manage GDM first with lifestyle	• Medications added as needed
Baseline opthalmology exam in first trimester in women with pregestational diabetes	• Monitor every trimester as needed by degree

	of retinopathy
A1C target in pregnancy is <6.0%	• If can be achieved without significant hypoglycemia
GDM may indicate undiagnosed type 2 diabetes	• Screen DM for persistent diabetes or prediabetes at 6-12 wks postpartum, and every 1-3 yrs thereafter

Screening Gestational Diabetes	
Pregnant women with risk factors	Screen for undiagnosed type 2 diabetes at first prenatal visit
Pregnant women without known prior diabetes	Screen at 24-28 wks
Women with GDM	Screen for persistent diabetes 6-12 wks postpartum using OGTT and nonpregnancy diagnostic criteria
Women with GDM history	Screen for diabetes or prediabetes every ≥3 yrs
Women with GDM history and prediabetes	Lifestyle interventions or metformin for diabetes prevention

Strategies for Diagnosing Gestational Diabetes	
No uniform approach for GDM diagnosis Two options for women not previously diagnosed with overt diabetes:	
"One-Step" Strategy • 75-g OGTT with PG measurement fasting and at 1 h and 2 h, at 24-28 wks in women not previously diagnosed with overt diabetes • Perform OGTT in the morning after overnight fast (≥8 h) • GDM diagnosis made if PG values meet or exceed: • Fasting: 92 mg/dL (5.1 mmol/L)	**"Two-Step" Strategy** • 50-g GLT (nonfasting) with PG measurement at 1 h (Step 1), at 24-28 wks in women not previously diagnosed with overt diabetes • If PG at 1 h after load is ≥140 mg/dL (7.8 mmol/L), proceed to 100-g OGTT (Step 2), performed while patient is fasting • GDM diagnosis made when two or more PG levels meet or exceed:

• 1 h: 180 mg/dL (10.0 mmol/L) • 2 h: 153 mg/dL (8.5 mmol/L)	• Fasting: 95 mg/dL or 105 mg/dL (5.3/5.8) • 1 hr: 180 mg/dL or 190 mg/dL (10.0/10.6) • 2 hr: 155 mg/dL or 165 mg/dL (8.6/9.2) • 3 hr: 140 mg/dL or 145 mg/dL (7.8/8.0)

Glycemic Targets in Pregnancy	
GDM targets for women without preexisting type 1 or 2 diabetes	**Targets for women with preexisting type 1 or 2 who become pregnant**
Preprandial: ≤95 mg/dL (5.3 mmol/L) *and either*	Premeal, bedtime, overnight glucose: 60-99 mg/dL (3.3-5.4 mmol/L)
1-hr postmeal: ≤140 mg/dL (7.8 mmol/L)	Peak postprandial glucose: 100-129 mg/dL (5.4-7.1 mmol/L)
2-hr postmeal: ≤120 mg/dL (6.7 mmol/)	A1C: <6.0%

Insulin Use During Pregnancy
Insulin is the preferred medication • Noninsulin medications lack long-term safety data
Insulin management during pregnancy is complex • Requires frequent titration to match changing requirements • Referral to specialized center recommended
Most insulins are category B; glargine and glulisine are category C

Managing Hypertension During Pregnancy	
Target BP	• SBP: 110-129 mm Hg • DBP: 65-79 mm Hg
ACEIs and ARBs are contraindicated	
Safe antihypertensive medications: • Methyldopa • Labetalol • Diltiazem • Clonidine • Prazosin	

ACEI=angiotensin-converting enzyme inhibitor; ARB=angiotensin receptor blocker; BP=blood pressure; CVD=cardiovascular disease; DBP=diastolic blood pressure; GDM=gestational diabetes mellitus; GLT=glucose loading test; OGTT=oral glucose tolerance test; PG=plasma glucose; SBP=systolic blood pressure

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11. Management of In-Patient Glycemia

Treatment for Hospitalized Patients With Diabetes
Insulin is the preferred method of glycemic control • Sliding scale insulin (SSI) is strongly discouraged in the hospital setting as the sole method of treatment
ICU, intravenous insulin is the preferred route of administration
Outside of critical care units: • Basal-bolus regimen for individuals with good nutritional intake • Basal plus correction insulin regimen for individuals with poor oral intake or who are not taking anything by mouth (NPO)

Glycemic Targets for Critically Ill Patients With Diabetes
Insulin is the preferred method for glycemic control
Persistent hyperglycemia: • Initiate insulin starting at ≤180 mg/dL (≤10.0 mmol/L) • Once insulin started, 140-180 mg/dL (7.8-10.0 mmol/L) recommended glucose range for most patients
More stringent targets may be appropriate for certain patients providing it can be achieved without increasing hypoglycemia risk • 110-140 mg/dL (6.1-7.8 mmol/L)
IV insulin protocol with demonstrated efficacy and safety in achieving targets with no increased hypoglycemia risk

Glycemic Targets for Non-Critically Ill Patients With Diabetes
Insulin is the preferred method for glycemic control
Insulin-treated: premeal target <140 mg/dL (<7.8 mmol/L) with random blood glucose <180 mg/dL (<10.0 mmol/L)
More or less stringent targets may be appropriate • More stringent: stable patients with previous tight glycemic control • Less stringent: severe comorbidities
Basal plus correction insulin regimen is preferred for patients with poor oral intake or who are taking nothing by mouth (NPO) • Good nutritional intake: basal-bolus regimen
Hypoglycemia management protocol is critical

• Document and track each episode
Obtain A1C in patients with diabetes admitted to the hospital if result of testing in prior 3 months is unavailable
Patients with hyperglycemia in the hospital who do not have prior diabetes diagnosis: appropriate follow-up testing and care documented at discharge

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2015 American Diabetes Association (ADA) Diabetes Guidelines Summary Recommendations from NDEI

Source: American Diabetes Association. Standards of medical care in diabetes—2015. *Diabetes Care*. 2015;38(suppl 1):S1-S93.
Refer to source document for full recommendations, including level of evidence rating.

12. Diabetes Care in Older Adults

Diabetes Care in Older Adults	
Older adults who are • Functional • Cognitively intact • Expected to live long enough to reap benefits	Same treatment goals as younger adults
Glycemic targets may be relaxed for some older adults based on individual criteria (eg, advanced complications, life-limiting comorbidities, cognitive or functional impairment) • Avoid hyperglycemic complications	
Treat cardiovascular risk factors considering: • Timeframe of benefit and individual patient characteristics • Hypertension treatment indicated in many older adults • Lipid and aspirin therapy may benefit patients whose life expectancy is equal to the timeframe of primary- or secondary-prevention trials	
Individualize screening for complications	

• Be mindful of complications that may lead to functional impairment
Age ≥65 is a high-priority poulation for depression screening and treatment

Pharmacologic Therapy for Older Adults With Diabetes	
Cost may be a significant factor due to polypharmacy	
• Metformin may be contraindicated due to renal insufficiency or significant heart failure	
Thiazolidinediones (TZDs)	• Use cautiously in individuals with, or at risk for, heart failure • Associated with fracture risk
• Sulfonylureas Insulin Insulin secretagogues	Can cause hypoglycemia
Insulin requires that patients or caregivers have good visual and motor skills and cognitive ability	
GLP-1 receptor agonists DPP-4 inhibitors	• Few side effects • Cost may be a barrier • DPP-4: may increase hospitalization for heart failure (saxagliptin)[1] 1. Scirica BM, et al. *N Engl J Med*. 2013;369:1317-1326.

DPP-4=dipeptidyl peptidase-4; GLP-1=glucagon-like peptide-1

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13. Children & Adolescents With Diabetes

Screening Children for Type 2 Diabetes and Prediabetes
Consider for all children who are overweight* and have ≥2 of the following risk factors:
• Family history of type 2 diabetes in first- or second-degree relative • Native American, African American, Larino, Asian American, or Pacific Islander • Signs of insulin resistance or conditions associated with insulin resistance† • Maternal history of diabetes or GDM during child's gestation
• Begin testing at age 10 yrs or onset of puberty
• Test every 3 yrs using A1C beginning at age 10 or puberty onset
Children: age ≤18 yrs *BMI >85th percentile for age and sex, weight for height >85th percentile, or weight >120% ideal for height †Acanthosis nigricans, hypertension, dyslipidemia, PCOS, or small-for-gestational-age birth weight §Sleep apnea, hepatic steatosis, orthopedic complications, psychosocial concerns

Glycemic Targets for Children and Adolescents With Type 1 Diabetes	
Consider risk-benefit assessment, including hypoglycemia risk, when individualizing targets	
A1C	<7.5%
Plasma glucose before meals	90-130 mg/dL (5.0-7.2 mmol/L)
Plasma glucose at bedtime and overnight	90-150 mg/dL (5.0-8.3 mmol/L)
If on basal-bolus: measure postprandial PG to monitor glycemic values and if discrepancy between preprandial PG and A1C: goals should be individualized. Glucose goals should be modified in children with frequent hypoglycemia or hypoglycemia unawareness.	

Managing Microvascular Complications in Children and Adolescents With Type 1 Diabetes	
Nephropathy	
Screening	• At least annual albuminuria screen with random spot urine sample for urine albumine-to-creatinine ratio (UACR) in patients with 5-yr diabetes duration • Measure creatinine clearance and eGFR at initial evaluation and then based on age, diabetes duration, and treatment
Treatment	ACEI titrated to normalization of albumin excretion • If elevated ACR confirmed (>30 mg/g) over 6 mos, after efforts to control glucose, normalize BP
Retinopathy	
Screening	Initial dilated and comprehensive eye exam • Aged ≥10 yrs or puberty onset (whichever occurs first) with 3-5–yr diabetes duration

Follow-up	• Yearly • Less frequently: per recommendation of eye care professional
ACEIs are not approved by the U.S. Food and Drug Administration (FDA) for treatment of nephropathy. Not all ACEIs are indicated for use in children/adolescents by the FDA. Refer to full prescribing information for indications and uses in pediatric populations.	

Managing High Blood Pressure in Children and Adolescents With Type 1 Diabetes		
Screening	• Measure BP at every visit • Confirm elevated BP at separate visit	
Treatment	High-normal BP (SBP or DBP >90th percentile*) • Lifestyle changes (diet & exercise) • If target BP not met in 3-6 mos	Pharmacologic therapy ACEI or ARB: initial treatment†
	Hypertension (SBP or DBP >95th percentile)	
	Target: <130/80 mm Hg or <90th percentile*	
*For age, sex, height; †Provide counseling re: potential teratogenic effects Not all ACEIs are indicated for use in children/adolescents by the U.S. Food and Drug Administration (FDA). Refer to full prescribing information for indications and uses in pediatric populations.		

Managing Dyslipidemia in Children and Adolescents With Type 1 Diabetes	
Obtain fasting lipids	Aged ≥2 years post-diagnosis*
Lipid monitoring in all patients • Abnormal lipids: yearly every 5 yrs • LDL-C <100 mg/dL (<2.6 mmol/L)	
Treatment	
Initial	Optimal glucose control Medical nutrition therapy (MNT): decrease saturated fat intake
Aged ≥10 yrs	• Lifestyle changes and MNT • After lifestyle changes, add statin† if LDL-C >160 mg/dL (>4.1 mmol/L) or >130 mg/dL (>3.4 mmol/L) + ≥1 CVD risk factor
Target: LDL-C <100 mg/dL (<2.6 mmol/L)	

*When glucose levels well controlled
†Statins are approved by the U.S. Food and Drug Administration for treatment of heterozygous familial hypercholesterolemia in children and adolescents. Not all statins are FDA approved for use under the age of 10 yrs; statins should generally not be used in children with type 1 diabetes before age 10. Refer to full prescribing information for indications and uses in pediatric populations. For postpubertal girls, pregnancy prevention is important as statins are contraindicated in pregnancy.

Screening for Autoimmunities in Children and Adolescents With Type 1 Diabetes	
Hypothyroidism	
Post-diagnosis of type 1 diabetes consider	Screening for • Antithyroid peroxidase antibodies • Antithyroglobulin antibodies
	Measuring TSH (when metabolic levels well controlled) • Reassess every 1-2 yrs if normal
Celiac disease	
Post-diagnosis of type 1 diabetes consider measuring	• IgA antitissue transglutaminase • Antiendomysial antibodies
Candidates for testing • Family history of celiac disease • Failure to grow or gain weight • Weight loss • Diarrhea or flatulence • Abdominal pain • Signs of malabsorption • Repeated hypoglycemia of unknown cause or decline in glycemic control	
Asymptomatic with positive antibodies	Gastroenterologist referral for confirmatory endoscopy and biopsy
If diagnosis confirmed	Gluten-free diet; dietitian consultation

Monogenic Diabetes Syndromes
Neonatal diabetes • Maturity-onset diabetes of the young
Consider if: • Diabetes diagnosed within first 6 mos after birth • Strong diabetes family history; no typical features of type 2 diabetes • Mild fasting hyperglycemia,* esp if young and nonobese • Diabetes with negative autoantibodies, no signs of obesity or insulin resistance
*100-150 mg/dL (5.5-8.5 mmol/L)

Considerations for Children and Adolescents With Type 2 Diabetes	
At diagnosis	After diagnosis
• Perform eye exam • Measure risk factors • Blood pressure • Fasting lipids • Albumin secretion	Similar screening and treatment as for type 1 diabetes for: • Hypertension • Albumin excretion • Dyslipidemia • Retinopathy
Other issues that may need to be addressed: • Polycystic ovarian disease • Pediatric obesity comorbidities: sleep apnea, hepatic steatosis, orthopedic complications, psychosocial concerns	

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14. Immunizations

Immunization/Vaccine Recommendations	
Influenza vaccine	Annually in all patients with diabetes aged ≥6 mos
Pneumococcal polysaccharide vaccine 23 (PPSV23)	All patients with diabetes aged ≥2 yrs
	• Aged >65 yrs previously vaccinated with PPSV23: • Administer pneumococcal conjugate vaccine 13 (PCV13) followed by PPSV23 6-12 months after initial vaccination*

	• Aged >65 yrs previously vaccinated with PPSV23:
	  • Follow-up vaccine in ≥12 months with PCV13
	  • If additional doses of PPSV23 required, subsequent doses given 6-12 months after PCV13 and ≥5 yrs since most recent PPSV23 dose

Hepatitis B vaccine	• Unvaccinated adults with diabetes aged 19-59 yrs • Consider in unvaccinated adults aged ≥60 yrs
*Two doses should not be coadministered: minimum interval between dosing: 8 wks	

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15. Psychosocial Care & Assessment

Immunization/Vaccine Recommendations
Reasonable to include psychological and social assessments of patient as part of diabetes management
Psychosocial screening and follow-up may include: • Attitudes about diabetes • Expectations for medical management and outcomes • Mood • Quality of life • Financial, social, emotional resources • Psychiatric history
Older adults (65 yrs)with diabetes should be considered a high-priority population for depression screening and treatment
Routinely screen for depression and diabetes-related distress, anxiety, eating disorders, and cognitive impairment

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