

Standards of Care in Diabetes—2024

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DIABETES: First Description

“Diabetes [Mellitus] is a remarkable disorder, and not one very common to man... The disease is chronic in its character, and is slowly engendered, though the patient does not survive long when it is completely established, for the marasmus produced is rapid, and death speedy. Life too is odious and painful, the thirst is ungovernable, and the copious potations are more than equaled by the profuse urinary discharge; for more urine flows away, and it is impossible to put any restraint to the patient’s drinking or making water. For if he stops for a very brief period, and leaves off drinking, the mouth becomes parched, the body dry; the bowels seem on fire, he is wretched and uneasy, and soon dies, tormented with burning thirst.”

**ARETAEUS OF CAPPODOCIA (ca. 120 A.D.
- 200 A.D.)**

DIABETES: First Description

دیابت شیرین بیماری قابل توجهی است و برای انسان چندان شایع نیست. این بیماری مزمن است و به آرامی ایجاد می شود، اگرچه بیمار پس از ایجاد کامل آن مدت زیادی زنده نمی ماند، زیرا ماراسموس تولید شده سریع است. مرگ سریع، زندگی نیز دردناک است، تشنگی غیرقابل کنترل است، و نوشیدنی های فراوان با ترشحات فراوان ادرار برابر است. زیرا ادرار بیشتری دفع می شود و نمی توان هیچ گونه محدودیتی برای نوشیدن آب بیمار ایجاد کرد. زیرا اگر برای مدت کوتاهی توقف کند و نوشیدن را ترک کند، دهانش خشک می شود و بدنش خشک می شود. به نظر می رسد که روده ها در آتش می سوزند، او بدبخت و مضطرب است، و به زودی در عذاب تشنگی می میرد.»

ARETAEUS OF CAPPODOCIA (ca. 120 A.D. - 200 A.D.)

Good Diabetes Management

- HbA1c close to normal
- No (severe) hypoglycemia
- Low glucose variability
- Optimal Time in Range
- Low risk for micro- and macrovascular complications
-
- Patient capable of self-managing diabetes
- Quality of Life close to 'normal'
Physical, Mental and Social wellbeing
- Satisfied with care

Where are we?

- 30% elevated HbA1c
- Glucose variability a problem for many
- Severe hypoglycemia affecting 25% T1 diabetes
- 30-40% develop serious diabetes complications
- Reduced life expectancy
-
- 30% have adjustment problems (distress)
- Mental quality of life lower than healthy controls
- Limited social/role functioning in many settings
- Patients' unmet needs

Glycemic Control for Type 2 Diabetes Mellitus Patients: A Systematic Review

The prevalence of poor glycemic control was high, and it ranged between 45.2% and 93% among the studies.

The factors associated with glycemic control were stratified into four categories:

- **Personal:** Education level, gender, body mass index, and obesity.
- **Clinical:** Duration of T2DM, fasting glucose level, and hypertension
- **Medication-related:** Number of anti-diabetics and regimen of diabetes treatment
- **Behavioral factors:** Adherence to treatment and exercise

Case 1

ID/CC: 56 years old man with T2DM _ 6 years on *Metformin*.

A1c increasing to 7.8% over the past year.

Further attempts at lifestyle change unsuccessful.

PMH: HTN on losartan, receives rosuvastatin.

Father had CAD

Highly compliant/adherent.

Declines injectables.

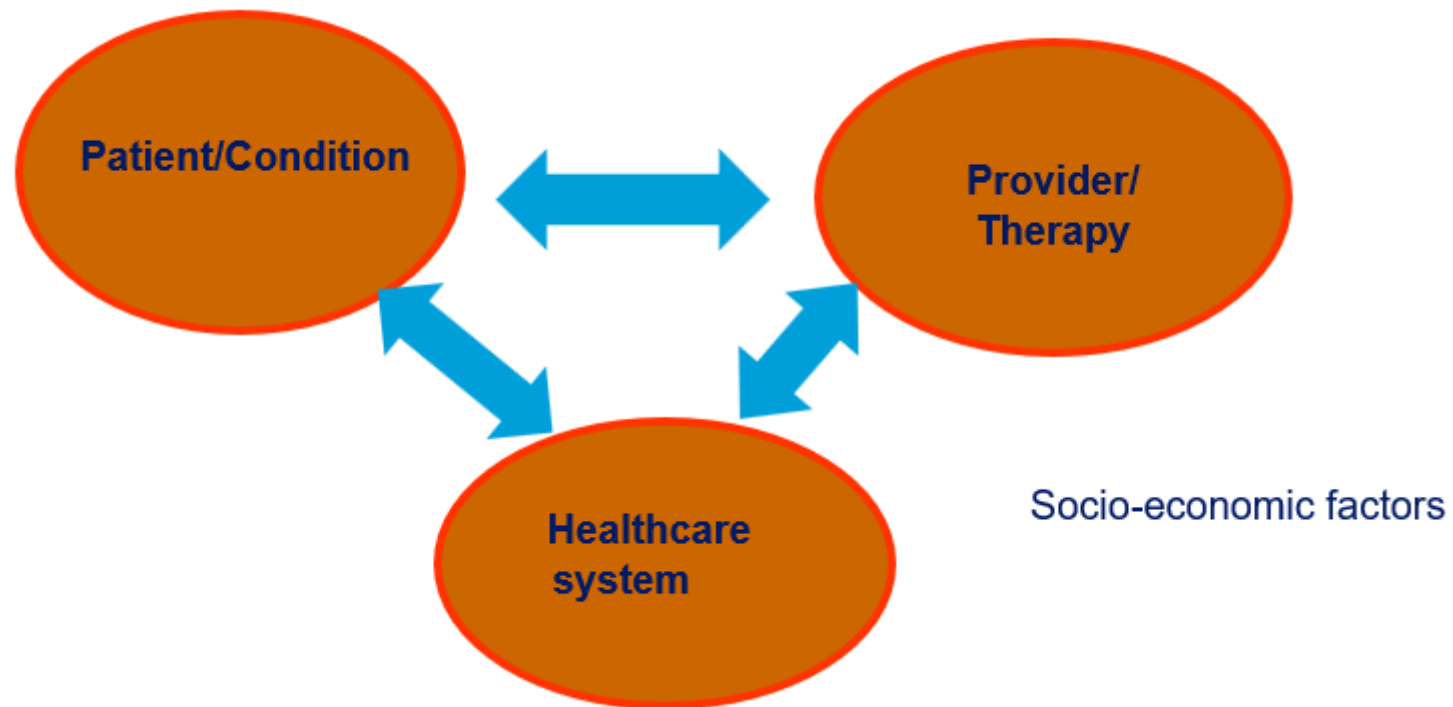
Case 1

**PE: Obese, BMI= 31.5,
BP= 142/84,
Data: A1c 7.8%, FPG 147,
Cr =1.1 (eGFR =60),
LDL 84, HDL 38, TG 256,
ECG: normal.
Your recommendation?**

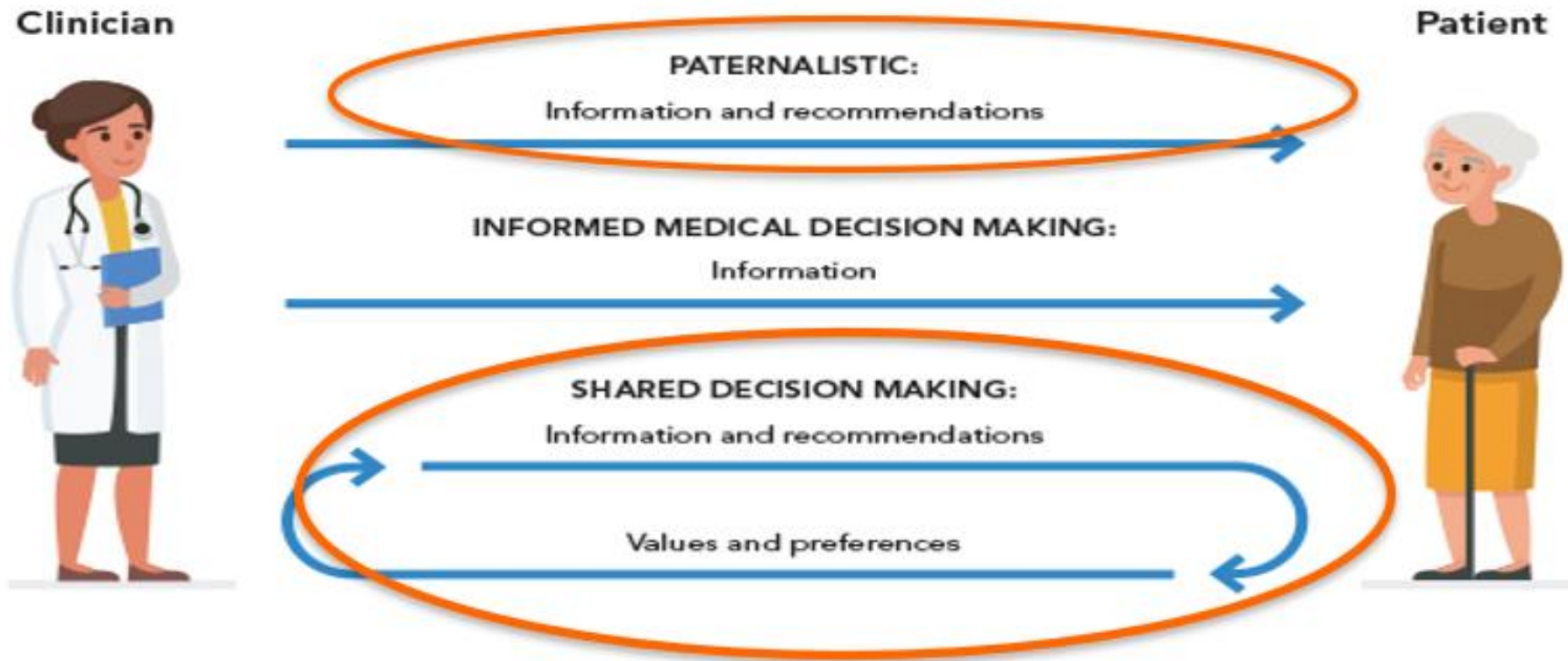
Section 4.

Comprehensive Medical Evaluation and Assessment of Comorbidities

Multiple Factors Determining Diabetes Outcomes



Patient Physician Co-operation



Comprehensive Medical Evaluation

4.3 A complete medical evaluation should be performed at the initial visit to:

- Confirm the diagnosis and classify diabetes. **A**

Classification

Diabetes can be classified into the following general categories:

1. Type 1 diabetes (due to autoimmune β -cell destruction, usually leading to absolute insulin deficiency, including latent autoimmune diabetes of adulthood)
2. Type 2 diabetes (due to a non-autoimmune progressive loss of adequate β -cell insulin secretion frequently on the background of insulin resistance and metabolic syndrome)
3. Specific types of diabetes due to other causes, e.g., monogenic diabetes syndromes (such as neonatal diabetes and maturity-onset diabetes of the young), diseases of the exocrine pancreas (such as cystic fibrosis and pancreatitis), and drug- or chemical-induced diabetes (such as with glucocorticoid use, in the treatment of HIV/AIDS, or after organ transplantation)
4. Gestational diabetes mellitus (diabetes diagnosed in the second or third trimester of pregnancy that was not clearly overt diabetes prior to gestation)

COMPREHENSIVE MEDICAL EVALUATION AND ASSESSMENT OF COMORBIDITIES

Table 4.1 - Components of the comprehensive diabetes medical evaluation at initial, follow-up, and annual visits

		INITIAL VISIT	EVERY FOLLOW-UP VISIT	ANNUAL VISIT
PAST MEDICAL AND FAMILY HISTORY	Diabetes history			
	▪ Characteristics at onset (e.g., age, symptoms)	✓		
	▪ Review of previous treatment regimens and response	✓		
	▪ Assess frequency/cause/severity of past hospitalizations	✓		
	Family history			
	▪ Family history of diabetes in a first-degree relative	✓		
	▪ Family history of autoimmune disorder	✓		
	Personal history of complications and common comorbidities			
	▪ Common comorbidities (e.g., obesity, OSA, NAFLD)	✓		✓
	▪ High blood pressure or abnormal lipids	✓		✓
	▪ Macrovascular and microvascular complications	✓		✓
	▪ Hypoglycemia: awareness/frequency/causes/timing of episodes	✓	✓	✓
	▪ Presence of hemoglobinopathies or anemias	✓		✓
	▪ Last dental visit	✓		✓
	▪ Last dilated eye exam	✓		✓
	▪ Visits to specialists	✓	✓	✓
	Interval history			
	▪ Changes in medical/family history since last visit		✓	✓

COMPREHENSIVE MEDICAL EVALUATION AND ASSESSMENT OF COMORBIDITIES

BEHAVIORAL FACTORS	▪ Eating patterns and weight history	✓	✓	✓
	▪ Assess familiarity with carbohydrate counting (e.g., type 1 diabetes, type 2 diabetes treated with MDI)	✓		✓
	▪ Physical activity and sleep behaviors	✓	✓	✓
	▪ Tobacco, alcohol, and substance use	✓		✓
MEDICATIONS AND VACCINATIONS	▪ Current medication regimen	✓	✓	✓
	▪ Medication-taking behavior	✓	✓	✓
	▪ Medication intolerance or side effects	✓	✓	✓
	▪ Complementary and alternative medicine use	✓	✓	✓
	▪ Vaccination history and needs	✓		✓
TECHNOLOGY USE	▪ Assess use of health apps, online education, patient portals, etc.	✓		✓
	▪ Glucose monitoring (meter/CGM): results and data use	✓	✓	✓
	▪ Review insulin pump settings and use, connected pen and glucose data	✓	✓	✓
SOCIAL LIFE ASSESSMENT	Social network			
	▪ Identify existing social supports	✓		✓
	▪ Identify surrogate decision maker, advanced care plan	✓		✓
	▪ Identify social determinants of health (e.g., food security, housing stability & homelessness, transportation access, financial security, community safety)	✓		✓

COMPREHENSIVE MEDICAL EVALUATION AND ASSESSMENT OF COMORBIDITIES

PHYSICAL EXAMINATION	▪ Height, weight, and BMI; growth/pubertal development in children and adolescents	✓	✓	✓
	▪ Blood pressure determination	✓	✓	✓
	▪ Orthostatic blood pressure measures (when indicated)	✓		
	▪ Fundoscopic examination (refer to eye specialist)	✓		✓
	▪ Thyroid palpation	✓		✓
	▪ Skin examination (e.g., acanthosis nigricans, insulin injection or insertion sites, lipodystrophy)	✓	✓	✓
	▪ Comprehensive foot examination			
	• Visual inspection (e.g., skin integrity, callous formation, foot deformity or ulcer, toenails)**	✓		✓
	• Screen for PAD (pedal pulses—refer for ABI if diminished)	✓		✓
	• Determination of temperature, vibration or pinprick sensation, and 10-g monofilament exam	✓		✓
	▪ Screen for depression, anxiety, and disordered eating	✓		✓
	▪ Consider assessment for functional performance*	✓		✓
	▪ Consider assessment for functional performance*	✓		✓

COMPREHENSIVE MEDICAL EVALUATION AND ASSESSMENT OF COMORBIDITIES

LABORATORY EVALUATION	■ A1C, if the results are not available within the past 3 months	✓	✓	✓
	■ If not performed/available within the past year	✓		✓
	• Lipid profile, including total, LDL, and HDL cholesterol and triglycerides [#]	✓		✓ [^]
	• Liver function tests [#]	✓		✓
	• Spot urinary albumin-to-creatinine ratio	✓		✓
	• Serum creatinine and estimated glomerular filtration rate ⁺	✓		✓
	• Thyroid-stimulating hormone in patients with type 1 diabetes [#]	✓		✓
	• Vitamin B12 if on metformin	✓		✓
	• Serum potassium levels in patients on ACE inhibitors, ARBs, or diuretics ⁺	✓		✓

ABI, ankle-brachial pressure index; ARBs, angiotensin receptor blockers; CGM, continuous glucose monitors; MDI, multiple daily injections; NAFLD, nonalcoholic fatty liver disease; OSA obstructive sleep apnea; PAD, peripheral arterial disease

*At 65 years of age or older

+May be needed more frequently in patients with known chronic kidney disease or with changes in medications that affect kidney function and serum potassium (see Table 11.1)

#May also need to be checked after initiation or dose changes of medications that affect these laboratory values (i.e., diabetes medications, blood pressure medications, cholesterol medications, or thyroid medications)

[^]In people without dyslipidemia and not on cholesterol-lowering therapy, testing may be less frequent

**Should be performed at every visit in patients with sensory loss, previous foot ulcers, or amputations

Comprehensive Medical Evaluation and Assessment of Comorbidities:
Standards of Care in Diabetes - 2023. Diabetes Care 2023;46(Suppl. 1):S49-S67

Highly recommended immunizations for adults with diabetes

Vaccine	Recommended ages	Schedule
COVID-19	Recommended for all 6 months of age and older	Current initial vaccination and boosters
Hepatitis B	Recommended for adults with diabetes aged <60 years; for adults aged ≥ 60 years, hepatitis B vaccine may be administered at the discretion of the treating clinician based on the person's likelihood of acquiring hepatitis B infection	
Influenza	All people with diabetes advised not to receive live attenuated influenza vaccine	Annual

Highly recommended immunizations for adults with diabetes

Vaccine	Recommended ages	Schedule
Pneumonia (PPSV23 [Pneumovax])	19–64 years of age, vaccinate with Pneumovax	One dose is recommended for those who previously received PCV13; if PCV15 was used, follow with PPSV23 ≥ 1 year later; PPSV23 is not indicated after PCV20; adults who received only PPSV23 may receive PCV15 or PCV20 ≥ 1 year after their last dose
	≥ 65 years of age	One dose is recommended for those who previously received PCV13; if PCV15 was used, follow with PPSV23 ≥ 1 year later; PPSV23 is not indicated after PCV20; adults who received only PPSV23 may receive PCV15 or PCV20 ≥ 1 year after their last dose

Diabetes and COVID-19

- 4.11 Health care professionals should help people with diabetes aim to achieve individualized targeted glycemic control to reduce the risk of macrovascular and microvascular risk as well as reduce the risk of COVID-19 and its complications. **B**
- 4.12 As we move into the recovery phase, diabetes health care services and practitioners should address the impact of the pandemic in higher-risk groups, including ethnic minority, deprived, and older populations. **B**

Diabetes and COVID-19 (continued)

- 4.13 People who have been infected with SARS-CoV-2 should be followed up in the longer term to assess for complications and symptoms of long COVID. **E**
- 4.14 People with new-onset diabetes need to be followed up regularly in routine clinical practice to determine if diabetes is transient. **B**
- 4.15 Health care professionals need to carefully monitor people with diabetes for diabetic ketoacidosis during the COVID-19 pandemic. **C**

Assessment and treatment plan

Assessing risk of diabetes complications

- 1-ASCVD and heart failure history
- 2-ASCVD risk factors and 10-year ASCVD risk assessment
- 3-Staging of chronic kidney disease
- 4-Hypoglycemia risk
- 5-Assessment for retinopathy
- 6-Assessment for nephropathy

Assessment and treatment plan

Goal setting

- 1-Set A1c/blood glucose/time in range target
- 2-If hypertension is present, establish blood pressure target
- 3- Diabetes self-management goals

Assessment and treatment plan

Therapeutic treatment plans

- Lifestyle management
- Pharmacologic therapy: glucose lowering
- Pharmacologic therapy: cardiovascular and renal disease risk factors
- Use of glucose monitoring and insulin delivery devices
- Referral to diabetes education and medical specialists

Autoimmune Diseases

People with type 1 diabetes should be screened for autoimmune thyroid disease soon after diagnosis and periodically thereafter.

Adults with type 1 diabetes should be screened for celiac disease in the presence of gastrointestinal symptoms, signs, laboratory manifestations, or clinical suspicion suggestive of celiac disease.

Cognitive Impairment/Dementia

In the presence of cognitive impairment, diabetes treatment plans should be simplified as much as possible and tailored to minimize the risk of hypoglycemia.

Nonalcoholic Fatty Liver Disease

People with type 2 diabetes or prediabetes with cardiometabolic risk factors, who have either elevated liver enzymes (ALT) or fatty liver on imaging or ultrasound, should be evaluated for presence of nonalcoholic steatohepatitis and liver fibrosis.

Bone Health

- Fracture risk should be assessed in older adults with diabetes as a part of routine care in diabetes clinical practice, according to risk factors and comorbidities. A

Bone Health

- Monitor bone mineral density using dual-energy X-ray absorptiometry of high-risk older adults with diabetes (aged >65 years) and younger individuals with diabetes and multiple risk factors every 2–3 years.

Bone Health

- To reduce the risk of falls and fractures, glycemic management goals should be individualized for people with diabetes at a higher risk of fracture.

Prioritize use of glucose-lowering medications that are associated with low risk for hypoglycemia to avoid falls.

Glycemic Targets

Case 2

ID/CC: 56 years old man with recent diagnosis of T2DM

_ Unable to tolerate *Metformin*.

A1c 8.5 and 9% on two occasions.

Further attempts at lifestyle change unsuccessful.

PMH: HTN on valsartan.

Highly compliant/adherent.

Declines injectables.

Case 2

PE: Obese, BMI= 31, BP= 135/85,

Data: A1c 9%, FPG 157,

Cr 1.1 (eGFR =60),

LDL 94, HDL 38, TG 240,

ECG: normal.

Your recommendation?

Glycemic Assessment

Assess glycemic status (A1C or other glycemic measurement such as **time in range** or glucose management indicator) at least two times a year in patients who are meeting treatment goals (and who have stable glycemic control).

Assess glycemic status at least quarterly and as needed in patients whose therapy has recently changed and/or who are not meeting glycemic goals.

Estimated Average Glucose

Table 6.1—Estimated average glucose (eAG)

A1C (%)	mg/dL*	mmol/L
5	97 (76–120)	5.4 (4.2–6.7)
6	126 (100–152)	7.0 (5.5–8.5)
7	154 (123–185)	8.6 (6.8–10.3)
8	183 (147–217)	10.2 (8.1–12.1)
9	212 (170–249)	11.8 (9.4–13.9)
10	240 (193–282)	13.4 (10.7–15.7)
11	269 (217–314)	14.9 (12.0–17.5)
12	298 (240–347)	16.5 (13.3–19.3)

Data in parentheses are 95% CI. A calculator for converting A1C results into eAG, in either mg/dL or mmol/L, is available at professional.diabetes.org/eAG. *These estimates are based on ADAG data of ~2,700 glucose measurements over 3 months per A1C measurement in 507 adults with type 1, type 2, or no diabetes. The correlation between A1C and average glucose was 0.92 (13,14). Adapted from Nathan et al. (13).

Standardized CGM Metrics

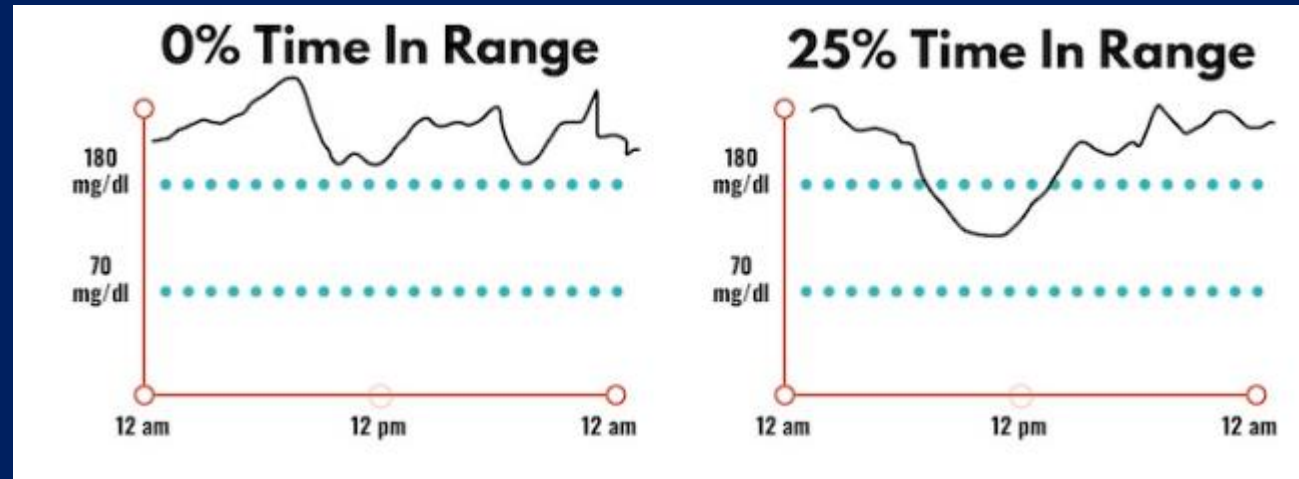
GLYCEMIC TARGETS

Table 6.2—Standardized CGM metrics for clinical care

1. Number of days CGM device is worn (recommend 14 days)
2. Percentage of time CGM device is active (recommend 70% of data from 14 days)
3. Mean glucose
4. Glucose management indicator
5. Glycemic variability (%CV) target $\leq 36\%$ *
6. TAR: % of readings and time >250 mg/dL (>13.9 mmol/L) Level 2 hyperglycemia
7. TAR: % of readings and time 181–250 mg/dL (10.1–13.9 mmol/L) Level 1 hyperglycemia
8. TIR: % of readings and time 70–180 mg/dL (3.9–10.0 mmol/L) In range
9. TBR: % of readings and time 54–69 mg/dL (3.0–3.8 mmol/L) Level 1 hypoglycemia
10. TBR: % of readings and time <54 mg/dL (<3.0 mmol/L) Level 2 hypoglycemia

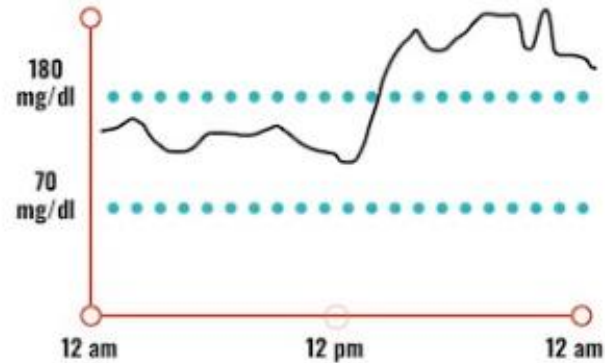
CGM, continuous glucose monitoring; CV, coefficient of variation; TAR, time above range; TBR, time below range; TIR, time in range. *Some studies suggest that lower %CV targets ($<33\%$) provide additional protection against hypoglycemia for those receiving insulin or sulfonylureas. Adapted from Battelino et al. (35).

Time in Range

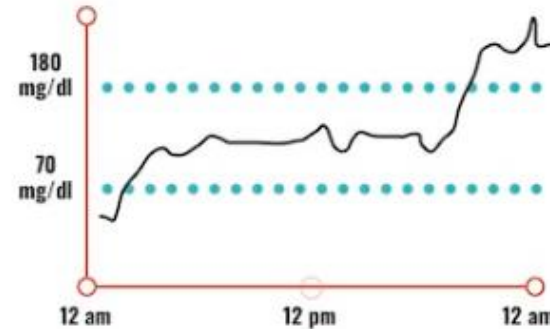


Time in Range

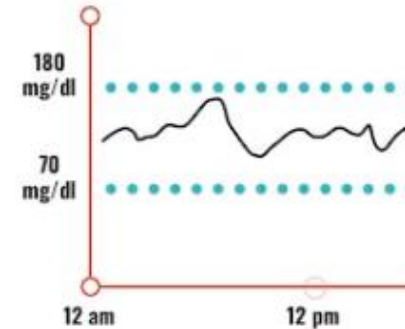
50% Time In Range



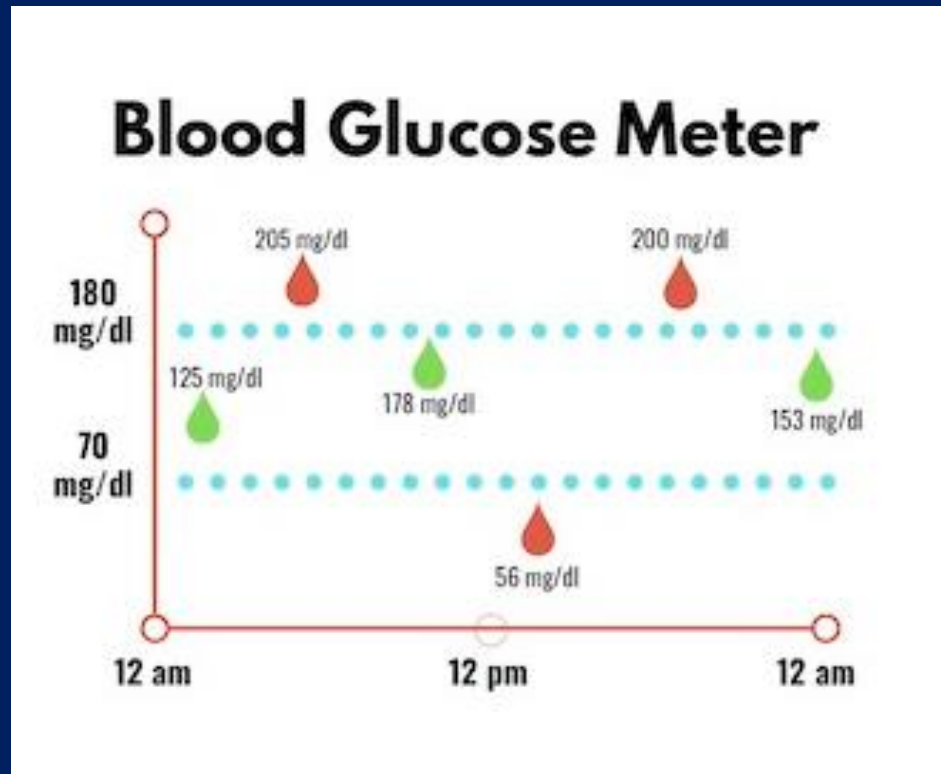
75% Time In Range



100% Time In Range



Time in Range



A 7-Point BGM Profile Schedule for 3 Consecutive Days of the Week

	Pre-Breakfast	Post-Breakfast	Pre-Lunch	Post-Lunch	Pre-Dinner	Post-Dinner	Bedtime
Sunday							
Monday							
Tuesday	X	X	X	X	X	X	X
Wednesday	X	X	X	X	X	X	X
Thursday	X	X	X	X	X	X	X
Friday							
Saturday							

Glucose Assessment by Continuous Glucose Monitoring

6.4 Time in range is associated with the risk of microvascular complications and can be used for assessment of glycemic control. Additionally, time below range and time above range are useful parameters for the evaluation of the treatment plan (Table 6.2). **C**

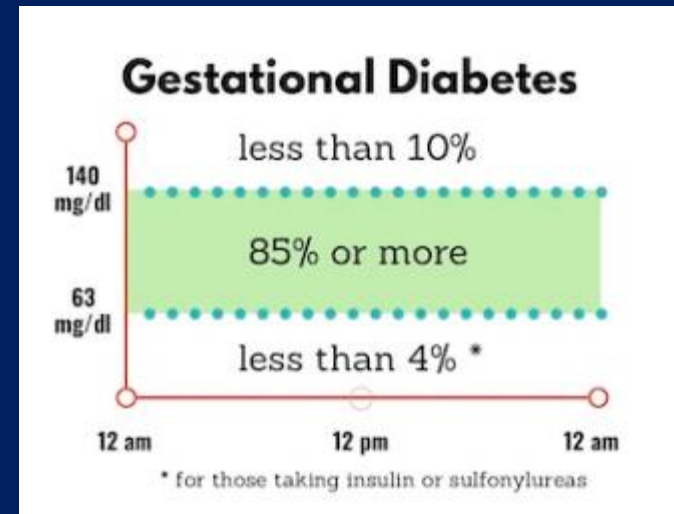
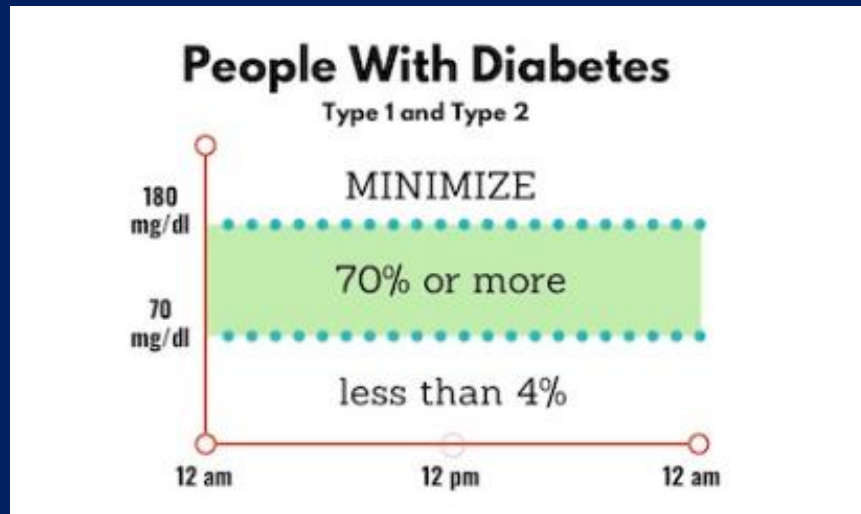
Glycemic Goals

6.5a An A1C goal for many nonpregnant adults of <7% (53 mmol/mol) without significant hypoglycemia is appropriate. **A**

Glycemic Goals

6.5b If using ambulatory glucose profile/glucose management indicator to assess glycemia, a parallel goal for many nonpregnant adults is time in range of >70% with time below range <4% and time <54 mg/dL <1%. For those with frailty or at high risk of hypoglycemia, a target of >50% time in range with <1% time below range is recommended. (See Fig. 6.1 and Table 6.2.). **B**

Time in Range



Glycemic Goals

6.6 On the basis of health care professional judgment and patient preference, achievement of lower A1C levels than the goal of 7% may be acceptable and even beneficial if it can be achieved safely without significant hypoglycemia or other adverse effects of treatment. **B**

Glycemic Goals (continued)

6.7 Less stringent A1C goals (such as $<8\%$ [64 mmol/mol]) may be appropriate for patients with limited life expectancy or where the harms of treatment are greater than the benefits. Health care professionals should consider deintensification of therapy if appropriate to reduce the risk of hypoglycemia in patients with inappropriate stringent A1C targets. **B**

6.8 Reassess glycemic targets based on the individualized criteria in Fig. 6.2. **E**

6.9 Reassess Setting a glycemic goal during consultations is likely to improve patient outcomes. **E**

Overall Health Assessment - Framework

		Good Health	Intermediate Health	Poor Health
Patient characteristics		≤ 2 chronic conditions* AND No ADL impairments and ≤ 1 IADL impairment	≥ 3 chronic conditions* AND/OR Any of the following: • Mild cognitive impairment / early dementia • ≥ 2 IADL impairments	Any of the following: • End-stage medical condition • Moderate to severe dementia • ≥ 2 ADL impairments • Residence in a long-term nursing facility
HbA1c goal		Shared decision making: <i>individualized targets may be lower or higher</i>		
Use of drugs that may cause hypoglycemia? (e.g., insulin, SU, glinides)	<u>No</u>	<7.5% <i>FPG: 90-130 md/dL HS: 90-150 mg/dL</i>	<8% <i>FPG: 90-150 md/dL HS: 100-180 mg/dL</i>	<8.5% <i>FPG: 100-180 md/dL HS: 110-200 mg/dL</i>
	<u>Yes</u>	<7.5% and $\geq 7\%$ <i>FPG: 90-150 md/dL HS: 100-180 mg/dL</i>	<8% and $\geq 7.5\%$ <i>FPG: 100-150 md/dL HS: 150-180 mg/dL</i>	<8.5% and $\geq 8\%$ <i>FPG: 100-180 md/dL HS: 150-250 mg/dL</i>

Adapted from: Cigolle CT, et al. *J Gerontol A Biol Sci Med Sci.* 2012; 67:1313-20 and Kirkman, et al. *Diabetes Care.* 2012;35:2650-64.

Summary of glycemic recommendations for many nonpregnant adults with diabetes

A1c	<7%
Peripheral capillary plasma glucose	80-130 mg/dL
Peak postprandial capillary plasma glucose	<180 mg/dL

Goals should be individualized based on duration of diabetes, age/life expectancy, comorbid conditions, known CVD or advanced microvascular complications, hypoglycemia unawareness, and individual patient considerations (as per Fig. 6.2). †Postprandial glucose may be targeted if A1C goals are not met despite reaching preprandial glucose goals. Postprandial glucose measurements should be made 1–2 h after the beginning of the meal, generally peak levels in people with diabetes.

Hypoglycemia

Case1

- A 75-year-old female with 20-year history of type 2 DM is brought to the office because of concerns about hypoglycemia.
- The previous day, her daughter found her unresponsive at home.
- BS was 45mg/dL.

Today, the patient is fine,

The patient's medical history is notable for CVD.

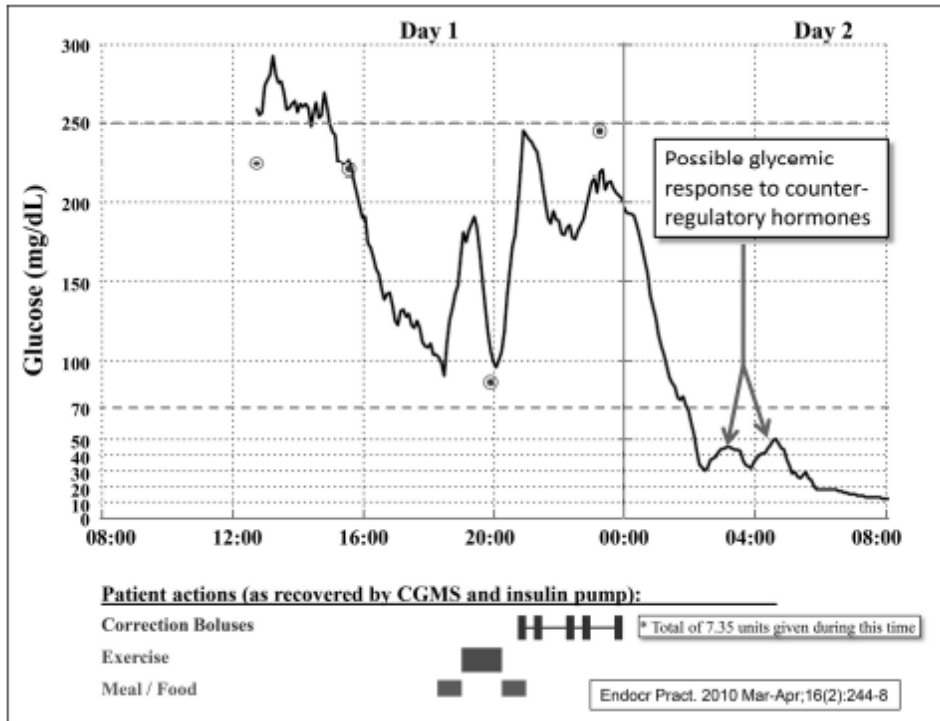
Current medications are:

- Clopidogrel
- Atorvastatin
- Lisinopril
- Glibenclamide 5 mg twice a day
- Metformin 1500 mg every day
- Linagliptin 5 mg every day

What additional information do you need??

- A. Log book of home blood glucose levels
- B. History of content and timing of meals/snacks ingested in the past week
- C. Record of activity done in the past week
- D. All of the above

Glucose levels captured by the retrospective continuous subcutaneous glucose monitoring system (CGMS)



The timing of the patient's meals, exercise, and correction insulin boluses are represented by the bars along the bottom of the graph.

The precipitous decrease in glucose level after the correction doses can be observed to start just after midnight, and possible counterregulatory efforts are noted once the glucose level declined to below 30. mg/dL shortly after 2 AM.

Hypoglycemia

- 6.10** Occurrence and risk for hypoglycemia should be reviewed at every encounter and investigated as indicated. Awareness of hypoglycemia should be considered using validated tools. **C**
- 6.11** Glucose (approximately 15–20 g) is the preferred treatment for the conscious individual with blood glucose <70 mg/dL (3.9 mmol/L), although any form of carbohydrate that contains glucose may be used. Fifteen minutes after treatment, if blood glucose monitoring (BGM) shows continued hypoglycemia, the treatment should be repeated. Once the BGM or glucose pattern is trending up, the individual should consume a meal or snack to prevent recurrence of hypoglycemia. **B**

Standardized CGM Metrics

GLYCEMIC TARGETS

Table 6.2—Standardized CGM metrics for clinical care

1. Number of days CGM device is worn (recommend 14 days)		
2. Percentage of time CGM device is active (recommend 70% of data from 14 days)		
3. Mean glucose		
4. Glucose management indicator		
5. Glycemic variability (%CV) target $\leq 36\%^*$		
6. TAR: % of readings and time >250 mg/dL (>13.9 mmol/L)	Level 2 hyperglycemia	
7. TAR: % of readings and time 181–250 mg/dL (10.1–13.9 mmol/L)	Level 1 hyperglycemia	
8. TIR: % of readings and time 70–180 mg/dL (3.9–10.0 mmol/L)	In range	
9. TBR: % of readings and time 54–69 mg/dL (3.0–3.8 mmol/L)	Level 1 hypoglycemia	
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CGM, continuous glucose monitoring; CV, coefficient of variation; TAR, time above range; TBR, time below range; TIR, time in range. *Some studies suggest that lower %CV targets ($<33\%$) provide additional protection against hypoglycemia for those receiving insulin or sulfonylureas. Adapted from Battelino et al. (35).

Glycemic Targets:

Standards of Care in Diabetes - 2023. Diabetes Care 2023;46(Suppl. 1):S97-S110

Hypoglycemia (continued)

- 6.12** Glucagon should be prescribed for all individuals at increased risk of level 2 or 3 hypoglycemia, so that it is available should it be needed. Caregivers, school personnel, or family members providing support to these individuals should know where it is and when and how to administer it. Glucagon administration is not limited to health care professionals. **E**
- 6.13** Hypoglycemia unawareness or one or more episodes of level 3 hypoglycemia should trigger hypoglycemia avoidance education and reevaluation and adjustment of the treatment plan to decrease hypoglycemia. **E**

Hypoglycemia (continued)

- 6.13 level 3
- 6.14 Insulin-treated patients with hypoglycemia unawareness, one hypoglycemic event, or a pattern of unexplained level 2 hypoglycemia should be advised to raise their glycemic targets to strictly avoid hypoglycemia for at least several weeks in order to partially reverse hypoglycemia unawareness and reduce risk of future episodes. **A**
- 6.15 Ongoing assessment of cognitive function is suggested with increased vigilance for hypoglycemia by the clinician, patient, and caregivers if impaired or declining cognition is found. **B**

Table 6.4—Classification of hypoglycemia

	Glycemic criteria/description
Level 1	Glucose <70 mg/dL (3.9 mmol/L) and ≥54 mg/dL (3.0 mmol/L)
Level 2	Glucose <54 mg/dL (3.0 mmol/L)
Level 3	A severe event characterized by altered mental and/or physical status requiring assistance for treatment of hypoglycemia

Reprinted from Agiostratidou et al. (74).

Table 4.3—Assessment of hypoglycemia risk

Factors that increase risk of treatment-associated hypoglycemia

- Use of insulin or insulin secretagogues (i.e., sulfonylureas, meglitinides)
- Impaired kidney or hepatic function
- Longer duration of diabetes
- Frailty and older age
- Cognitive impairment
- Impaired counterregulatory response, hypoglycemia unawareness
- Physical or intellectual disability that may impair behavioral response to hypoglycemia
- Alcohol use
- Polypharmacy (especially ACE inhibitors, angiotensin receptor blockers, nonselective β -blockers)
- History of severe hypoglycemic event

In addition to individual risk factors, consider use of comprehensive risk prediction models (198).

See references 199–203.

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Cardiovascular Disease and Risk Management

Case 3

ID/CC: 64 years old female with T2DM _ 14 years on Metformin/Sitagliptin. A1c now at 8.4%.

Add'l Hx: Recently hospitalized for ACS/stent. Diastolic dysfunction by echo.

Prior A1c's have been stable at 7 to 7.5%.

Cardiologist told her to seek your counsel about Improving metabolic control.

Case 3

**PMH: CAD s/p MI; HTN, HLD, hypothyroid, breast ca.
On Atorvastatin, losartan, levothyroxine, tamoxifen,
ASA.**

**Grade school teacher. Well insured.
Questionable adherence. Open to injections.**

Case 3

PE: Obese, BMI 32.1, BP 118/76.

**Data: A1c 8.4%, FPG 188.
Cr 1.4 (eGFR 44),
LDL 67, HDL54, TG 123,**

ECG: old IWM I

Your recommendation?

ASCVD Risk Estimator

EstimatorCliniciansPatientsAbout

ASCVD Risk Estimator*

10-Year ASCVD Risk

19.4%calculated risk

3.6%risk with optimal risk factors**

Lifetime ASCVD Risk

69%calculated risk

5%risk with optimal risk factors

Recommendation Based On Calcul...>

Gender

M

F

Age

55

Race

☒ White

☐ African American

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< Back

Recommendation

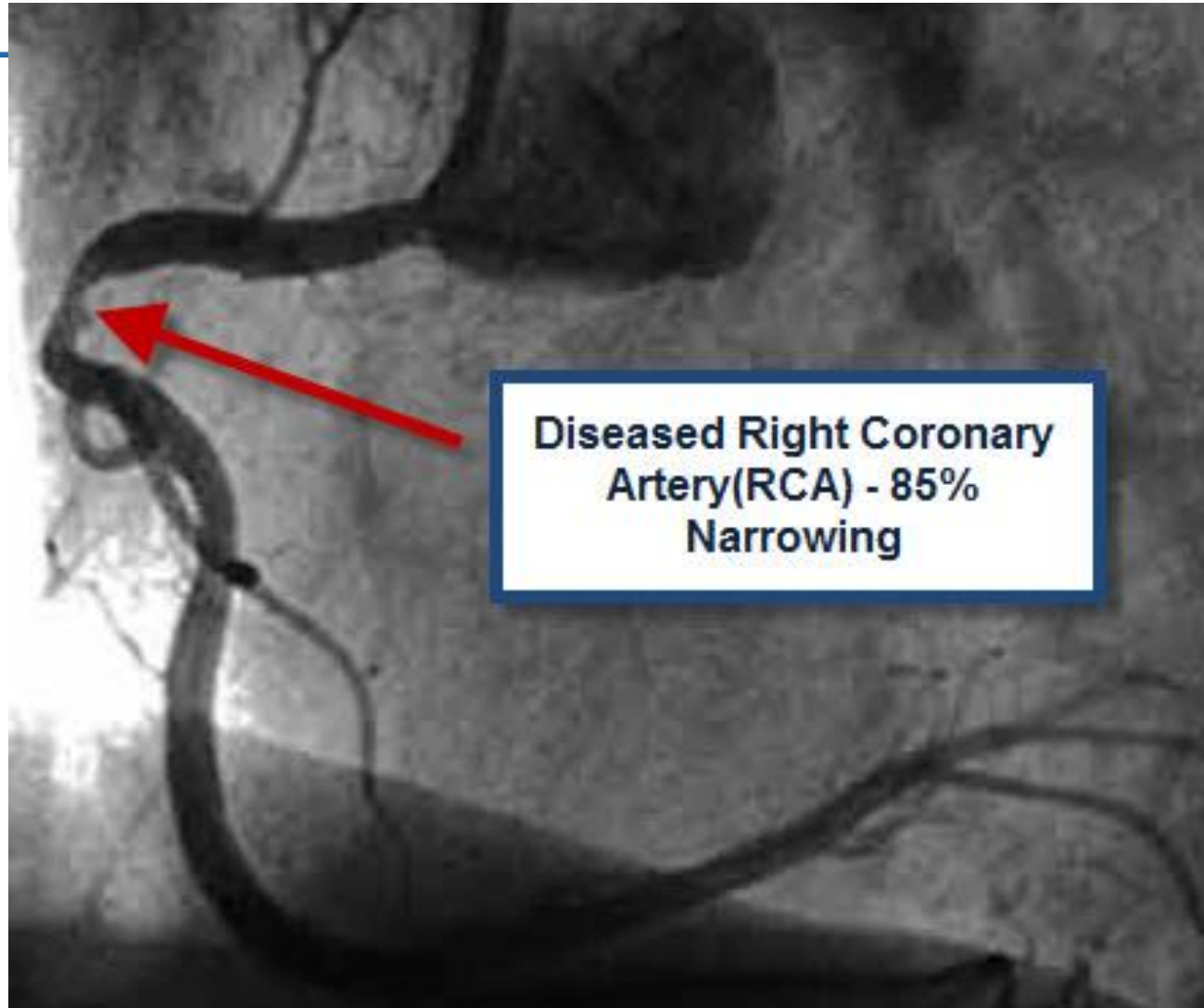
Based on the data entered (assuming no clinical ASCVD and LDL-C 70-189 mg/dL):

- Gender: Male
- Age: 55
- Race: White/Other
- Total Cholesterol: 150
- HDL-Cholesterol: 55
- Systolic Blood Pressure: 150
- Hypertension Treatment: Yes
- Diabetes: Yes
- Smoker: Yes

Consider High-Intensity Statin

Moderate-intensity statin therapy should be initiated or continued for adults 40 to 75 years of age with diabetes mellitus. (I A)

High-intensity statin therapy is



Screening and Diagnosis

- 10.1** measured at every routine clinical visit. When possible, individuals found to have elevated blood pressure (systolic blood pressure 120–129 mmHg and diastolic <80 mmHg) should have blood pressure confirmed using multiple readings, including measurements on a separate day, to diagnose hypertension. **A** Hypertension is defined as a systolic blood pressure ≥ 130 mmHg or a diastolic blood pressure ≥ 80 mmHg based on an average of ≥ 2 measurements obtained on ≥ 2 occasions. **A** Individuals with blood pressure $\geq 180/110$ mmHg and cardiovascular disease could be diagnosed with hypertension at a single visit. **E**
- 10.2** All people with hypertension and diabetes should monitor their blood pressure at home. **A**

Treatment Goals

- 10.3** For patients with diabetes and hypertension, blood pressure targets should be individualized through a shared decision-making process that addresses cardiovascular risk, potential adverse effects of antihypertensive medications, and patient preferences. **B**
- 10.4** People with diabetes and hypertension qualify for antihypertensive drug therapy when the blood pressure is persistently elevated $\geq 130/80$ mmHg. The on-treatment target blood pressure goal is $<130/80$ mmHg, if it can be safely attained. **B**

Treatment Goals (continued)

10.5 In pregnant individuals with diabetes and chronic hypertension, a blood pressure threshold of 140/90 mmHg for initiation or titration of therapy is associated with better pregnancy outcomes than reserving treatment for severe hypertension, with no increase in risk of small-for-gestational age birth weight. **A** There are limited data on the optimal lower limit, but therapy should be lessened for blood pressure <90/60 mmHg. **E** A blood pressure target of 110–135/85 mmHg is suggested in the interest of reducing the risk for accelerated maternal hypertension. **A**

Chronic Kidney Disease and Risk Management

Chronic Kidney Disease—Screening

- 11.1a** At least annually, urinary albumin (e.g., spot urinary albumin-to-creatinine ratio) and estimated glomerular filtration rate should be assessed in people with type 1 diabetes with duration of ≥ 5 years and in all people with type 2 diabetes regardless of treatment. **B**
- 11.1b** In people with established diabetic kidney disease, urinary albumin (e.g., spot urinary albumin-to-creatinine ratio) and estimated glomerular filtration rate should be monitored 1–4 times per year depending on the stage of the disease (Fig. 11.1). **B**

Retinopathy, Neuropathy, and Foot Care

Diabetic Retinopathy

- 12.1 Optimize glycemic control to reduce the risk or slow the progression of diabetic retinopathy. **A**
- 12.2 Optimize blood pressure and serum lipid control to reduce the risk or slow the progression of diabetic retinopathy. **A**

Diabetic Retinopathy - Screening

- 12.3** Adults with type 1 diabetes should have an initial dilated and comprehensive eye examination by an ophthalmologist or optometrist within 5 years after the onset of diabetes. **B**
- 12.4** People with type 2 diabetes should have an initial dilated and comprehensive eye examination by an ophthalmologist or optometrist at the time of the diabetes diagnosis. **B**
- 12.5** If there is no evidence of retinopathy for one or more annual eye exams and glycemia is well controlled, then screening every 1–2 years may be considered. If any level of diabetic retinopathy is present, subsequent dilated retinal examinations should be repeated at least annually by an ophthalmologist or optometrist. If retinopathy is progressing or sight-threatening, then examinations will be required more frequently. **B**

Diabetic Retinopathy - Screening (continued)

12.6 Programs that use retinal photography (with remote reading or use of a validated assessment tool) to improve access to diabetic retinopathy screening can be appropriate screening strategies for diabetic retinopathy. Such programs need to provide pathways for timely referral for a comprehensive eye examination when indicated . **B**

12.7 Individuals of childbearing potential with preexisting type 1 or type 2 diabetes who are planning pregnancy or who are pregnant should be counseled on the risk of development and/or progression of diabetic retinopathy. **B**

12.8 Individuals with preexisting type 1 or type 2 diabetes should receive an eye exam before pregnancy and in the first trimester and should be monitored every trimester and for 1 year postpartum as indicated by the degree of retinopathy. **B**

Neuropathy—Screening

- 12.15** All people with diabetes should be assessed for diabetic peripheral neuropathy starting at diagnosis of type 2 diabetes and 5 years after the diagnosis of type 1 diabetes and at least annually thereafter. **B**
- 12.16** Assessment for distal symmetric polyneuropathy should include a careful history and assessment of either temperature or pinprick sensation (small-fiber function) and vibration sensation using a 128-Hz tuning fork (for large-fiber function). All people with diabetes should have annual 10-g monofilament testing to identify feet at risk for ulceration and amputation. **B**
- 12.17** Symptoms and signs of autonomic neuropathy should be assessed in patients with microvascular complications. **E**

Neuropathy—Screening

12.17 Symptoms and signs of autonomic neuropathy should be assessed in people with diabetes starting at diagnosis of type 2 diabetes and 5 years after the diagnosis of type 1 diabetes and at least annually thereafter and with evidence of other microvascular complications, particularly kidney disease and diabetic peripheral neuropathy. Screening can include asking about orthostatic dizziness, syncope, or dry cracked skin in the extremities. Signs of autonomic neuropathy include orthostatic hypotension, a resting tachycardia, or evidence of peripheral dryness or cracking of skin. **E**

The early recognition and appropriate management of neuropathy in people with diabetes is important. Points to be aware of include the following:

1. Diabetic neuropathy is a diagnosis of exclusion. Nondiabetic neuropathies may be present in people with diabetes and may be treatable.
2. Up to 50% of diabetic peripheral neuropathy may be asymptomatic. If not recognized and if preventive foot care is not implemented, people with diabetes are at risk for injuries as well as diabetic foot ulcers and amputations.
3. Recognition and treatment of autonomic neuropathy may improve symptoms, reduce sequelae, and improve quality of life

Foot Care

- 12.21 Perform a comprehensive foot evaluation at least annually to identify risk factors for ulcers and amputations. **A**
- 12.22 The examination should include inspection of the skin, assessment of foot deformities, neurological assessment (10-g monofilament testing with at least one other assessment: pinprick, temperature, vibration), and vascular assessment, including pulses in the legs and feet. **B**
- 12.23 Individuals with evidence of sensory loss or prior ulceration or amputation should have their feet inspected at every visit. **A**

Factors that are associated with the at-risk foot include the following:

- Poor glycemic control
- Peripheral neuropathy/LOPS
- PAD
- Foot deformities (bunions, hammertoes, Charcot joint, etc.)
- Preulcerative corns or calluses
- Prior ulceration
- Prior amputation
- Smoking
- Retinopathy
- Nephropathy (particularly individuals on dialysis or posttransplant)