DiabetesEd Training Conference Syllabus

October 22nd & 23rd, 2026

Presented By:

Coach Beverly Thomassian, RN, MPH, CDCES, BC-ADM

Diana Isaacs, PharmD, BCPS, BC-ADM, BCACP, CDCES, FADCES

Christine Craig, MS, RD, CDCES

www.DiabetesEd.net

DiabetesEd Training Conference
October 22nd - 23rd, 2026

Welcome

We are proud to welcome you to our 26th Annual DiabetesEd Training Conference. Your attendance demonstrates a commitment to advocating for the best diabetes care for the 40 million Americans with diabetes. We encourage you to share the new ideas and information garnered from this conference with your community and colleagues. As advocates, specialists, and coaches, we believe we can make a dramatic difference in improving the quality of life for people with diabetes using a person-centered, evidence-based, compassionate approach coupled with curiosity.

Faculty and Staff Biographies

Beverly Dyck Thomassian, RN, MPH, BC-ADM, CDCES
Beverly Thomassian is the president of Diabetes Education Services and an enthusiastic advocate for improving diabetes care through education, equity, and curiosity. A dynamic award-winning diabetes coach and educator, Beverly inspires excellence through her nationally recognized live courses and webinars. With over two decades of experience as a Diabetes Nurse Specialist and Board-Certified in Advanced Diabetes Management, she is a respected leader, innovator, and mentor in the field.

She is also the recent author of the groundbreaking book, *Healing through Connection: For Healthcare Professionals*—a heartfelt guide that invites clinicians to nurture their own well-being while deepening authentic, healing relationships with the people they serve. In addition to her work with Diabetes Education Services, Beverly consults at a local Indian Health Services Clinic, where she provides one-on-one diabetes education and consults with providers. Her commitment to person-centered, culturally responsive care drives her mission to advance equitable diabetes care for all.

Diana Isaacs, PharmD, BCPS, BCACP, CDCES, BC-ADM, FADCES, FCCP
Diana Isaacs is an Endocrinology Clinical Pharmacy Specialist. She serves as the Co-Director of Endocrine Disorders in Pregnancy and the Director of Education and Training in Diabetes Technology at the Cleveland Clinic Endocrinology and Metabolism Institute. Dr. Isaacs holds board certifications in pharmacotherapy, ambulatory care, and advanced diabetes management. She served on the American Diabetes Association (ADA) Professional Practice Committee from 2020-2023, the committee that updates the ADA Standards of Care. She has been actively involved with the American Association of Clinical Endocrinology (AACE) and serves on the leadership of the Diabetes Disease State Network.

She co-hosts a podcast titled “Diabetes Dialogue: Technology, Therapeutics and Real-World Perspectives.” She advocates access and choice to the latest technologies and therapeutics for all people with diabetes and speaks on diabetes related topics nationally and internationally. She is a 2022 inductee into the SIUE Alumni Hall of Fame for her far-reaching contributions. She was awarded ADCES Diabetes Care and Education Specialist of the Year in 2020, and ADA Educator of the Year in 2026.

Christine Craig, MS, RDN, CDCES - CEO of Nutrition for Daily Living!
As a CEO and clinical nutrition expert, Christine believes that care is best delivered when people living with diabetes feel supported and empowered with information along with an individualized approach for lifelong health. Winner of the 2023 Impact on Diabetes Award, she is a leader in the field of nutrition, technology, and diabetes care. She has served as a preceptor, lecturer, researcher, and is an active association board member. She has worked across health systems; within Diabetes Care Centers, Endocrinology clinics, Primary Care, Telemedicine Rural Health, and Virtual-First Primary Care. Currently she is owner of Nutrition for Daily Living, where it is her mission to increase access to compassionate and evidenced-based nutrition and diabetes care.

Lonnie Vaughn, RNC, BSN, CDCES – Onsite Program Manager
As a leader in the field of diabetes management, Lonnie has been championing best care practices at Doctor's Hospital in Modesto for over 30 years. As a certified diabetes educator, trainer, mentor, and advocate, her passion and commitment to improving diabetes care is valued by her community and professionals alike. Thank you, Lonnie, for your service and dedication.

We are overjoyed that you are joining us!

Sincerely,

Coach Beverly Thomassian

Beverly Thomassian, RN, MPH, CDCES, BC-ADM
President and Founder, Diabetes Education Services

DiabetesEd Training Conference

ADA & AACE Standards Boot Camp + Meds & CV Risk Reduction

Day 1 | Oct 22, 2026 | 7.5 CEs | Marriott San Diego Airport/Liberty Station

Co-Instruction by Beverly Dyck Thomassian, RN, BC-ADM, MPH, CDCES & Diana Isaacs, PharmD, BCPS, BCACP, CDCES, BC-ADM, FADCES, FCCP

Time	Topic Schedule*
7:30 – 8:00 AM	Enjoy Breakfast / Register / Welcome
8:00 – 10:00 AM	Current State of Diabetes and SDOH Screening, Diagnosis and Identification of Prediabetes, Type 1, Type 2, LADA, Type 3 and GDM
10:00 – 10:15 AM	Break
10:15 AM – 12:00 PM	ADA & AACE Treatment Algorithms - Latest Data on SGLT2's and GLP-1's Faclitating Well Being & Keeping it Person Centered Assessing Glycemic Status Across Lifespan
12:00 – 1:00 PM	Lunch Break
1:00 – 2:30 PM	Glucose Management From Peds to Pregnancy & Older Adults Hypoglycemia: Prevention & Treatment Impact of Landmark Studies on Clinical Practice
2:30 – 2:45 PM	Break
2:45 – 3:15 PM	Noxious 9 and using ADA and AACE algorithms to treat Type 2 Addressing Chronic Kidney Disease
3:15 – 4:45 PM	Solving the Mystery: Assessing and Addressing Cardiovascular Monitoring and Risk Reduction

Diabetes Education SERVICES 25 years

Diabetes Education SERVICES

25 years



Day 1 October 22, 2026
www.DiabetesEd.net

Diabetes Education SERVICES 25

Class starts at 8:00am



- Enjoy Breakfast & Beverages
- Make yourself at home
- Download CDCES Coach App for Resource page, Store & More
- Choose Team name

Our Virtual Customer Happiness Team!

Bryanna Sabourin
Director of Operations
& Customer Happiness

Ashlie Sabourin
Customer Happiness
Advocate

Scan QR Code to Chat

If you have questions, You can chat with Ashlie or Bryanna. Scan code on the contact cards at your table.

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We Expanded our Certification

For Pharmacists: Upon successfully completing the online evaluation, your credit will be submitted to CPE Monitor. Please check your NABP account within thirty (30) days to make sure the credit has posted.

ACCREDITATION

Earn 15.50 CEs for 2-day Live Seminar

Estimated time to complete the activity: 15 hours and 30 minutes
+Plus 17 hours from included bonus courses
(Visit our Online University at www.DiabetesEd.net to complete bonus courses).

Complete Eval at the end of Day 2 to get CE Certificates

FREE Bonus Courses on Online University

- We can't cover it all in this live course.
- So, we provide supplemental courses.
- Now includes "Behavior Change Theories made Easy"

- Test Taking Practice Exam Toolkit
- Behavior Change Theories Made Easy
- ADA Standards 1 & 5
- ADA Standards 2 & 6
- ADA Standards 3 & 5
- ADA Standard 13
- ADA Standard 14
- ADA Standard 15
- ADA Standard 16
- Mindfulness & Compassion in the Diabetes Encounter

Thank you for Being a Part of This Awesome Community – Join Conference FB Page & Ad Pics



Important Stuff

- Sign in each day please
- Breakfast & lunch provided!
  - Vegetarian options for those who requested
- Green Envelope
  - PocketCards, Sticker, Chat 411
- Handouts & Resources Module has PDF of all Slides
- Team Names & Quick Quizzes– Note your table number

Giving Out Prizes is BACK

- Enter Raffle
- DiaBingo Prizes
- Who made longest journey?
- We love having fun!



Coach Bev has no Conflict of Interest

- She's not on any speaker's bureau
- Does not invest or have any financial relationships with diabetes related companies.
- Gathers information from reading package inserts, research and articles
- The ADA Standards of Medical Care is main resource for course content

Diana Isaacs, PharmD, BCPS, BCACP, BC-ADM, CDCES, FADCES, FCCP



- Provides diabetes care to diverse population including T1D, T2D, transplant, pregnancy and other high-risk individuals
- Engaged in clinical research and diabetes advocacy
- Usually sees about 10 clients a day – Constantly mentoring
- Author, Researcher, Podcaster, Thought Leader

Endocrine Clinical Pharmacy Specialist
Director, Education & Training in Diabetes Technology
Co-Director Center for Endocrine Disorders in Pregnancy
Cleveland Clinic Endocrinology and Metabolism Institute
ADCES Educator of the Year in 2020 | ADA Outstanding Educator in Diabetes 2026

Conflict of Interest

Partners for Advancing Clinical Education

Diabetes Education Services

Faculty and Disclosure of Conflicts of Interest

Partners requires every individual in a position to control educational content to disclose all financial relationships with ineligible companies that have occurred within the past 24 months. Ineligible companies are organizations whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients.

All relevant financial relationships for anyone with the ability to control the content of this educational activity are listed below and have been mitigated according to Partners policies. Others involved in the planning of this activity have no relevant financial relationships.

Faculty	Disclosures
Beverly Thomassian	Has no relevant financial relationships.
Diana Isaacs	Consultant, Advisor, Speaker: Abbott, Dexcom, MiniMed, Novo Nordisk, Insulet, Lilly, Cequr, Sanofi, Beta Bionics, and Sequel
Christine Craig	Diabetes Devices, Product Trainer: Tandem & Medtronics

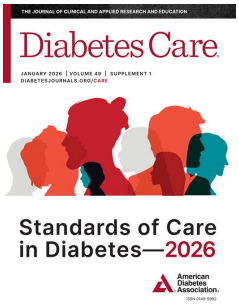
Diabetes Overview and Glycemic Goals

Objectives:

1. Discuss current Diabetes ADA & AACE Standards
2. Describe person-centered care for Type 1, Type 2, LADA, GDM
3. List steps for Medical Evaluation, Risk Identification and Prevention
4. State glycemic targets across the lifespan
5. Discuss hypoglycemia prevention & treatment
6. Describe significance of Landmark Diabetes Studies
7. List medications considerations for Type 2
8. Describe the pharmacology Algorithms
9. Discuss most recent cardiovascular risk mitigation strategies and goals.



Standard 17 – Diabetes Advocacy





17. Diabetes Advocacy

- People living with diabetes deserve to be free from the burden of discrimination.
- We need to all be a part of advocating to ensure a healthy and productive life for people living with diabetes.
- Make sure cost is not a barrier to diabetes self-management.



Diabetes Care needs to meet outlined standards in all settings.

- In school setting
- Young children in childcare
- For Drivers
- In work settings
- In Detention Facilities
- Insulin Access & Affordability

17. Diabetes Advocacy: Standards of Care in Diabetes—2026

American Diabetes Association Professional Practice Committee for Diabetes*

CDC Announces



35% of Americans will have Diabetes by 2050

Boyle, Thompson, Barker, Williamson
2010, Oct 22:8(1)29
www.pophealthmetrics.com

Poll Question 1

- What percent of U.S. adults are living with undiagnosed and diagnosed type 2 diabetes?
- A. About 30%
- B. 11.3%
- C. 14.7%
- D. 25.6%



Type 2 Diabetes in America 2026

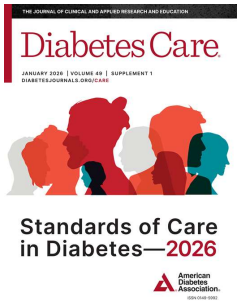
- 14.7% with Diabetes - 38 million adults
  - 25% don't know they have it
- 38% with Prediabetes – 100+ million adults

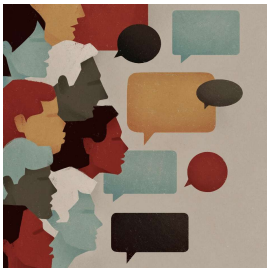
Figure 3. Age-adjusted, county-level prevalence of diagnosed diabetes among adults aged 20 years or older, United States, 2004, 2012, and 2019



https://gis.cdc.gov/grasp/diabetes/diabetesatlas-statsreport.html

Standard 1- Improving Care & Population Health





1. Improving Care - Population Health

- "Health outcomes of a group of individuals
  - including the distribution of health outcomes within the group"
- These outcomes can be measured in terms of health outcome:
  - mortality, morbidity, health, and functional status
  - disease burden
    - (incidence and prevalence)
  - behavioral and metabolic factors
    - (exercise, diet, A1C, etc.)



ADA Standards 2026



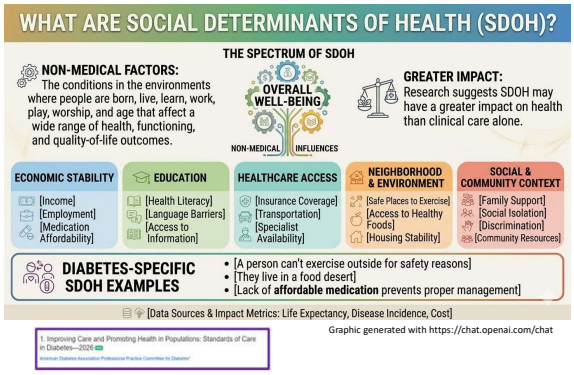
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Diabetes Prevalence Stats

- **For adults in U.S., diabetes prevalence:**
  - American Indians and Alaska Natives – highest rates
  - Non-Hispanic Blacks (17.4%),
  - People of Hispanic origin (15.5%),
  - Non-Hispanic Asians (16.7%)
  - White Individuals (13.6%)
- **Education and SES and Location**
  - Less than high school ed (13.1%)
  - More than high school (6.9%)
  - Living below federal poverty (13.1%)
  - Living at 500% of federal poverty (5.1%)
  - Rural living (9.5%)
  - Metropolitan (8.1%)

1. Improving Care and Promoting Health in Populations: Standards of Care in Diabetes—2026

Social Determinants (Drivers) of Health



Graphic generated with https://chat.openai.com/chat

1. Improving Care and Promoting Health in Populations: Standards of Care in Diabetes—2026

Status of Diabetes Care

- In 2015–2018, U.S. community-dwelling adults with diabetes achieved:
  - A1C <7% by 50.5%
    - 75.4% achieved A1C <8%.
  - BP target of <130/80 achieved by 47.7%
    - 70.4% achieved blood pressure <140/90 mmHg.
  - Lipid control (non-HDL cholesterol) <130 mg/dL, achieved by 55.7%
- 22.2% met targets for all three risk factors
- Many not receiving adequate lifestyle or pharmacotherapy.

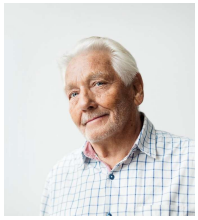


1. Improving Care and Promoting Health in Populations: Standards of Care in Diabetes—2026

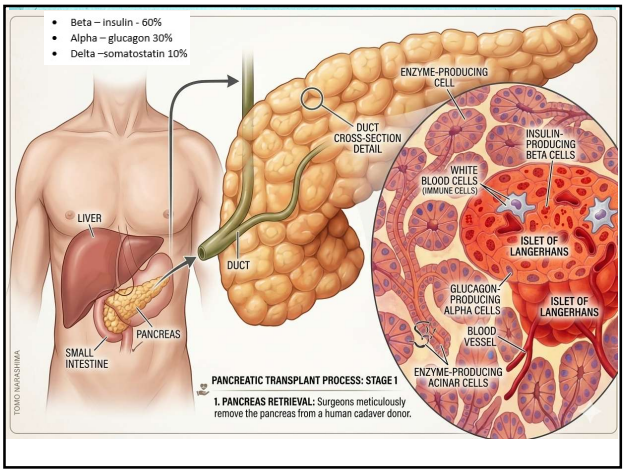
Rising Complication Rates

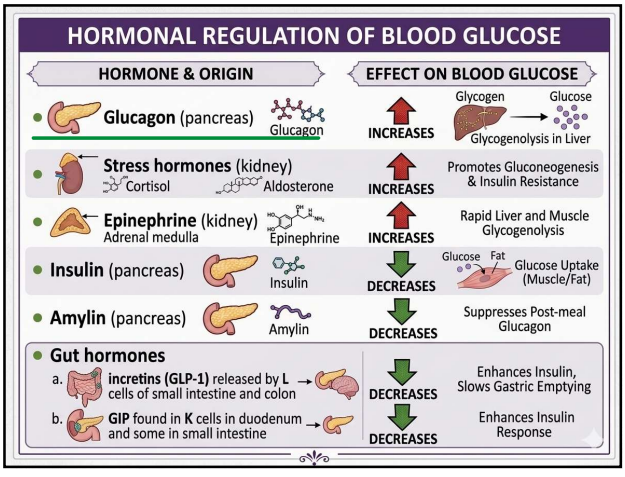
- Since 2010, adults with diabetes across the U.S. complication rates are increasing for:
  - kidney failure,
  - nontraumatic lower-extremity amputations,
  - stroke,
  - heart failure, and
  - hyperglycemic crises

Rates of myocardial infarction have plateaued, reversing decades of earlier improvements

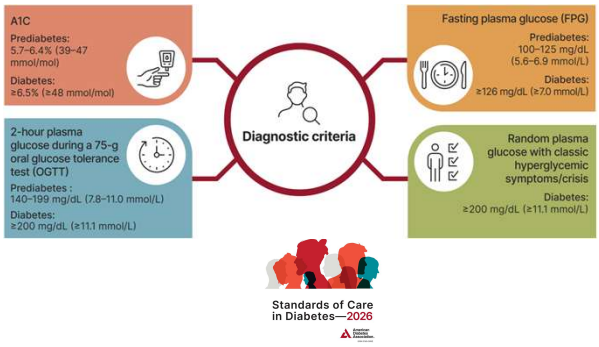


1. Improving Care and Promoting Health in Populations: Standards of Care in Diabetes—2026





Standard 2 – Diagnosis & Classification



Pre Diabetes & Type 2- Screening Guidelines (ADA 2026 Clinical Practice Guidelines)

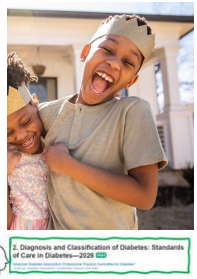
1. Start screening all people at age 35.
2. Screen at any age if BMI ≥ 25 (Asians BMI ≥ 23) plus one or > additional **risk factor**:



- First-degree relative w/ diabetes
- Member of a high-risk ethnic population
- Habitual physical inactivity
- History of heart disease
- Check more frequently if taking high risk meds; antiretrovirals, 2nd generation antipsychotics or steroids, thiazide diuretics, statins
- History of pancreatitis, prediabetes, GDM, periodontal disease

Risk-Based Screening for Prediabetes or Type 2 in Children and Youth

- Test youth with excess weight (BMI >85% percentile)
- Plus any ONE of following risk factors:
  - Maternal diabetes or GDM during child's gestation
  - Family history type 2 in 1st or 2nd degree relative
  - Native American, African American, Latino, Asian American, Pacific Islander
  - Signs of insulin resistance (acanthosis nigricans, HTN, dyslipidemia, Polycystic Ovary Syndrome – PCOS, large or small for gestational-age birth weight



- Test at 10 yrs or puberty (whichever is first and at least every 3 yrs or more frequently if indicated. Consider earlier screening if multiple risk factors.

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Diabetes Screening Guidelines

(ADA 2026 Clinical Practice Guidelines – Cheat Sheet)

RECOMMENDATIONS FOR DIAGNOSIS AND CLASSIFICATION OF DIABETES – 2026

CRITERIA FOR SCREENING FOR DIABETES AND PREDIABETES IN ASYMPTOMATIC ADULTS – TABLE 1

DIABETES TYPE	RISK FACTORS and FREQUENCY OF SCREENING and TESTING FOR DIABETES
Type 1	Screen those at risk for presymptomatic type 1 diabetes, by testing autoantibodies to insulin, GAD, islet antigen 2 or ZnT8. Also test antibodies for those with type 1 phenotypic risk (younger age, weight loss, ketoacidosis , etc.)
Type 2	1. Test all adults starting at age **35** for prediabetes and diabetes using Fasting Plasma Glucose, A1C or OGTT. 2. Perform risk-based screening if BMI ≥ 25 or BMI ≥ 23 in Asian Americans 10yrs+ with 1 or more risk factors: • History of cardiovascular disease • Physical inactivity • First degree relative with diabetes • HDL ≤ 35 mg/dl or triglyceride ≥ 250 mg/dl • High risk ethnicity or ancestry • Hypertension ≥ 130/80 or on therapy for HTN • Other conditions associated with insulin resistance (PCOS, Acanthosis Nigricans, Steatosis, Obesity) 3. If results normal, repeat test at a minimum of 3-year intervals or more frequently based on risk status. 4. **Test Yearly** if A1C ≥ 5.7% or Impaired Fasting Glucose or History of GDM (test at least every 1- 3 years) 5. **Closely monitor high-risk groups**- people with HIV, exposure to high-risk medicines, evidence of periodontal disease, history of pancreatitis.



Poll Question 2

- Which of the following level is considered diabetes range?



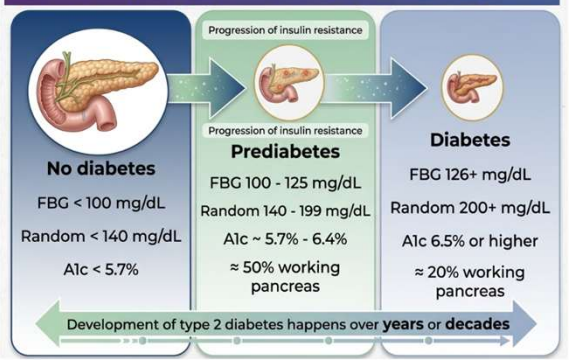
a. Fasting BG of 122

b. A1c of 5.9 %

c. After meal BG of 207

d. Random BG of 143

2. Diagnosis and Classification of Diabetes | Natural History of Diabetes



Recommendations for Diagnosis and Classification of Diabetes – 2026

Criteria for Screening for Diabetes and PreDiabetes in Asymptomatic Adults – Table 1

DIABETES TYPE	RISK FACTORS and FREQUENCY OF SCREENING and TESTING FOR DIABETES
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2. Diagnosis and Classification of Diabetes: Standards of Care in Diabetes—2026

Tests to Diagnose Diabetes - Table 2

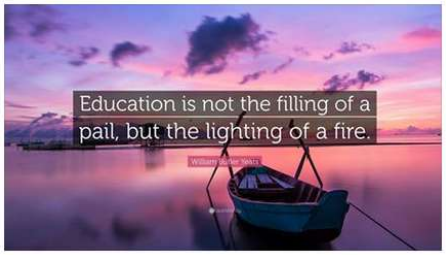
STAGE	For all the below tests, in the absence of unequivocal hyperglycemia, Confirm results by repeat testing.			
	A1C *NGSP certified & standardized assay*	**Fasting* Plasma Glucose (FPG)** **No intake 8 hrs.*	**Random Plasma Glucose**	**Oral Glucose Tolerance Test (OGTT) 75-g** (Carb intake of ≥ 150 g/day for 3 days prior to test.)
Diabetes	A1C ≥ 6.5%	FPG ≥ 126 mg/dl	Random plasma glucose ≥ 200 mg/dl plus symptoms[1] [1]Random = any time-of-day w/out regard to time since last meal; symptoms include usual polyuria, polydipsia, and unexplained wt. loss.	Two-hour plasma glucose (2hPG) ≥ 200 mg/dl
Prediabetes	A1C 5.7 – 6.4%	Impaired Fasting BG (IFG) = FPG 100-125 mg/dl		Impaired Glucose Tolerance (IGT) = 2hPG 140 -199 mg/dl
Normal	A1C < 5.7%	FPG < 100 mg/dl		2hPG < 140 mg/dl

Diabetes is Complex

- Goal – achieve well being and negotiated outcomes
- Psychological factors:
  - Environmental
  - Social
  - Behavioral
  - Emotional
- Keep it person centered while integrating care into daily life
  - Consider the individual



Let's meet people where they are at.



Type 1 ~ Immune Mediated 5-10% of Diabetes



ADCES In Practice - March 2024
Recent Advances in Type 1 Diabetes: Teplizumab (Tzeild®)
Karen S. Fiano, PHARMD, BCACP, Devada Singh-Franco, PHARMD, CDCES, Young M. Kwon, BS, PHD

1.5 Million people have type 1 in U.S.

Prevalence increasing:

2001 – 1.48 per 1000 youths diagnosed with diabetes

2017 - 2.15 per 1000 youths diagnosed with diabetes

Incidence & Prevalence increasing

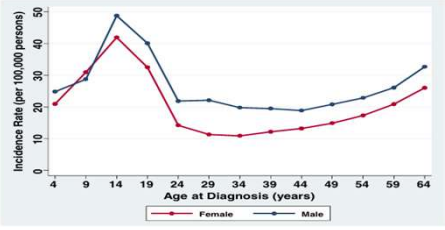
Highest incidence in Finland or Northern Europe.

Type 1 is 5- 10% of all Diabetes

- Auto-immune pancreatic beta cells destruction
- Most commonly expressed at age 10 – 14
- Insulin sensitive (require 0.5 - 1.0 units/kg/day)
- Expression due to a combo of genes and environment:
  - Autoimmunity tends to run in families
  - Exposure to virus or other environmental factors



T1D Can Occur at Any Age



* A longitudinal study comprising 32,476 commercially insured Americans aged 0-64 years who developed T1D between 2001 and 2015.
Rogers MAM, et al. BMC Med. 2017;15(1):199.

Screen People at Increased Risk of T1D

Screening for T1D autoantibodies is recommended by

American Diabetes Association.

ISPAD International Society for Pediatric and Adolescent Diabetes

Breakthrough T1D Formerly JDRF

First-degree relatives of individuals with T1D

~15x greater risk

of T1D versus the general population

Individuals with personal or family history of select autoimmune diseases

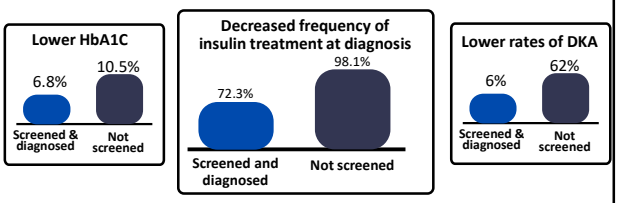
2-3X greater risk of T1D in individuals with select autoimmune diseases

Thyroid disorders
- Hashimoto's thyroiditis
- Graves' disease

Celiac disease

Also screen those with phenotypic risk factors that overlap with T1D (ex. Younger age at diagnosis, intentional weight loss, ketoacidosis, short to insulin treatment)

Benefits of Early T1D Detection



Sims E. et al. Diabetes. 2022 Apr 1;71(4):610-623.
Hummel S, et al. Diabetologia. 2023 Sep;66(9):1633-1642

Ordering Autoantibodies

AAbs are currently the only available serum immune marker to identify T1D prior to hyperglycemia and/or symptom onset

	GADA	IAA	IA-2A	ZnT8A	ICA	Blood draw location	Sampling method
Local laboratories (e.g, Guest diagnostics, Labcorp)	✓	✓	✓	✓	✓	Local laboratory or healthcare provider's office	Blood draw
Online ordering, delivery to doctor's office	✓	✓	✓			Testing kits from vendors such as Enable Biosciences through online ordering	In-clinic finger poke blood test
TrailNet			✓	✓	✓	TrailNet-sponsored event, health fair, at-home kit (by mail)	Blood draw or at home finger poke
Autoimmunity screening for kids	✓	✓	✓	✓		Barbra Davis Center, Children's Hospital Colorado, UC Health Laboratory, at-home kit (by mail)	Blood draw or at-home finger poke

Glutamic acid decarboxylase 65 autoantibody (GADA)
Insulin autoantibody (IAA)
Insulinoma-associated antigen 2 autoantibody (IA-2A)
Zinc transporter 8 autoantibody (ZnT8A)
Islet cell autoantibody (ICA)

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Stages of T1D

	Stage 1	Stage 2	Stage 3
Characteristics	• Autoimmunity • Normoglycemia • Presymptomatic	• Autoimmunity • Dysglycemia • Presymptomatic	• Autoimmunity • Overt hyperglycemia • Symptomatic
Diagnostic criteria	• 2 or more islet autoantibodies Glucose levels are in normal range FBG<100mg/dL A1C<5.6% 2-h PG <140mg/dL	• 2 or more islet autoantibodies Dysglycemia: Elevated IFG and/or IGT • FPG 100–125 mg/dL • 2-h PG 140–199 mg/dL • A1C 5.7–6.4% or ≥10% increase in A1C	• Autoantibodies may disappear over time (5-10% may not express antibodies) • Diabetes diagnosed by standard criteria

Pharmacologic Intervention to Delay Stage 3 T1D

- Teplizumab-Tzield (CD3-monoclonal antibody)
- An option for individuals aged ≥1 years with stage 2 T1D to delay progression to Stage 3 T1D
- 14-day infusion for stage 2 T1D
- In a single trial, 44 individuals received 14-day course of teplizumab vs 32 in placebo
- The median time to delay stage 3 T1D was 2 years
  - 48.4 months in teplizumab group vs. 24.4 months placebo
- Financial assistance available

Herold KC, et al; Type 1 Diabetes TrialNet Study Group. An Anti-CD3 Antibody, Teplizumab, in Relatives at Risk for Type 1 Diabetes. N Engl J Med. 2019 Aug 15;381(7):603-613.

Templizumab for Stage 3 T1D

- An option for individuals aged 6-17 with stage 3 T1D diagnosed to delay the decline in endogenous insulin
- Must start within 8 weeks of diagnosis
- Requires 2, 12 day infusions, 6 months apart
- Patients treated with teplizumab (217 patients) had significantly higher stimulated C-peptide levels than patients receiving placebo (111 patients) at week 78 (95% CI, 0.09 to 0.17; P<0.001)
- Caution: cytokine release syndrome, lymphopenia

TZIELDHCP.com | For US Healthcare Providers

Ramos EL, et al ; PROTECT Study Investigators. Teplizumab and β-Cell Function in Newly Diagnosed Type 1 Diabetes. N Engl J Med. 2023 Dec 7;389(23):2151-2161.

Monitoring for T1D Progression

3. Prevention or Delay of Diabetes and Associated Comorbidities: Standards of Care in Diabetes—2026

- In people with presymptomatic T1D; Monitor for disease progression
  - A1C every 6 months
  - 75- OGTT every year
  - Modify screening frequency based on number/type of antibodies, age and glycemic metrics.
  - May benefit from CGM to monitor progression
- In kids, monitor every 3 months



Trialnet.org

Phillip M, et al. Diabetes Care. 2024 Aug 1;47(8):1276-1298.

Type 1 & Lifestyle Prevention

- Observational studies in those with antibodies, shed light on factors that ***increase*** β-cell demand:
  - Less physical activity
  - Consuming higher glycemic index foods
  - Sugar intake
- Factors that **reduced risk** of progression from TEDDY study:
- Daily minutes spent doing vigorous physical exercise.
- More info needed

3. Prevention or Delay of Diabetes and Associated Comorbidities: Standards of Care in Diabetes—2026

Quick Question 3

- **Question:** LT is diagnosed with stage 1, type 1 diabetes. He has 2 positive autoantibodies and his glucose is in normal range. He asks you if he is a candidate for "that therapy" that can protect beta cells and slow progression of type 1 diabetes. **What is the most accurate response?**
  a. Unfortunately, you are not a candidate, since you already have 2 positive autoantibodies.
  b. Let's talk to your provider about the possibility of starting teplizumab therapy.
  c. Since you have T1D, the best early intervention is insulin therapy.
  d. Since you are in stage 1, the therapy is not indicated, but let's talk about monitoring.

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Determine if Type 1 - Use AABBCC Approach

- **A**ge
  - e.g., for individuals <35 years old, consider type 1 diabetes
- **A**utoimmunity
  - e.g., personal or family history of autoimmune disease or polyglandular autoimmune syndromes
- **B**ody habitus
  - e.g., BMI <25 kg/m2
- **B**ackground
  - e.g., family history of type 1 diabetes
- **C**ontrol
  - e.g., level of glucose control on noninsulin therapies
- **C**omorbidities
  - e.g., treatment with immune checkpoint inhibitors for cancer can cause acute autoimmune type 1 diabetes or presence of other autoimmune conditions



Type 1 Diabetes Features?



Misdiagnosis is common and can occur in ~40% of adults with new type 1 diabetes

- For JR, a 28 admitted to the ICU with a blood glucose of 476 mg/dl, pH of 7.1, anion gap of 15. Recently lost 13 pounds.

Type I Most Discriminative Features

- Younger than 35 years at diagnosis
- Lower BMI (<25 kg/m^2)
- Unintentional weight loss
- Ketoacidosis
- Glucose 360 mg/dl or greater.



What kind of Diabetes?

- 58 yr old, states she has had type 1 diabetes for 18 years. Quit smoking a year ago and gained about 20 lbs. BMI 25.
- Meds
  - Lispro 18-23 units before each meal
  - Glargine 28 units at bedtime
  - Metformin 500mg TID
- What tests would you recommend?



25% of ind's with Type 1 also have type 2 diabetes.
ADA Post Grad, 2010

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What type of Diabetes?

- 72 Years old
- A1c 3 months prior 6.2%
- A1c now 13.9%
- BMI 24.5
- Lost about 10 pounds over last month



Latent AutoImmunity Diabetes in Adults (LADA)

- Antibody positive to 1-2 of below
  - GAD-65 autoantibodies
  - Insulin Autoantibodies
  - Islet Cell antigen-2
  - ZnT8
- Adult Age at onset
- Usually benefit from insulin w/in first 6 months of diagnosis
- Early insulin therapy may preserve beta cell function



Latent Autoimmune Diabetes

Diabetes Care 26:536-538, 2003
Jerry P. Palmer, MD and Irl B. Hirsch, MD

LADA Clinical Features Compared to Type 2

Feature	LADA	Type 2
Age <50	63%	19%
Acute hyperglycemia	66	24
BMI < 25	33	13
Hx of autoimmune dx	27	12
Family hx autoimmune	46	35

Latent Autoimmune Diabetes
Venkatraman Rajkumar, Steven N. Levine.
Author Information and Affiliations
Last Update: June 21, 2022.

Practical Diabetology March 08, Unger MD



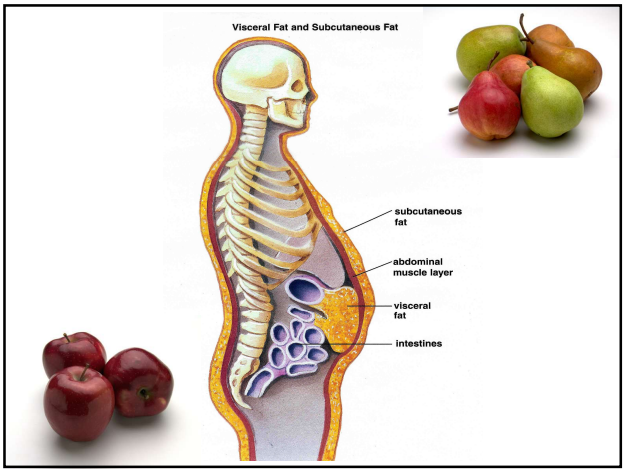
Patti Labelle
"divabetic"
“I have diabetes, it doesn’t have me”



Signs of Diabetes

- Polyuria
- Polydipsia
- Polyphasia
- Weight loss
- Fatigue
- Skin and other infections
- Blurry vision

- Glycosuria, H_2O losses
- Dehydration
- Fuel Depletion
- Loss of body tissue, H_2O
- Poor energy utilization
- Hyperglycemia increases incidence of infection
- Osmotic changes



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What is Type 2 Diabetes?

- Type 2 diabetes is associated with insulin secretory defects related to
  - genetic predisposition,
  - epigenetic changes (how genes are expressed)
  - inflammation, and
  - metabolic stress.
- Future classification schemes for diabetes will likely focus on the pathophysiology of the underlying β-cell dysfunction.



Life Study – Mrs. Jones

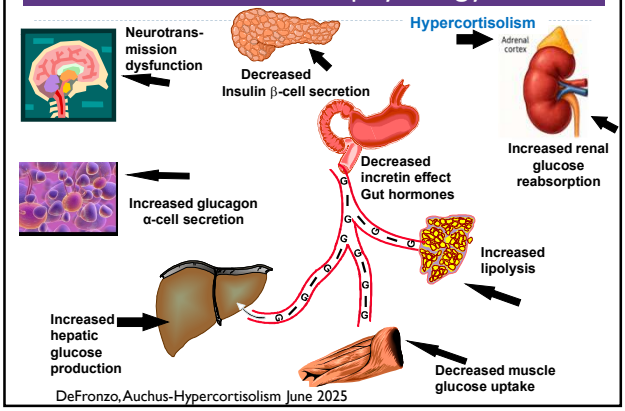
MJ is 62 years old, with a BMI of 36 and complains of feeling tired and urinating several times a night. Has a urinary tract infection. Her A1c is 8.3%, glucose 237.

MJ is hypertensive with a history of gestational diabetes. No ketones in urine.

- What are risk factors and signs of diabetes?
- You find a few moments to teach and MJ asks you some questions.



The Noxious Nine – Pathophysiology T2D



Hypercortisolism in Type 2

- Cortisol increases gluconeogenesis in the liver
- Reduces peripheral glucose uptake → insulin resistance
- Stimulates protein catabolism and lipolysis
- Chronic cortisol elevation → persistent hyperglycemia and hypertension



- Can lead to "Difficult to Control Type 2 Diabetes"
- CATALYST study revealed about 24% of people with elevated BG despite meds, may be due to hypercortisolism.
- Treatment with mifepristone decreased weight and BG.

DeFronzo, Auchus-Hypercortisolism June 2025 pmc.ncbi.nlm.nih.gov+3HCP

Comparison of Type 1,Type 2, LADA

	Type 1	Type 2	LADA
Excess weight	x	xxx	x
Insulin dependence	xxx	30%	6mos
Respond to oral agents	0	xxx	x
Ketosis	xxx	x	x
Antibodies present	xxx	0	xx
Typical Age of onset	teens	adult	adult
Insulin Resistance	0	xxx	x

Specific type of diabetes due to other causes

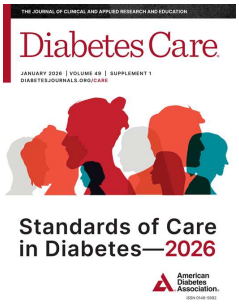
- Medications:
  - Steroids
  - Anti-retroviral meds
  - Antipsychotic meds
  - Transplant meds
  - Checkpoint inhibitors

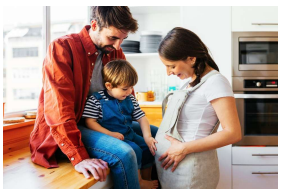


- Exocrine pancreas disease:
  - Cystic fibrosis
  - Type 3c
  - Pancreatitis
- Monogenic diabetes syndromes
- Agent Orange

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Standard 2 & 15 Diagnosis |Pregnancy & Diabetes





Poll question 4

- What best describes gestational diabetes?



a. Diabetes discovered within the first 12 weeks of pregnancy.
b. Diabetes discovered in the 24-28 weeks of pregnancy.
c. Risk of getting diabetes before pregnancy.
d. Diabetes discovered at any point during pregnancy.

Diabetes in Pregnancy Background

- Prevalence of diabetes in pregnancy is increasing
- Definitions
  - Pre-gestational diabetes: pre-existing type 1 or type 2 diabetes in pregnancy
  - Gestational diabetes: diabetes diagnosed in the 2nd or 3rd trimester of pregnancy



Rates of Gestational Diabetes (GDM) and Diabetes in Pregnancy increasing

- 1% to 2% have type 1 or type 2 during pregnancy
- ~9% develop GDM
- From 2000 to 2010
  - GDM rates increased 56%
  - Type 1 or type 2 before pregnancy increased 37%.
- Asian and Hispanic women have higher rates of GDM
- Black and Hispanic women have higher rates of type 1 or type 2 diabetes during pregnancy.



CDC
https://www.cdc.gov/reproductivehealth/maternalinfanthealth/diabetes-during-pregnancy.htm

Screening in Early Pregnancy

- Before 15 weeks, screen those with **risk factors** (B)
- Consider screening **everyone** before 15 weeks (E)

- If BG in normal range, recheck at 24-28 weeks for Gestational Diabetes using OGTT

- If fasting BG 110+ or A1C 5.9%+
  - At higher risk of adverse outcomes and more likely to experience GDM and need insulin.

2. Diagnosis and Classification of Diabetes: Standards of Care in Diabetes—2026 Diabetes Care 2026;49(Suppl. 1):S27–S49 | https://doi.org/10.2337/dc26-S002

Gestational DM ~ 9% of all Pregnancies

- Detected at 24-28 weeks of pregnancy (most insulin resistant phase)
- Rates are increasing:
  - Women getting pregnant later
  - Higher rates of obesity
- 50% chance of getting diabetes post delivery
- Offspring at greater risk of insulin resistance and diabetes



Glucose Monitoring in Pregnancy



- Check FBG and 1 or 2 hour PPG
- Pre-existing type 1, need to also check premeal BG
- CGM can help to achieve A1C targets when pre- and postprandial glucose targets
- Recommended for T1D and may be beneficial for other types of diabetes in pregnancy
  - Can reduce macrosomia and neonatal hypoglycemia in pregnancy complicated by type 1 diabetes.

15. Management of Diabetes in Pregnancy: Standards of Care in Diabetes—2026 Diabetes Care 2026;49(Suppl. 1):S321–S338

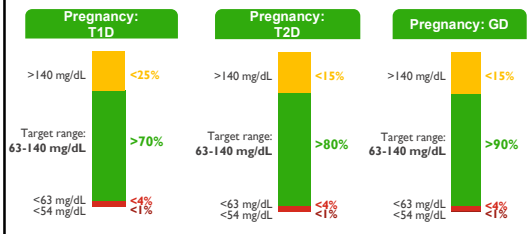
Glucose Targets in Pregnancy

	Blood Glucose Goal		
Glucose measurement	T1D or T2D	GD treated with insulin	GD not treated with insulin
Fasting glucose	70-95 mg/dL	70-95 mg/dL	<95 mg/dL
1 hr post-prandial glucose	110-140 mg/dL	110-140 mg/dL	<140 mg/dL
2 hr post-prandial glucose	100-120 mg/dL	100-120 mg/dL	<120 mg/dL

Monitor at least 4 times daily (FBG, PPG after each meal) or use CGM)

ADA. Diabetes Care. 2026; 49(Suppl 1): S27-49

CGM targets in Pregnancy



Battelino T, et al. *Diabetes Care*. 2019;42(8):1593-1603.
Benhalima K, et al. *Lancet Diab*, 2025. doi: 10.1016/S2213-8587(25)00335-3

Pharmacologic Treatment during Pregnancy



- Insulin is preferred therapy for all forms of diabetes in pregnancy
  - Does not cross placenta
  - Can overcome insulin resistance assoc w/ type 2
- Sulfonylureas pass through placenta / associated with neonatal hypo (glyburide)
- Metformin – lower risk of hypo and maternal wt gain but may increase prematurity rate/childhood obesity
  - Passes through placenta
  - If using for PCOS, stop by end of first trimester
- Refer to specialized center

Pregnancy and Hypertension



- If pregnant with diabetes and hypertension
  - Blood pressure target of <140/90 mmHg
    - Reduces risk for accelerated maternal hypertension
    - Minimizes impaired fetal growth
  - Initiate therapy if BP>140/90, reduce therapy if <90/60
  - Stop potentially harmful medications in prep for pregnancy
    - Avoid ACE inhibitors, angiotensin receptor blockers (ARBs), statins in sexually active women of childbearing age if not using reliable contraception
    - Preferred HTN meds: labetolol, nifedipine , clonidine, methyldopa
    - Other beta blockers except atenolol can be used

15. Management of Diabetes in Pregnancy: Standards of Care in Diabetes—2026 Diabetes Care 2026;49(Suppl. 1):S321–S338

See Diabetes and Pregnancy Level 2

Screening and Diagnosis of Diabetes Cheat Sheet

GESTATIONAL DIABETES (GDM)*

PREGNANCY SCREENING	TEST	DIAGNOSTIC CRITERIA
Screen to identify abnormal glucose metabolism before 15 weeks gestation Test those w/ risk factors (table 1) to identify undiagnosed prediabetes or diabetes at first prenatal visit.	Standard Diagnostic Testing and Criteria as listed in Diagnosing Diabetes –Table 2	Standard Diagnostic Testing and Criteria as listed in Diagnosing Diabetes –Table 2 Those with fasting of 110-125 or A1C of 5.9% to 6.4% are at higher risk of adverse outcomes (GDM, need insulin, preeclampisa and other)
Screen for GDM at 24–28 wks gestation for those without known diabetes. Screen those with GDM for diabetes 4 - 12 wks postpartum with 75-g OGTT. Lifelong screening at least every 3 yrs. *Please see reference below for complete guidelines.*	Can use either IADPSG consensus: **"One Step" 75-g OGTT** fasting and at 1 and 2 h (perform after overnight fast of at least 8 h) **"Two step" NIH Consensus – Step 1:** 50gm glucose load (non fasting) w/ plasma BG test at 1 hr. If BG ≥ 130-140*, go to **Step 2 >**	**One Step:** GDM diagnosis when ANY of following BG values are exceeded: • Fasting ≥92 mg/dl, • 1 h ≥180 mg/dl • 2 h ≥153 mg/dl **Two Step -Step 2** - 100g OGTT (fasting) GDM diagnosis if at least 2 of 4 BG measured at fasting, 1h, 2h, 3h after OGTT meet or exceed 95, 180, 155, 140 mg/dL respectively.

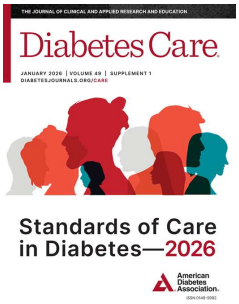
***Reference** - Diagnosis & Classification of Diabetes. American Diabetes Association Standards of Medical Care in Diabetes. Diabetes Care 2026 Jan; 49 (Supplement 1): S27-S49. **Compliments of Diabetes Education Services www.DiabetesEd.net**

2. Diagnosis and Classification of Diabetes: Standards of Care in Diabetes—2026

DiaBingo

- **B** Frequent skin and yeast infections
- **B** A BMI of ____ or greater indicates increased pre/diabetes risk?
- **B** To reduce complications, control **A**1c, **B**lood pressure, **C**holesterol
- **B** PreDiabetes – fasting glucose level of ___ to ____
- **B** Erectile dysfunction indicates greater risk for ____
- **B** Diabetes – fasting glucose level____ or greater
- **B** Type 1 diabetes is best described as an _____ disease
- **B** People with diabetes are _____ times more likely to die of heart dx
- **B** Elevated triglycerides, < HDL, smaller dense LDL
- **B** Each percentage point of A1C = _____ mg/dl glucose
- **B** At dx of type 2, about __% of the beta cell function is lost
- **B** Diabetes – random glucose ____ or greater

Standard 3 & AACE Prevention and Delay of Diabetes





PreDiabetes is FREAKING ME OUT



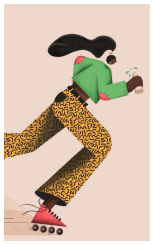


Do I look like I am freaking out?

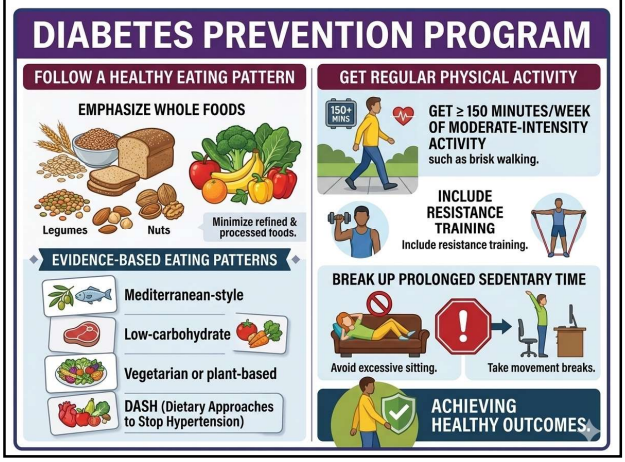
- Associated with higher rates of heart attack, stroke, neuropathy and vessel disease

3. Prevent or Delay Diabetes for those with Prediabetes

- Prediabetes defined as:
  - A1c 5.7 – 6.4% or fasting BG 100 -125mg/dl
- Action:
  - Screen yearly for diabetes
  - For adults with BMI 23/25
    - Refer to DPP approved programs
  - Should be covered by third-party payers,
  - Address inconsistencies in access – leverage technology
- Monitor people with prediabetes at least annually for development of type 2 diabetes.







DPP Short Term & Long-Term Evidence

The U.S. DPP trial demonstrated intensive lifestyle intervention **Reduces risk of incident type 2 diabetes by 58% over 3 years.**

- In the U.S. Diabetes Prevention Program Outcomes Study (DPPOS) benefits continued:
  - 34% reduction at 10 years
  - 27% reduction at 15 years
  - 24% reduction at 21 years*

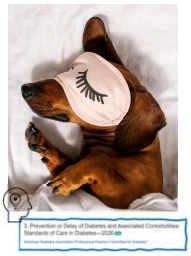




*major cardiovascular events were not significantly different from comp group 21 years after the DPP concluded.

Sleep quality and Diabetes Risk

- Sleep quality "an individual's self-satisfaction with all aspects of sleep experience."
- Sleep modulates important metabolic, endocrine, cardiovascular processes.
- Poor sleep quality associated with 40% increased risk of developing type 2 diabetes
- Night owls have 2.5 higher odds for type 2 than early birds (chronotype)



3. Metformin & Prediabetes

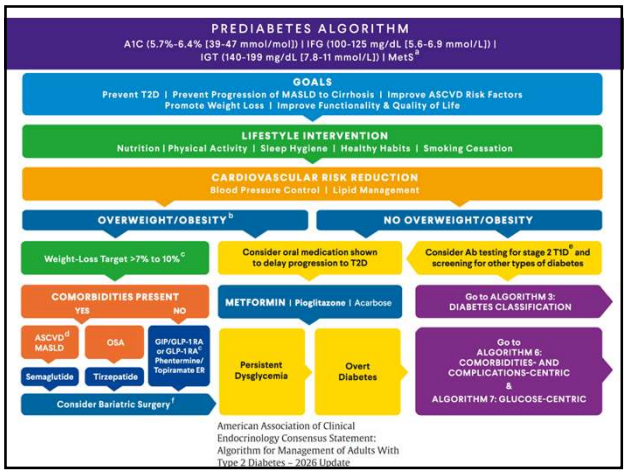
- Use metformin for prevention of type 2 for those at high risk:
  - 25–59 yrs with BMI ≥35
  - A1C 6.0% or more
  - History of GDM
- Periodic assess of B12, esp if have anemia, peripheral neuropathy.
- Consider Metformin to prevent hyperglycemia in high-risk individuals:
- Ind's treated with Chemo medications:
  - Phosphatidylinositol 3-kinase α (PI3Kα) inhibitor (e.g., alpelisib and inavolisib).
  - High dose steroids

Poll Question 5

- A 36-year-old has an A1C of 6.2%, BMI of 36, hypertension, and a strong family history of type 2 diabetes. Despite sustained nutrition and physical activity interventions, they can't seem to lower their A1C. They ask whether medication could help reduce their risk of developing type 2 diabetes. Which approach is MOST consistent with American Association of Clinical Endocrinology (AACE) recommendations?



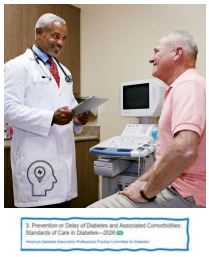
- **A.** Avoid pharmacologic treatment until the A1C or FPG reaches the diagnostic threshold for diabetes.
  B. Consider pharmacotherapy, including metformin or GLP-1–based therapy to reduce metabolic risk.
  C. Initiate a sulfonylurea to improve beta-cell function and prevent progression to type 2 diabetes.
  D. Initiate basal insulin to preserve pancreatic beta-cell function and lower A1C.



American Association of Clinical Endocrinology Consensus Statement: Algorithm for Management of Adults With Type 2 Diabetes – 2026 Update

GLP-1 Therapy for Prediabetes?

- The use glucagon-like peptide 1–based therapies for weight management in individuals with BMI of 25+ is highly beneficial and should be considered.
- Every kilogram of weight loss confers a 16% reduction in risk of progression over 3.2 years



Incretins: GLP-1 & GLP-1/GIP Receptor Agonists

GLP-1: glucagon like peptide 1
GIP: glucose-dependent insulinotropic polypeptide

The Rise of GLP-1 Agonists

- 1st available in 2005 (exenatide)
- Semaglutide FDA approval 2017
- Tirzepatide FDA approval 2022
- 12% (1 in 8 adults) said they have taken a GLP-1 agonist



KFF Health Tracking Poll May 2024:The Public's Use and Views of GLP-1 Drugs | KFF

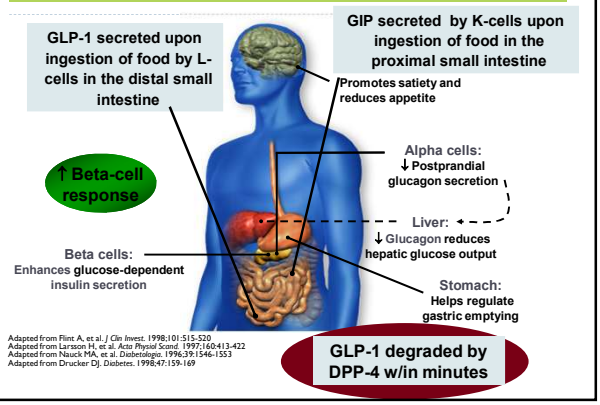
Polling Question 6

GLP-1 Medications are approved for all of the following conditions except:

A. Obesity
B. Type 2 Diabetes
C. Sleep apnea
D. Alcohol use disorder
E. Kidney disease

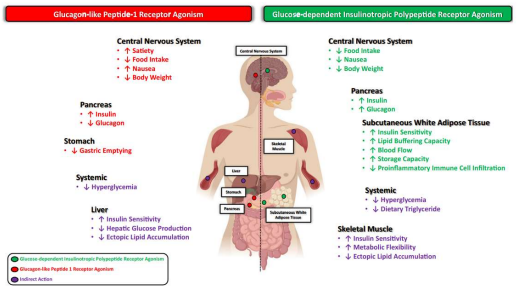


Understanding the Natural Role of Incretins



Adapted from Flint A, et al. *J Clin Invest.* 1998;101:515-520
Adapted from Larsson H, et al. *Acta Physiol Scand.* 1997;160:413-422
Adapted from Nauck MA, et al. *Diabetologia.* 1996;39:1546-1553
Adapted from Drucker DJ. *Diabetes.* 1998;47:159-169

Action of GLP-1 and GIP



Samms RJ, Coghlan MP, Sloop KW. How May GIP Enhance the Therapeutic Efficacy of GLP-1? Trends Endocrinol Metab. 2020 Jun;31(6):410-421.

PocketCard: GLP-1 & GIP RA

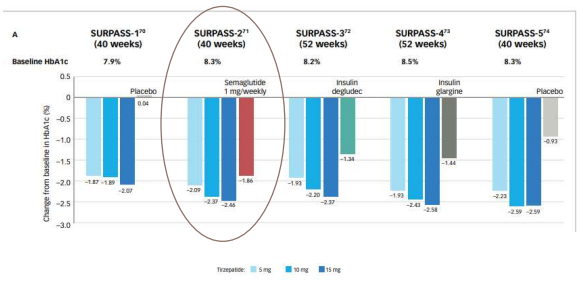
GLP-1 & GIP for Diabetes & Weight Loss

Class/Action	Generic Name	Diabetes Version Dose & Indications	Wt loss Version Max Dose & Indications	Considerations
GLP-1 RA - Glucagon Like Peptide Receptor Agonist **"Incretin Mimetic"** • Increases insulin release with food • Slows gastric emptying • Promotes satiety • Suppresses glucagon	exenatide 2x day injection	exenatide 5 and 10 mcg		**Side effects:** N/V, wt loss. Report signs of pancreatitis or ileus, stop med. **Black box warning:** Avoid if family history medullary thyroid tumor. FDA approved to reduce Major Adverse CV Events; MI, Stroke, Death (except exenatide, Saxenda). †Approved for peds 10-17 yrs ††Approved for Peds 12-17 years Lowers A1C ~ 0.5 - 1.6% Wt loss: 4-9% (Diabetes versions)
	liraglutide 1x day injection	Victoza† 0.6, 1.2, 1.8mg	Saxenda†† - 3.0mg	
	dulaglutide 1x week injection	Trulicity† 0.75, 1.5, 3.0, 4.5mg		
	semaglutide 1x week injection	Ozempic 0.25, 0.5, 1.0, 2.0mg Tx for CKD	Wegovy†† - 2.4mg High Dose - 7.2mg Tx for MASH	
	semaglutide Daily Oral - fasting w/ H20	Oral Ozempic 1.5, 4, 9 mg Rybelsus 3, 7, 14 mg	Wegovy - 25mg Oral tablet	
GLP-1 & GIP Receptor Agonist Activates receptors for GLP-1 (see above) & Glucose-dependent Insulinotropic Polypeptide (GIP).	tirzepatide 1x week injection. Single dose prefilled pen or vial. Gradually adjust dose based on shared decision, individual goals.	Mounjaro† 2.5, 5.0, 7.5, 10, 12.5, 15 mg. Reduces Major Adverse CV Events; MI, Stroke, Death	Zepbound Max dose 15mg Tx for sleep apnea	**Side effects:** N/V, wt loss. Report pancreatitis or signs of ileus, stop med. **Black box warning:** Avoid if family hx of medullary thyroid tumor. †Approved for peds 10-17 yrs Lowers A1C ~ 1.8 - 2.4% Wt loss: 7-14% (Diabetes versions)

Oral Semaglutide (Rybelsus, Ozempic)

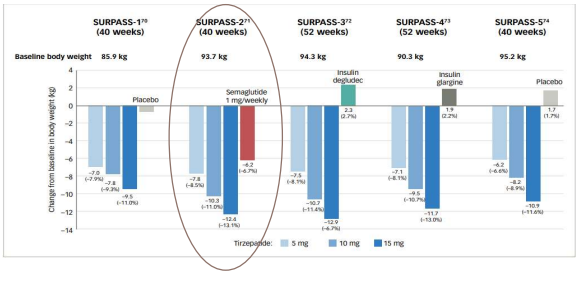
- Barriers to GLP-1 oral absorption:
  - Degradation by gastrointestinal enzymes
  - pH induced conformational changes
  - Limited protein permeability of the intestinal membrane
- Semaglutide co-formulated with sodium N-(8-[2-hydroxybenzoyl] amino) caprylate (**SNAC**), an absorption enhancer
- Absorbed in stomach where SNAC causes a localized increase in pH, leading to higher solubility and protection against proteolytic degradation
- Take daily at least 30 mins before first food, beverage, or other oral meds
- Take with no more than 4 ounces of plain water
- Swallow tablets whole (don't cut or crush)

SURPASS (Tirzepatide): A1C Change



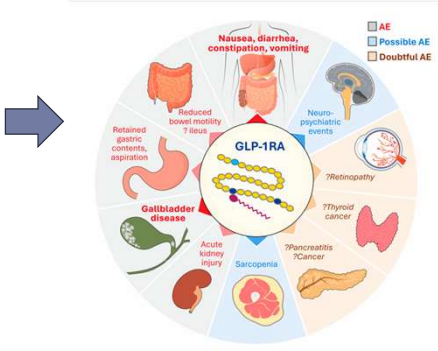
Rosenstock J, et al. Lancet. 2021;398:143–55. Frias JP, et al. N Engl J Med. 2021;358:503–15. 82. Ludvik B, et al. Lancet. 2021;398:583–98. 83. Del Prato S et al. Lancet. 2021;398:181 I–24. 84. Dahl Det al. Diabetologia. 2021:64(Suppl. I):S13. Abstr 20. Kaneko S.. touchREV Endocrinol. 2022 Jun;18(1):10-19.

SURPASS (Tirzepatide): Body Weight Change



Rosenstock J, et al. Lancet. 2021;398:143–55. Frias JP, et al. N Engl J Med. 2021;358:503–15. 82. Ludvik B, et al. Lancet. 2021;398:583–98. 83. Del Prato S et al. Lancet. 2021;398:181 I–24. 84. Dahl Det al. Diabetologia. 2021:64(Suppl. I):S13. Abstr 20. Kaneko S.. touchREV Endocrinol. 2022 Jun;18(1):10-19.

GLP-1 Safety Profile



Drucker DJ. Efficacy and Safety of GLP-1 Medicines for Type 2 Diabetes and Obesity. Diabetes Care. 2024 Nov 1;47(11):1873-1888.

Poll Question 7

Alice injects tirzepatide once a week. Which of the following is true?



a. May experience constipation
b. May cause hypoglycemia
c. Muscle aches are common
d. Doubles risk of pancreatitis

GLP-1 Adverse Effects

- GI side effects
  - Nausea, appetite loss, diarrhea, constipation, dyspepsia, abdominal pain
- Pancreatitis
- Hypoglycemia with concomitant use of insulin or secretagogues
- Acute kidney injury
- Thyroid C-Cell tumors –black box warning
  - Avoid if personal or family history of medullary thyroid carcinoma or personal history of MEN-2
- Acute gallbladder disease
- Worsening retinopathy

Package inserts.

GLP-1 FDA Warning

- Pulmonary Aspiration During General Anesthesia or Deep Sedation
- Rare post marketing reports of pulmonary aspiration in patients receiving GLP-1 RA undergoing elective surgeries or procedures requiring general anesthesia or deep sedation who had residual gastric contents despite following preoperative fasting recommendations
- Instruct patients to inform healthcare providers prior to any planned surgeries or procedures if they are taking a GLP-1 RA

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Holding GLP-1 RA Before Surgery?

- Balance withholding GLP-1 RA with risk of hyperglycemia
- Consider rapid sequence intubation, longer liquid fast or POC ultrasound to reduce risk of aspiration
- Bridging off therapy can be resource intensive, and lead to other SE-hyperglycemia or hypoglycemia
- If decision to hold, general guidance
  - 1 day for daily formulations
  - 1 week for weekly formulations

- Joshi, Girish P. et al. Preprocedure Care of Patients on Glucagon-like Peptide-1 Receptor Agonists: A Multisociety Clinical Practice Guidance. Anesthesiology 141(6):p 1208-1209, December 2024.

Counseling Points: GLP-1 RA & GLP-1/GIP



- Avoid in combo with DPP-4 inhibitors
- Potential risk of pancreatitis
- Watch for intestinal obstruction
- Increased risk of biliary disease
- Education: Eat smaller meals to reduce nausea and limit high fat meals
- Use of non-FDA *compounded* products not recommended
- If on tirzepitide, use back up contraception for first 4 weeks
- Ask about recent eye exam
  - Potential increase in diabetes retinopathy
  - Nonarteritic anterior ischemic optic neuropathy (NAION) reported (rare incidence)

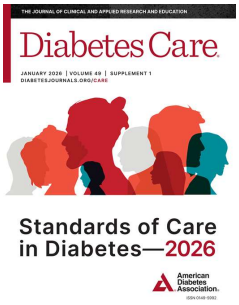
Poll Question 8

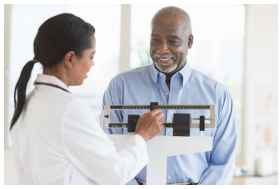
AR is 36 years old with type 2 diabetes and a BMI of 41kg/m^2. Current diabetes medications include: metformin, sitagliptin (Januvia) and empagliflozin (Jardiance) at maximum doses. AR is prescribed tirzepatide (Mounjaro). Based on this information, what action do you recommend to the provider?



A. Verify kidney function first.
B. Stop the sitagliptin when initiating tirzepatide.
C. Decrease the dose of metformin to prevent hypoglycemia.
D. Evaluate thyroid function before starting tirzepatide.

Standard 8 Obesity and Weight Management





Injectable Incretins Approved for Weight Loss

- Liraglutide:
  - Saxenda 3 mg
- Semaglutide inj:
  - Wegovy 2.4mg
  - Wegovy high dose 7.2mg
- Tirzepatide
  - Zepbound 15mg (wt loss)

All 3 Approved for use in adults:

- to reduce excess body weight and maintain weight reduction long term in adults with obesity or adults with overweight in the presence of at least one weight-related comorbid condition

Semaglutide (Wegovy) also indicated for those overweight/obesity & ASCVD to reduce CVD events and for those with metabolic dysfunction-associated steatohepatitis (MASH)
Tirzepatide (Zepbound) also indicated for those with obesity & Sleep Apnea

Oral GLP-1 RA Approved for Weight Loss

- Semaglutide oral:
  - Wegovy 25mg
- Orforglipron oral
  - Foundayo 17.2 mg

Both Approved for use in adults with :

- to reduce excess body weight and maintain weight reduction long term in adults with obesity or adults with overweight in the presence of at least one weight-related comorbid condition

Oral Semaglutide (Wegovy) also indicated for those overweight/obesity & ASCVD to reduce CVD events

GLP-1/GIP Receptor Agonist Indications

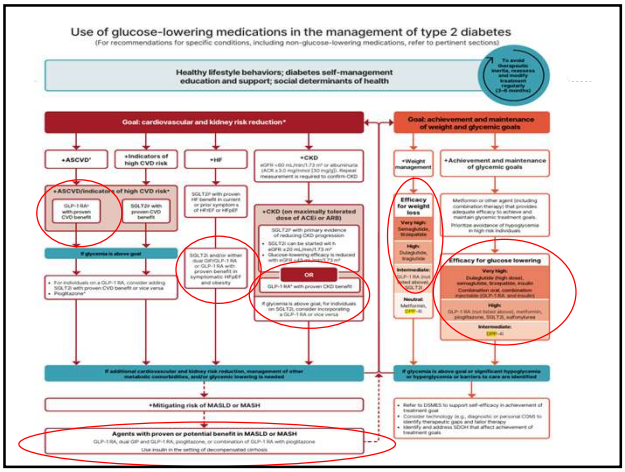
Indication Chart for GLP/GIP Receptor Agonists - Diabetes, Weight, CVD and Others

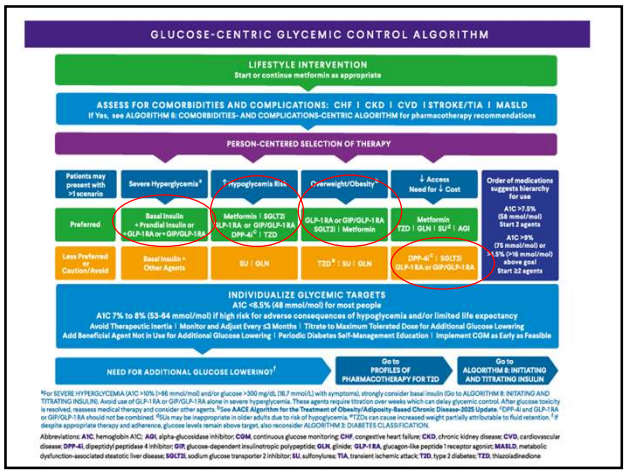
Drug	Type 2 Diabetes	Weight Loss Indication	CV Indication	Other Indication
Exenatide Immediate Release (IR)	Yes	No	No	
Dulaglutide (Trulicity)	Yes, 10 yrs and older	No	Yes	
Liraglutide (Victoza)	Yes, 10 yrs and older	No	Yes	
Liraglutide (Saxenda)	No	Yes, 12 yrs and older	No	
Semaglutide (Ozempic)	Yes	No	Yes	CKD
Semaglutide (Wegovy)	No	Yes, 12 yrs and older	Yes	MASH
Oral Semaglutide (Rybelsus)	Yes	No	Yes	
Oral Semaglutide (Wegovy)	No	Yes	Yes	
Tirzepatide (Mounjaro)	Yes, 10 yrs and older	No	Yes	
Tirzepatide (Zepbound)	No	Yes	No	Sleep Apnea

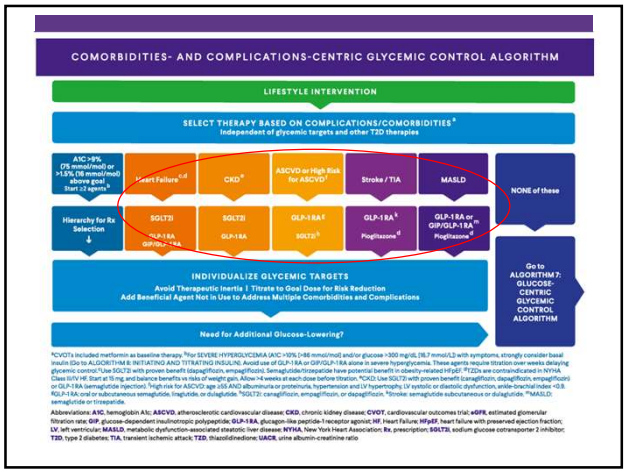
Diana Isaacs, PharmD, BCPS, BCACP, BC-ADM, CDCES Beverly Thomassian, RN, MPH, CDES, BC-ADM
www.DiabetesEd.net 2026

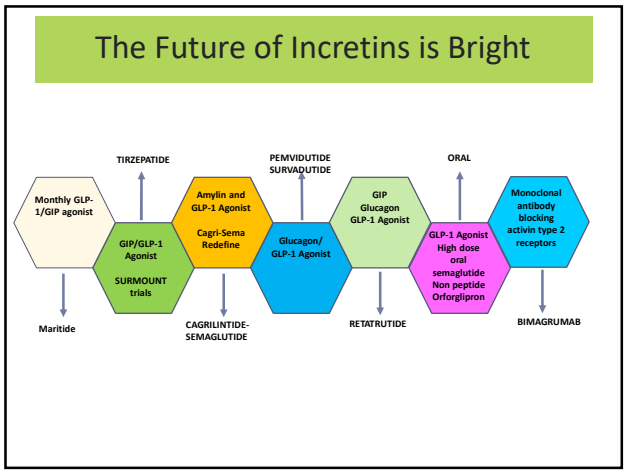
Package Inserts, dailymed.nlm.nih.gov 2026

Where Do Incretins Fit within the Guidelines for Diabetes?

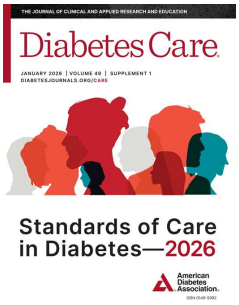



GLUCOSE-CENTRIC GLYCEMIC CONTROL ALGORITHM
LIFESTYLE INTERVENTION
Start or continue metformin as appropriate
ASSESS FOR COMORBIDITIES AND COMPLICATIONS: CHF | CKD | CVD | STROKE/TIA | MASLD
If Yes, see ALGORITHM B: COMORBIDITIES- AND COMPLICATIONS-CENTRIC ALGORITHM for pharmacotherapy recommendations
PERSON-CENTERED SELECTION OF THERAPY
Patients may present with >1 scenario
Severe Hyperglycemia
↑ Hypoglycemia Risk
Overweight/Obesity
↓ Access Need for ↓ Cost
Order of medications suggests hierarchy for use
Preferred
Basal Insulin + Prandial Insulin or + GLP-1 RA or + GIP/GLP-1 RA
Metformin | SGLT2i | GLP-1 RA or GIP/GLP-1 RA | DPP-4i | TZD
GLP-1 RA or GIP/GLP-1 RA | SGLT2i | Metformin
Metformin | TZD | GLN | SU | AGI
A1C >7.5% (58 mmol/mol) Start 2 agents
A1C >9% (75 mmol/mol) or >1.5% (>16 mmol/mol) above goal Start ≥2 agents
Less Preferred or Caution/Avoid
Basal Insulin + Other Agents
SU | GLN
TZD | SU | GLN
DPP-4i | SGLT2i GLP-1 RA or GIP/GLP-1 RA
INDIVIDUALIZE GLYCEMIC TARGETS
A1C <6.5% (48 mmol/mol) for most people
A1C 7% to 8% (53-64 mmol/mol) if high risk for adverse consequences of hypoglycemia and/or limited life expectancy
Avoid Therapeutic Inertia | Monitor and Adjust Every ≤3 Months | Titrate to Maximum Tolerated Dose for Additional Glucose Lowering
Add Beneficial Agent Not in Use for Additional Glucose Lowering | Periodic Diabetes Self-Management Education | Implement CGM as Early as Feasible
NEED FOR ADDITIONAL GLUCOSE LOWERING?
Go to PROFILES OF PHARMACOTHERAPY FOR T2D
Go to ALGORITHM B: INITIATING AND TITRATING INSULIN


COMORBIDITIES- AND COMPLICATIONS-CENTRIC GLYCEMIC CONTROL ALGORITHM
LIFESTYLE INTERVENTION
SELECT THERAPY BASED ON COMPLICATIONS/COMORBIDITIES
Independent of glycemic targets and other T2D therapies
A1C >9% (75 mmol/mol) or >1.5% (16 mmol/mol) above goal Start ≥2 agents
Heart Failure
CKD
ASCVD or High Risk for ASCVD
Stroke / TIA
MASLD
NONE of these
Hierarchy for Rx Selection
SGLT2i
GLP-1 RA
GIP/GLP-1 RA
SGLT2i
GLP-1 RA
SGLT2i
GLP-1 RA
Pioglitazone
GLP-1 RA or GIP/GLP-1 RA
Pioglitazone
INDIVIDUALIZE GLYCEMIC TARGETS
Avoid Therapeutic Inertia | Titrate to Goal Dose for Risk Reduction
Add Beneficial Agent Not in Use to Address Multiple Comorbidities and Complications
Need for Additional Glucose-Lowering?
Go to ALGORITHM 7: GLUCOSE-CENTRIC GLYCEMIC CONTROL ALGORITHM


The Future of Incretins is Bright
TIRZEPATIDE
PEMVIDUTIDE
SURVADUTIDE
ORAL
Monthly GLP-1/GIP agonist
Amylin and GLP-1 Agonist
Cagri-Sema Redefine
GIP Glucagon GLP-1 Agonist
Monoclonal antibody blocking activin type 2 receptors
GIP/GLP-1 Agonist
SURMOUNT trials
Glucagon/ GLP-1 Agonist
GLP-1 Agonist High dose oral semaglutide Non peptide Orforglipron
Maritide
CAGRILINTIDE-SEMAGLUTIDE
RETATRUTIDE
BIMAGRUMAB

Standard 4 – Comprehensive Medical Evaluation & Assessment



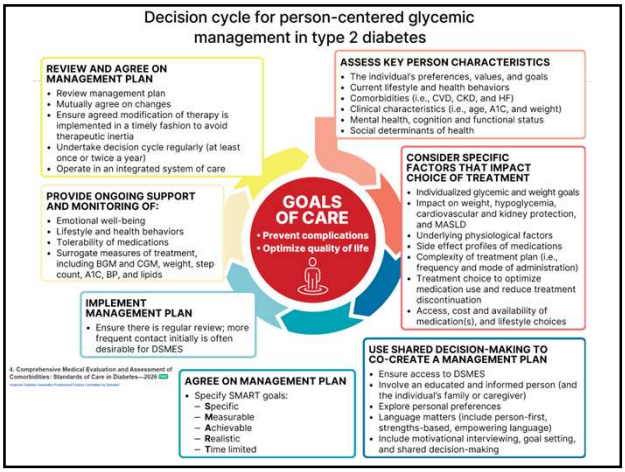


4. Comprehensive Medical Evaluation and Assessment of Comorbidities

- Use person-centered communication, culturally sensitive, strength-based language and active listening;
- Elicit individual preferences and beliefs; develop self-management plan together.
- Diabetes Care coordinated by multi disciplinary team:
  - CDCES, Providers, nurses, dietitians, exercise specialists, pharmacists, dentists, podiatrists, and behavioral health professionals.
- Goal is to optimize health outcomes and quality of life.



4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026



Diabetes Goals and Treatment Plan

The goals of treatment for diabetes are to prevent or delay complications and optimize quality of life.

Goals and plans co-created by the care team and individual based on preferences, values, and goals.

Management plan considers the person's:

Age, cognitive abilities, school/work schedule and conditions,	Health beliefs, support systems, social situation, financial concerns, cultural factors, literacy and numeracy	Eating patterns, physical activity, (mathematical literacy)	Diabetes history (duration, complications, and current use of medications), comorbidities, disabilities, health priorities, other medical conditions	Preferences for care, access to health care services, and life expectancy

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

Standard 4 – Diabetes Medical Evaluation

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

	Visit		
	Initial	Every follow-up	Annual
Past medical and family history			
Diabetes history			
• Characteristics at onset (e.g., age and symptoms and/or signs)	✓		
• Review of previous treatment plans and response	✓		
• Assess frequency, cause, and severity of past hospitalizations	✓		
Family history			
• Family history of diabetes in a first-degree relative	✓		
• Family history of autoimmune disorders	✓		
Personal history of complications and common comorbidities			
• Common comorbidities (e.g., obesity, OSA, and MASLD)	✓		✓
• High blood pressure or abnormal lipids	✓		✓
• Macrovascular and microvascular complications	✓		✓
• Hypoglycemia: awareness, frequency, causes, and timing of episodes	✓	✓	✓
• Presence of hemoglobinopathies or anemias	✓		✓
• Last dental visit	✓		✓
• Last foot exam	✓		✓
• Last dilated eye exam	✓		✓
• Visits to specialists	✓		
• Disability assessment and use of assistive devices (e.g., physical, cognitive, vision and auditory, history of fractures, and podiatry)	✓	✓	✓
• Personal history of autoimmune disease	✓		
Surgical and procedure history			
• Surgeries (e.g., metabolic surgery and transplantation)	✓	✓	✓
Interval history			
• Changes in medical or family history since last visit		✓	✓
Behavioral factors			
• Physical activity, sleep behaviors, eating patterns and weight history	✓	✓	✓
• Assess familiarity with carbohydrate counting (e.g., type 1 diabetes or type 2 diabetes treated with MDI)	✓		✓
• Screen for OSA	✓	✓	✓
• Tobacco, alcohol, and substance use	✓		✓
Medications and vaccinations			
• Current medication plan	✓	✓	✓
• Medication-taking behavior, including rationing of medications and/or medical equipment	✓	✓	✓

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

Laboratory evaluation			
• A1C, if the results are not available within the past 3 months or if earlier assessment is necessary	✓	✓	✓
• Lipid profile, including total, LDL, and HDL cholesterol and triglycerides§	✓		
• Liver function tests (i.e., FIB-4)‡	✓		✓
• Spot urinary albumin-to-creatinine ratio	✓		✓
• Serum creatinine and estimated glomerular filtration rate§	✓		✓
• Thyroid-stimulating hormone in people with type 1 diabetes‡	✓		✓
• Celiac disease screening in people with type 1 diabetes‖	✓		
• Vitamin B12 if taking metformin for >5 years	✓		✓
• CBC with platelets	✓		✓
• Serum potassium levels in people treated with ACE inhibitors, ARBs, or diuretics§	✓		✓
• Calcium, vitamin D, and phosphorous as appropriate	✓		✓

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

Assessment and Treatment of Disabilities

- Diabetes associated with increased risks of disability due to neuropathy, visual impairment and lower limb complications
- Refer to specialist
- Take preventive action to maximize quality of life.



Assess for disability at the initial visit and for decline in function at each subsequent. If a disability is impacting functional ability or capacity to manage their diabetes, refer to appropriate specialist.

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

Lab Eval at Initial & Annual Visit

- A1c (each 3-6 mo's)
- Each year
  - Lipids, CBC with platelets
  - Liver function
  - Spot urinary albumin-to-creat ratio (UACR))
  - Serum creat and GFR
  - TSH, celiac (type 1)
  - B12 if on metformin >5yrs
  - Calcium, Vita D, and phosphorus if appropriate
- Serum K
  - If on ACE, ARBs or diuretics



4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

Referrals for Initial Care Mgmt

- Eye professional – annual check
- Family planning
- RDN for Med Nutrition Therapy
- DSMES - Diabetes Self-Management Education Support
- Dentist for comprehensive dental examination
- Behavioral health professional
- Audiology if indicated
- Social worker/community resources
- Rehab medicine for cog/disability eval



4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

Type 3c Diabetes (Pancreatogenic)

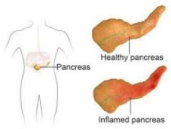
- Includes both structural and functional loss of insulin secretion in the context of exocrine pancreatic dysfunction.
- About 5-10% of diabetes, often misdiagnosed as type 2 diabetes.
- Insulin sensitive
- Assess wt loss, fatty stools – indications may need pancreatic enzyme replacement therapy (PERT).
- The diverse set of etiologies includes:
  - pancreatitis (acute and chronic) ~70%
  - trauma or pancreatectomy
  - neoplasia
  - cystic fibrosis
  - hemochromatosis
  - fibrocalculous pancreatopathy

Screen for diabetes within 3-6 months of pancreatitis & annually.

2. Diagnosis and Classification of Diabetes: Standards of Care in Diabetes—2026

Pancreatitis

- People with diabetes 2xs risk of acute pancreatitis
- After episode of pancreatitis, one third of people will get prediabetes or diabetes
  - About 25% to 80% of people with chronic pancreatitis develop Type 3c diabetes.
- Pancreatitis is an exocrine dysfunction:
  - Disrupts global architecture or physiology of pancreas
  - Results in both exocrine and endocrine dysfunction.

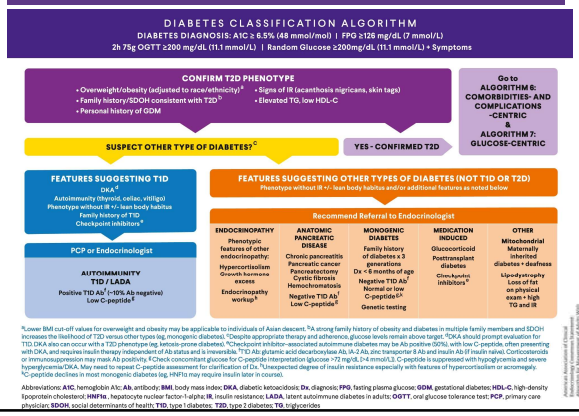


Healthy Pancreas vs Pancreatitis



Screen people for diabetes within 3–6 months following an episode of acute pancreatitis and annually thereafter

AACE 2026 Classification Algorithm



Assess Risk factors for Fracture

Table 4.4—Diagnostic assessment

Individuals who should receive BMD testing
People aged ≥65 years
Postmenopausal women and men aged ≥50 years with history of adult-age fracture or with diabetes–specific risk factors: • Frequent hypoglycemic events • Diabetes duration >10 years • Diabetes medications: insulin, thiazolidinediones, sulfonylureas • A1C >8% • Peripheral or autonomic neuropathy, retinopathy, nephropathy • Frequent falls • Glucocorticoid use

Avoid TZDs if high risk and use caution with medications that can cause hypo (insulin, meglitinides and sulfonylureas)

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

Sexual and Dental Health

- Screen for those with prediabetes and diabetes for **sexual dysfunction.**
- Men – erectile dysfunction and level of libido



- **Dental health**
- Coordinate efforts between medical and dental teams.
- Refer for dental exam at least once a year.
- Treatment can lower A1C 0.4%

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

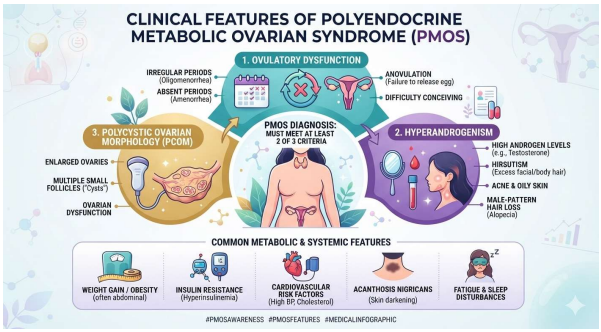
Women with Diabetes & Sexual Health

- Screening for desire (libido), arousal, and orgasm difficulties, particularly in those who experience depression and/or anxiety and those with recurrent urinary tract infections
- In postmenopausal women, screen for symptoms and/or signs of genitourinary syndrome of menopause, including vaginal dryness and dyspareunia.



4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

PCOS to PMOS



Metabolic dysfunction–associated steatotic liver disease (MASLD)

- Recent studies estimate that MASLD is prevalent in >70% of adults with type 2.
- 50% of people with MASLD have MASH (Metabolic Associated Steatohepatitis)
  - MASH = 5% plus hepatic steatosis with inflammation and hepatocyte injury (hepatocyte ballooning), with or without evidence of liver fibrosis
- Screen for liver fibrosis using FIB 4 Index
  - Uses liver enzymes (ALT & AST), platelet count plus age
  - If positive, (FIB ≥ 1.3) follow-up with imaging or ultrasound



Join our Level 2 Critical Assessment of People with Diabetes

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

Screening for MASH – FIB-4

Fibrosis-4 (FIB-4) Calculator

$$\text{FIB-4} = \frac{\text{Age (years)}\ 58 \times \text{AST Level (U/L)}\ 90}{\text{Platelet Count (}10^9\text{/L)}\ 217 \times \sqrt{\text{ALT (U/L)}\ 85}} = 2.61$$

- The American College of Gastroenterology considers Upper limit of normal ALT levels:
- 29–33 units/L for males
- 19–25 units/L for female individuals

(mdcalc.com/calc/2200/fibrosis-4-fib-4-index-liver-fibrosis).

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026

FIB-4 estimates risk of hepatic cirrhosis (age 35+):

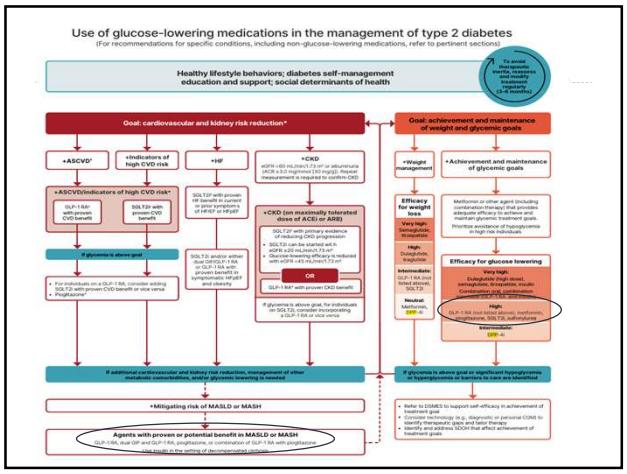
- Calculated by imputing:
  - Age
  - plasma aminotransferases (AST and ALT)
  - and platelet count
- FIB-4 Risk Levels
  - Lower risk is <1.3
  - Intermediate 1.3 to 2.67
  - High risk >2.67
    - considered as having a high probability of advanced fibrosis (F3–F4).

Poll Question 9

In the 2026 ADA Standards they recommend pharmacologic agents along with lifestyle interventions to treat people with diabetes and Metabolic Associated Steatohepatitis (MASH). Which of the following are the recommended diabetes medications to treat MASH?



A. Vitamin E and SGLT-2
B. Pioglitazone and/or GLP-1 RA / GIP
C. Fish oil supplements and statin
D. Metformin and/or bolus insulin therapy

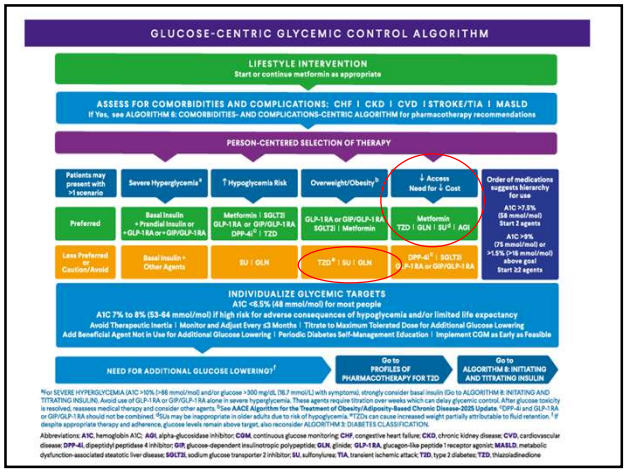


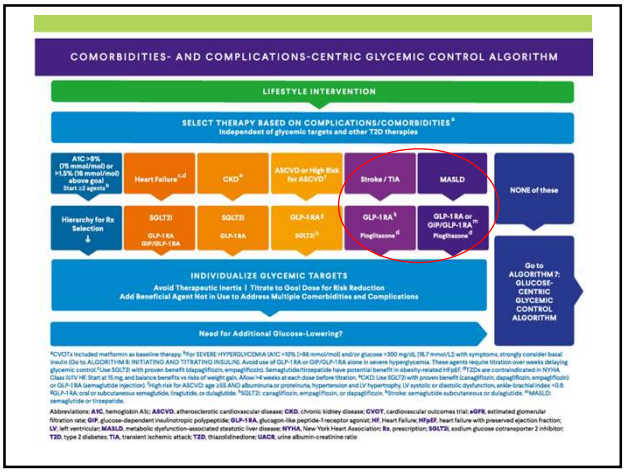
Insulin Sensitizers

- **Action**: decrease insulin resistance by making muscle and adipose cells more sensitive to insulin; decrease free fatty acids
- **Name**:
  - pioglitazone (Actos) – bladder cancer warning
    - Dosing: 15-45 mg daily
    - Consider adding low dose if history of stroke or have steatosis
- **Efficacy/ Considerations**
  - Reduce A1C ~0.5-1.0%
  - 6 to 12 weeks for maximum effect
  - pioglitazone $5 a month
  - Can cause fluid retention, avoid w/ CHF



Thiazolidinediones "TZDs" • Increases insulin sensitivity	pioglitazone (Actos)	15 – 45 mg daily	Pioglitazone is recommended for people with diabetes after a stroke and/or to treat steatosis. May increase bladder cancer risk. Start with low dose, increase if needed. Monitor for edema. Increases fracture risk. Lowers A1C 0.5 – 1.0%.





Immunization Schedule for Diabetes 2026

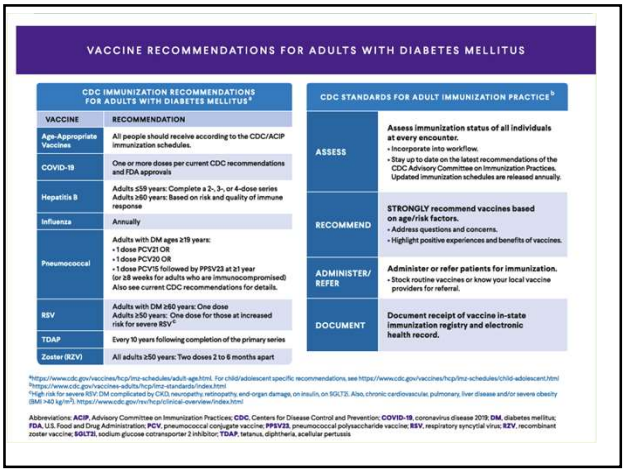
Vaccine	Who by Age	Series and Frequency
Hepatitis B Vaccine	Adults ≤ 60 years*	2-3 dose series
RSV	Adults ≥ 60 years	Single dose
Influenza (avoid live attenuated vaccine)	All	Annually
Tetanus, diphtheria, pertussis (Tdap)	All adults; extra dose during pregnancy	Booster every 10 years.
Zoster	Adults ≥ 50 years	2 dose Shingrix
COVID-19	Starting at age 6 mo's	Initial vaccination and boosters
Pneumonia (PPSV23) Pneumovax	Adults19-64*	See Standards for schedule and details and for those 65 or older.
*Pneumococcal Conjugate Vaccine (PCV15, PCV20)	Adults 19-64 with underlying risk factors or no previous vaccination*	May need PPSV23 follow-up vaccine ≥1 year.* If 65+, discuss with provider.



2026 ADA Standards, Vol.49, s67 – s68
*See Table 4.3 for detailed info/considerations

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026 FREE

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Herbal Supplements

- Berberine
- Zinc
- Vitamin D
- Cinnamon
- Ginseng
- Aloe Vera
- Chromium
- Alpha lipoic acid
- Magnesium
- Gymnema

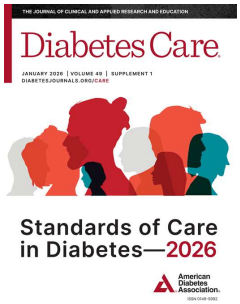


Deciding to Take Herbal Supplements

- Lack of regulation with herbal supplements
- Provide reliable education on costs/benefits/risks



Standard 5 Lifestyle & DSMES





5. Facilitating Positive Health Behaviors and Well Being to Improve Health Outcome

- Building positive health behaviors and maintaining psychological well-being are foundational for achieving diabetes management goals and maximizing quality of life
- Engage in person-centered collaborative care and shared decision making



STANDARDS OF CARE | DECEMBER 08 2025
5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026

Critical Times to Provide/Modify DSMES



- At diagnosis.
- Annually and/or when not meeting treatment goals.
- When complicating factors develop (medical, functional, psychosocial).
- When transitions in life and care occur.

Powers MA, Bardsley JK, et al. DSMES Consensus Report, The Diabetes Educator, 2020
ADCES. AADE7 Self-Care Behaviors, The Diabetes Educator, 2020

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DSMES Benefits

- ↑ Knowledge
- ↓ A1c and weight
- ↑ Quality of life
- ↓ Mortality
- Positive coping
- ↓ Cost
- < 10% referred receive DSMES
- ↑ primary care, preventive services
- ↓ frequency of acute care and inpt admissions
- More likely to follow best practice recommendations (esp. those with Medicare)

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Diabetes Distress & Screening Tools

- Screen for diabetes distress at least annually in people with diabetes, caregivers, and family members.
- Repeat screening when treatment goals are not met, at transitional times, and/or in the presence of diabetes complications.
- Consider referral to a qualified behavioral health professional, ideally one with experience in diabetes, for further assessment and treatment if not adequately addressed during medical appointments

- The ADA provides access to tools for screening specific psychosocial topics, such as diabetes distress, fear of hypoglycemia, and other relevant psychological symptoms professional.diabetes.org/sites/default/files/media/ada_mental_health_toolkit_questionnaires.pdf


Diabetes Distress Scale (DDS-17)

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Addressing Diabetes Distress

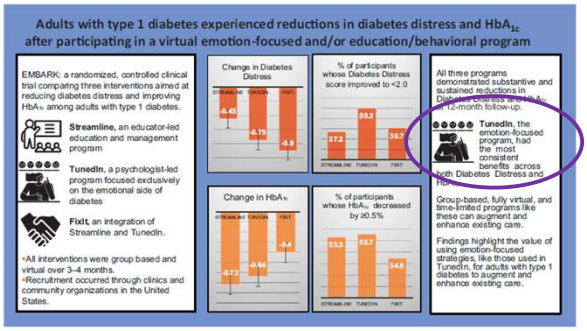
- Involves initiating a conversation about feelings and beliefs in a respectful, sensitive, and direct manner.
- Create a space for emotional disclosure, validating the emotional aspects of diabetes, and linking emotions to self-management behaviors.
- HCP's can introduce brief coping strategies (e.g., values affirmation, mindful breathing, cognitive reframing) and highlight past successes to reinforce resilience.



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EMBARK Trial

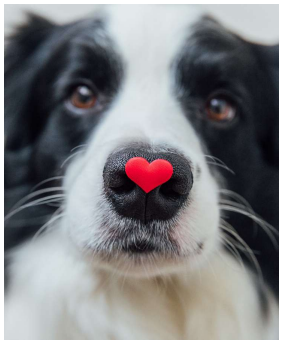


EMBARK: A Randomized, Controlled Trial Comparing Three Approaches to Reducing Diabetes Distress and Improving HbA_{1c} in Adults With Type 1 Diabetes. *Diabetes Care* 2024; dc232452. https://doi.org/10.2337/dc23-2452

Embark Trial – Emotions as Priority

I have finally given myself permission to make addressing the emotional aspects of diabetes a priority.

~Coach Beverly



Cognitive Capacity Monitoring

- Monitor cognitive capacity throughout the life span for all individuals with diabetes.
- Particularly in those who have:
  - documented cognitive disabilities,
  - those who experience severe hypoglycemia,
  - very young children, and
  - older adults.

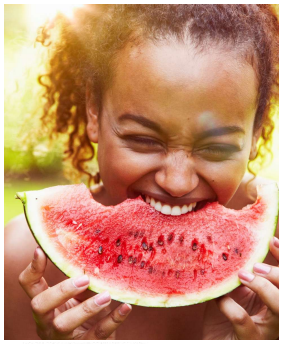


If cognitive capacity changes or appears to be suboptimal for decision-making and/or behavioral self-management, consider referral for a formal assessment.

5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026

Medical Nutrition Therapy Works

- MNT is effective and beneficial to people with prediabetes and diabetes.
- When delivered by an RDN, MNT is associated with A1C absolute decreases of:
  - 1.0–1.9% for people with type 1 diabetes and
  - 0.3–2.0% for people with type 2 diabetes



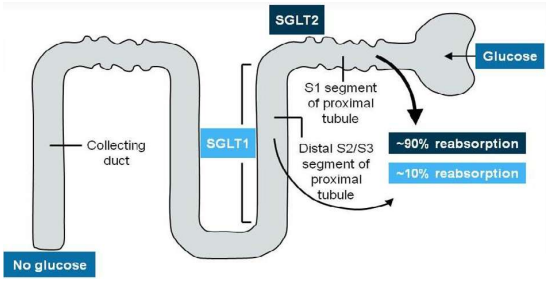
5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026

Standard 9 & AACE – Pharmacologic Therapy for Type 2 Diabetes

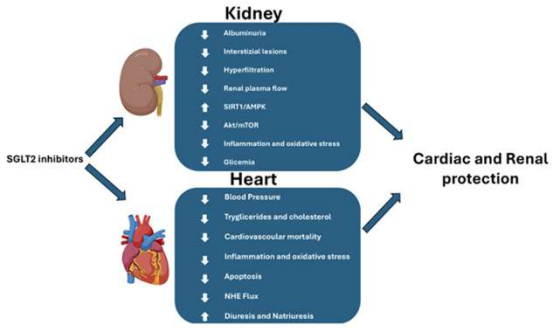




SGLT and the Kidney



Additional SGLT2 Inhibitor Effects



Gaggini M, et al. Cells. 2025 Mar 6;14(5):387. doi: 10.3390/cells14050387.

Poll Question 1

- FZ has type 2 diabetes and kidney disease. He was recently diagnosed with an A1C of 7.1%. What is the best medication to start?



a. Pioglitazone
b. Tirzepatide
c. Metformin
d. Dapagliflozin

SGLT-2 Inhibitors- "Flozins"



- **Action**: decrease renal reabsorption of glucose in the proximal tubule of kidneys (reset renal threshold)
- **Preferred** diabetes treatment for people with heart failure and kidney disease. Decreases BG & CV Risk
- Dapagliflozin now generic

Class/Main Action	Name(s)	Daily Dose Range	Considerations
SGLT2 Inhibitors "Glucoretic" • Decreases glucose reabsorption in kidneys	Canagliflozin*† (Invokana) Dapagliflozin*† (Farxiga) Empagliflozin*† (Jardiance) Ertugliflozin (Steglatro) Bexagliflozin (Brenzavvy)	100 - 300 mg 1x daily 5 - 10 mg 1x daily 10 - 25 mg 1x daily 5 – 15 mg 1x daily 20 mg 1x daily	**Side effects:** hypotension, UTIs, genital infections, increased urination, weight loss, ketoacidosis. **Heart Failure, CV & Kidney Protection:** 1st line therapy for Heart Failure (HF), Kidney Disease (CKD), Cardiovascular Disease, before or with metformin **Considerations:** If GFR ≥ 20, use SGLT-2 to reduce CVD, Heart Failure and Chronic Kidney Disease. Limited BG lowering effect if GFR <45. See package insert for GFR cut-offs and dosing. **Benefits:** SGLT-2s* reduce BG, CV death & HF, slow CKD. †Approved for peds, 10 yrs +. Lowers A1C 0.6% to 1.5%.

SGLT-2 Inhibitor Dosing and Renal Adjustments

Drug	Dose	Renal Adjustment
Ertugliflozin (Steglatro)	5-15 mg daily	Not recommended for eGFR <45
Dapagliflozin (Farxiga)	5-10 mg daily	Not recommended to initiate with eGFR <45 (glycemic control) or <25 (other conditions): may continue for CV, CKD benefits
Empagliflozin (Jardiance)	10-25 mg daily	Not recommended to initiate for eGFR <30 (glycemic control), may continue for CV, CKD benefits
Canagliflozin (Invokana)	100-300 mg daily	eGFR 30 to <60: 100 mg once daily eGFR <30: avoid initiation, may continue 100mg daily for kidney benefits
Bexagliflozin (Brenzavvy)	20 mg daily	Not recommended for eGFR <30

Package inserts, dailymed.nlm.nih.gov

SGLT-2 Inhibitor Indications

Drug	Lowers BG	CV Indication	Heart Failure Indication	Kidney Indication
Dapagliflozin (Farxiga)	Yes for 10 yrs and older	Yes	Yes +/- Diabetes	Yes +/- Diabetes
Empagliflozin (Jardiance)	Yes for 10 yrs and older	Yes	Yes +/- Diabetes	Yes +/- Diabetes
Canagliflozin (Invokana)	Yes for 10 yrs and older	Yes	Yes w/ Diabetes	Yes w/ Diabetes
Ertugliflozin (Steglatro)	Yes	No	No, although showed benefit	No
Bexagliflozin (Brenzavvy)	Yes	No	No	No

Benefits of SGLT-2 Inhibitors

- A1C lowering
- Modest weight loss
- Cardiovascular
- Renal
- Heart failure
- Blood pressure lowering

Side Effects of SGLT-2 Inhibitors

- Tip: Hold for 3 days prior to surgery or procedures with prolonged fasting

- Genitourinary infections
- Volume depletion
- Increased urination
- Hypotension
- Electrolyte changes
- Diabetes ketoacidosis (DKA)

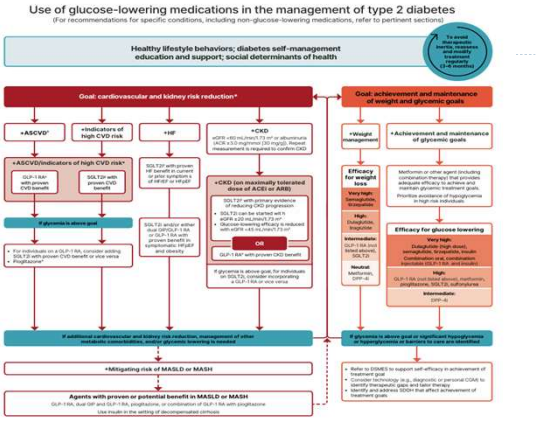
Amputation risk, Bone fracture (Canagliflozin)

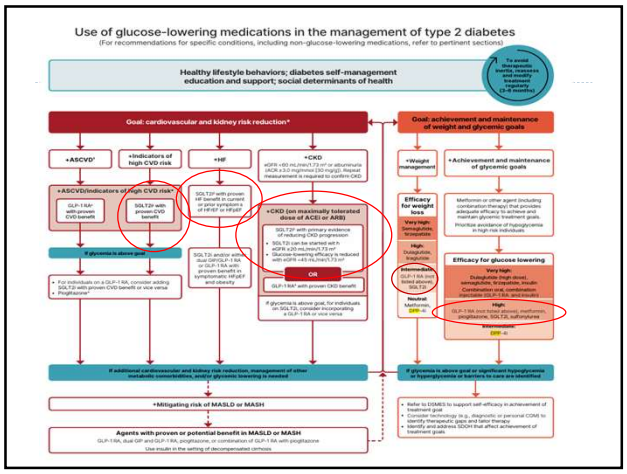
Managing Adverse Effects

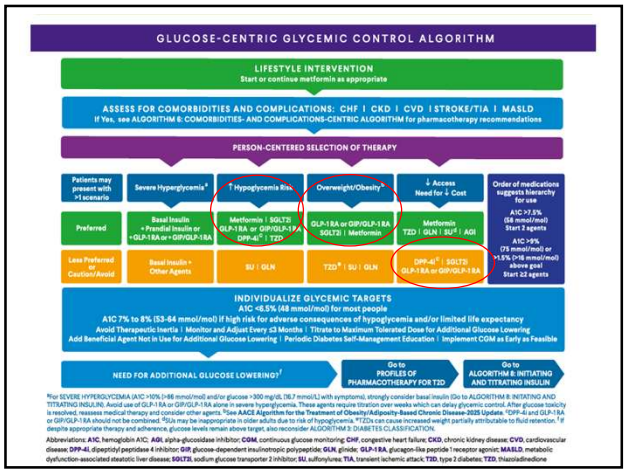


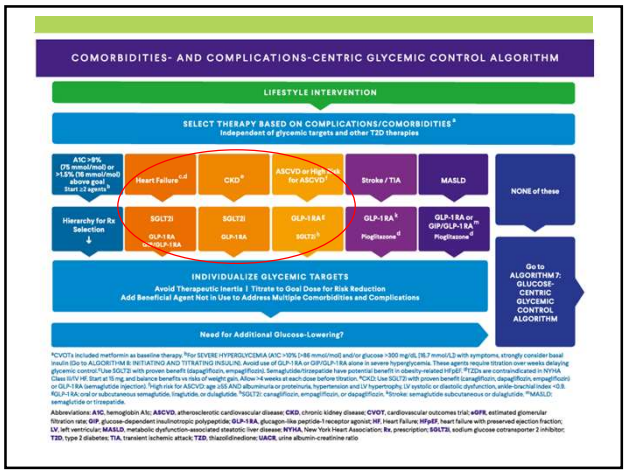
- Maintain good hygiene to reduce risk of genital mycotic infections
  - Higher risk with higher glucose
- DKA risk
  - Use caution with reducing insulin dose
  - Report nausea, vomiting and malaise
- Monitor BP
  - May need to reduce antihypertensive meds (esp diuretics)
- UTI risk greater with hyperglycemia

Where do SGLT2-2 Inhibitors Fit within the Guidelines?




Use of glucose-lowering medications in the management of type 2 diabetes
(For recommendations for specific conditions, including non-glucose-lowering medications, refer to pertinent sections)
Healthy lifestyle behaviors; diabetes self-management education and support; social determinants of health
Goal: cardiovascular and kidney risk reduction*
Goal: achievement and maintenance of weight and glycemic goals
+ASCVD†
+Indicators of high CVD risk
+HF
+CKD
+ASCVD/Indicators of high CVD risk*
+CKD (on maximally tolerated dose of ACEI or ARB)
+Weight management
+Achievement and maintenance of glycemic goals
Efficacy for weight loss
Efficacy for glucose lowering
Mitigating risk of MASLD or MASH
Agents with proven or potential benefit in MASLD or MASH
If additional cardiovascular and kidney risk reduction, management of other metabolic comorbidities, and/or glycemic lowering is needed
If glycemia is above goal or significant hypoglycemia or barriers to care are identified


GLUCOSE-CENTRIC GLYCEMIC CONTROL ALGORITHM
LIFESTYLE INTERVENTION
Start or continue metformin as appropriate
ASSESS FOR COMORBIDITIES AND COMPLICATIONS: CHF | CKD | CVD | STROKE/TIA | MASLD
If Yes, see ALGORITHM 6: COMORBIDITIES- AND COMPLICATIONS-CENTRIC ALGORITHM for pharmacotherapy recommendations
PERSON-CENTERED SELECTION OF THERAPY
Patients may present with >1 scenario
Severe Hyperglycemia
Hypoglycemia Risk
Overweight/Obesity
Access Need for Cost
Order of medications suggests hierarchy for use
Preferred
Less Preferred or Caution/Avoid
INDIVIDUALIZE GLYCEMIC TARGETS
A1C <6.5% (48 mmol/mol) for most people
A1C 7% to 8% (53-64 mmol/mol) if high risk for adverse consequences of hypoglycemia and/or limited life expectancy
Avoid Therapeutic Inertia | Monitor and Adjust Every ≤3 Months | Titrate to Maximum Tolerated Dose for Additional Glucose Lowering
Add Beneficial Agent Not in Use for Additional Glucose Lowering | Periodic Diabetes Self-Management Education | Implement CGM as Early as Feasible
NEED FOR ADDITIONAL GLUCOSE LOWERING?
Go to PROFILES OF PHARMACOTHERAPY FOR T2D
Go to ALGORITHM 8: INITIATING AND TITRATING INSULIN


COMORBIDITIES- AND COMPLICATIONS-CENTRIC GLYCEMIC CONTROL ALGORITHM
LIFESTYLE INTERVENTION
SELECT THERAPY BASED ON COMPLICATIONS/COMORBIDITIES
Independent of glycemic targets and other T2D therapies
Heart Failure
CKD
ASCVD or High Risk for ASCVD
Stroke / TIA
MASLD
NONE of these
Hierarchy for Rx Selection
SGLT2i
GLP-1 RA
INDIVIDUALIZE GLYCEMIC TARGETS
Avoid Therapeutic Inertia | Titrate to Goal Dose for Risk Reduction
Add Beneficial Agent Not in Use to Address Multiple Comorbidities and Complications
Need for Additional Glucose-Lowering?
Go to ALGORITHM 7: GLUCOSE-CENTRIC GLYCEMIC CONTROL ALGORITHM

Case Study: Rick

- Rick is a 51yoM diagnosed with type 2 diabetes 5 years ago.
- He takes metformin 1000mg twice daily and semaglutide 2mg weekly. His A1C=6.7%.
- In the last 3 months, he was diagnosed with heart failure with reduced ejection fraction. His kidney function is normal.
- Weight: 205lbs, 5"7, BMI=32kg/m^2



Case Study: Rick

- What is the best recommendation for Rick?

A. Focus on weight loss efforts
B. Add empagliflozin
C. Add pioglitazone
D. Add bexagliflozin

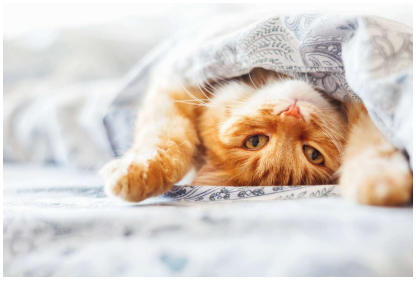


SGLT2 Inhibitors- How do they rate?

Question	Answer
Cause hypoglycemia?	No
Cause weight gain?	No
Affordable?	Yes
Lowers Cardiorenal risk?	Yes
Can most tolerate /use?	Yes

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Standard 6 - Glycemic Goals, Hypoglycemia and Hyperglycemic Crises



6. Glycemic Goals, Hypoglycemia, and Hyperglycemic Crises: Standards of Care in Diabetes—2026

6. Glycemic Goals & Hypo

A1C

Blood Pressure

Cardiovascular risk reduction



ADA 2026 ABC Goals

A1c less than 7% (individualize)	Blood Pressure <130/80 <120/80 for high risk	Cholesterol
• Pre-meal BG 80-130 • Post meal BG <180 • Time in Range (70-180) 70% of time		• Statin therapy based on age & risk status • If 40+ with ASCVD Risk, decrease LDL by 50%, LDL <70 • If 40+ with ASCVD, decrease LDL by 50%, LDL <55

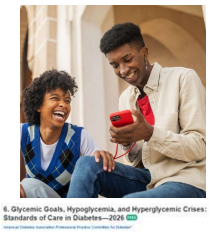
Poll Question 2



- Which of the following methods can be used to assess glycemic status?
  - A. A1C
  - B. Blood glucose monitoring
  - C. Time in Range
  - D. Fructosamine
  - E. All of the above

6. Assess Glycemic Status

- A1C measurement
- Blood glucose monitoring (BGM)
  - by capillary (finger-stick) devices
- Continuous glucose monitoring (CGM)
  - using time in range (TIR) or
  - mean CGM glucose.
- Fructosamine – 2-4 wk glucose average
  - glycated albumin for those with anemia or hemoglobinopathies



6. Glycemic Targets for Non-Pregnant Adults



- **A1c < 7%** - a reasonable goal for adults.
- **A1c < 6.5%** - for those without significant risk of hypoglycemia
- **A1c < 8%** - for those with history of hypoglycemia, limited life expectancy, or those with longstanding diabetes and vascular complications.
- **A1c Check Frequency:**
  - If meeting goal - At least 2 times a year
  - If *not* meeting goal – Quarterly
- **Also review Ambulatory Glucose Profile**

A1c and Estimated Avg Glucose (eAG)

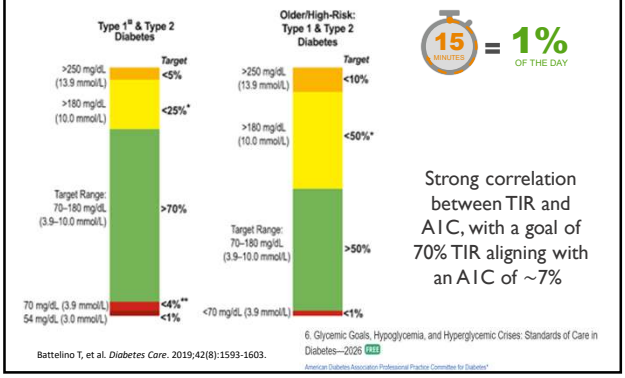
A1c (%)	eAG
5	**97** (76-120)
6	**126** (100-152)
7	**154** (123-185)
8	**183** (147-217)
9	**212** (170 -249)
10	**240** (193-282)
11	**269** (217-314)
12	**298** (240-347)



6. Glycemic Goals, Hypoglycemia, and Hyperglycemic Crises: Standards of Care in Diabetes—2026

eAG = 28.7 x A1c-46.7 ~ 29 pts per 1%
Translating the A1c Assay Into eAG – ADAG Study

Time in Range



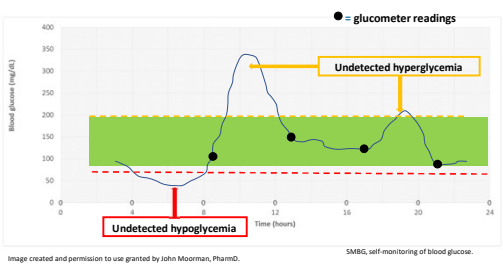
15 MINUTES = 1% OF THE DAY

Strong correlation between TIR and A1C, with a goal of 70% TIR aligning with an A1C of ~7%

Battelino T, et al. *Diabetes Care*. 2019;42(8):1593-1603.

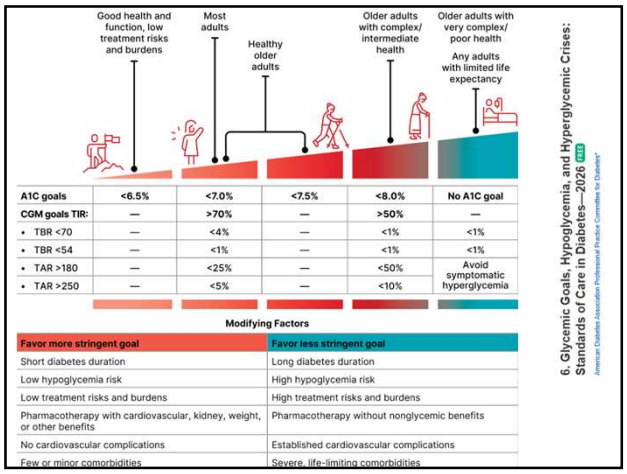
6. Glycemic Goals, Hypoglycemia, and Hyperglycemic Crises: Standards of Care in Diabetes—2026

Blood Glucose Monitoring vs. Continuous Glucose Monitoring (CGM)



SMBG, self-monitoring of blood glucose.

Image created and permission to use granted by John Moorman, PharmD.



A1C goals	<6.5%	<7.0%	<7.5%	<8.0%	No A1C goal
CGM goals TIR:	—	>70%	—	>50%	—
• TBR <70	—	<4%	—	<1%	<1%
• TBR <54	—	<1%	—	<1%	<1%
• TAR >180	—	<25%	—	<50%	Avoid symptomatic hyperglycemia
• TAR >250	—	<5%	—	<10%	

Modifying Factors

Favor more stringent goal	Favor less stringent goal
Short diabetes duration	Long diabetes duration
Low hypoglycemia risk	High hypoglycemia risk
Low treatment risks and burdens	High treatment risks and burdens
Pharmacotherapy with cardiovascular, kidney, weight, or other benefits	Pharmacotherapy without nonglycemic benefits
No cardiovascular complications	Established cardiovascular complications
Few or minor comorbidities	Severe, life-limiting comorbidities

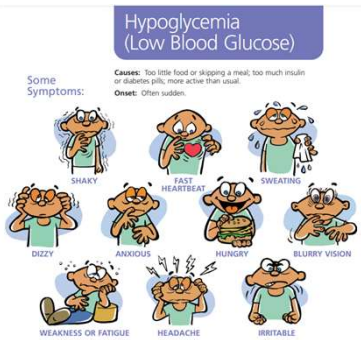
6. Glycemic Goals, Hypoglycemia, and Hyperglycemic Crises: Standards of Care in Diabetes—2026

Standard 7 - Diabetes Tech Tomorrow





6. Hypoglycemia – A Big Deal



Hypoglycemia (Glucose) Alert Values

- **BG <70mg/dl – Level 1**
- Follow 15/15 rule and contact provider make needed changes



- **BG < 54mg/dl – Level 2**
- Indicates serious hypo. Contact provider for med change. Glucagon Emergency Kit

- **Severe Hypoglycemia – Level 3**
- Requires external assistance – no threshold

6. Glycemic Goals, Hypoglycemia, and Hyperglycemic Crises: Standards of Care in Diabetes—2026

If hypo 15 Gm Carb Sources

- 4 ounces apple juice
- 3 - 4 Glucose Tablets
- 8 - 10 Lifesavers candy
- 8 - 10 Hard candies
- 2 Tablespoons Raisins
- 4 - 6 oz's Fruit juice/soda

Avoid foods with protein for people with type 2, since can stimulate insulin production.



*Individuals using automated insulin delivery systems should typically ingest 5–10g carbs, unless hypo due to exercise or over insulinization.

6. Glycemic Goals, Hypoglycemia, and Hyperglycemic Crises: Standards of Care in Diabetes—2026

Tx of Level 2 & 3 Hypoglycemia

- If can swallow w/out risk of aspiration, try gel, honey, etc. inside cheek
- If unable or unwilling to swallow, D50 IV or Glucagon
- If on Insulin at risk for high risk for hypoglycemia, prescribe Glucagon ER Kit.
- Glucagon injection (need Rx)
  - Inform and instruct caregivers, school personnel, fami of hypo signs and appropriate action
  - Dosing: Adults 1mg, Children <20kg 0.5mg
  - Glycemic effect 20 - 30mg, short lived
  - Must intake carb as soon as able
- Re-evaluate diabetes med treatment plan.



Hypoglycemia: Identify, Treat, & Prevent

Step 1

Identify your signs of hypoglycemia or low blood sugar:

- Sweaty
- Shaky
- Hungry
- Can't think straight
- Headache
- Irritated, grouchy
- Other

Step 2

If have signs of hypo, treat with carbs until glucose reaches 70+, then eat usual meal.

- Sugary drink, 4–8oz
- Piece of fruit
- Raisins, handful
- Glucose tabs, 4+
- Honey/glucose gel
- Skittles candy, 15+

Step 3

Have glucagon rescue meds available.

In case of severe hypo, identify someone (ahead of time) who can get medical help & give a glucagon rescue medication.

Notify your provider of low blood sugar events.

Hypoglycemia Levels:

Level 1 – Glucose less than 70
Level 2 – Glucose less than 54
Level 3 - Severe, needs assistance

Identify Causes of Hypo & Problem Solve to Prevent Future Episodes

» Low carb meal
» Extra activity
» Drinking alcohol
» Delayed, missed meal
» Too much insulin/meds
» Insulin timing

www.DiabetesEd.net

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SDOH and Hypoglycemia

Food insecurity, housing instability, underinsured, under-resourced living areas is associated with increased risk of hypoglycemia-related emergency department visits

Identify if fasting part of religious observances

Young children and older adults at highest risk due to lack of recognition of hypo symptoms

Insulin pumps with automated low-glucose suspend and automated insulin delivery systems have been shown to be effective in reducing hypoglycemia in type 1 diabetes

6. Glycemic Goals, Hypoglycemia, and Hyperglycemic Crises: Standards of Care in Diabetes—2026

Assess Hypo History

- Review history of hypoglycemia at every clinical encounter for all individuals at risk for hypoglycemia
- Evaluate hypoglycemic events
- Screen for impaired hypoglycemia awareness at least annually.



- Consider individual's risk for hypoglycemia when selecting diabetes medications and glycemic goals.
- Use of CGM is beneficial and recommended for individuals at high risk for hypoglycemia.

6. Glycemic Goals, Hypoglycemia, and Hyperglycemic Crises: Standards of Care in Diabetes—2026

Hypoglycemia: Clinical Risk Factors

Table 6.5—Assessment of hypoglycemia risk among individuals treated with insulin, sulfonylureas, or meglitinides

Clinical and biological risk factors	Social, cultural, and economic risk factors
Major risk factors • Recent (within the past 3–6 months) level 2 or 3 hypoglycemia • Intensive insulin therapy* • Impaired hypoglycemia awareness • Kidney failure • Cognitive impairment or dementia • History of metabolic surgery	Major risk factors • Food insecurity • Low-income status§ • Housing insecurity • Fasting for religious or cultural reasons • Underinsurance
Other risk factors • Multiple recent episodes of level 1 hypoglycemia • Basal insulin therapy* • Age ≥75 years† • Female sex • High glycemic variability‡ • Polypharmacy • Cardiovascular disease • Chronic kidney disease (eGFR <60 mL/min/1.73 m^2 or albuminuria) • Neuropathy • Retinopathy • Major depressive disorder • Severe mental illness • Gastroparesis • β-Blocker therapy	Other risk factors • Low health literacy • Alcohol or substance use disorder

6. Glycemic Goals, Hypoglycemia, and Hyperglycemic Crises: Standards of Care in Diabetes—2026

Poll Question 3

- JL is 78 and drinks a "few cocktails" every night. Lives with partner and takes basal insulin at night and bolus insulin as needed. Has had a few low blood glucose levels in past week of 62, 49 and 51. What is the most important recommendation?

- A. Decrease alcohol intake
- B. Check BG at least 4 times a day.
- C. Double check injection sites.
- D. Get glucagon rescue medication.



Glucagon Rescue Medications for Diabetes-Related Hypoglycemia

Name/Delivery	Supplied	Dose Range		Age / Route / Storage
		Adult	Peds / Age WT Dosing	
Glucagon Emergency Kit Injection requires mixing glucagon powder	1mg / 1mL vial + syringe	1mg	0.03mg/kg or < 6yrs or < 25 kgs | 0.5mg ≥ 6yrs or > 25kgs | 1mg	All ages approved SubQ, IM or IV administration Expires in 2 years at room temp.
Baqsimi Nasal glucagon powder	3 mg intranasal device	3 mg	1 yr or older | 3mg dose	Approved Age 1 year+ Nasal admin Expires ~ 2 years at room temp (keep in shrink-wrapped tube).
Gvoke Injectable liquid stable glucagon solution	0.5mg or 1.0mg in -Prefilled syringe -HypoPen auto-injector -Kit with vial and syringe	1 mg	< 2yrs: not recommended 2- 12 yrs < 45kg | 0.5mg ≥ 45kg | 1mg 12 yrs or older | 1mg	Approved Age 2 year+ SubQ admin in arm, thigh, abdomen Expires in 2 years at room temp (keep in foil pouch).

**All raise BG 20+ points. Can cause nausea, vomiting. After admin, roll person on side. Seek medical help. If no response after 1st dose, give 2nd dose in 15 mins. When awake, give oral carbs ASAP when safe to swallow. Please consult package insert for detailed info.*
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Sulfonylureas - Secretagogues or "Squirters"

- Mechanism: Stimulate beta cells to release insulin
- Dosed 1-2x daily before meals
- Adverse effects
  - Hypoglycemia, weight gain, watch renal function (increases risk of hypo)
- Low cost, $12 for 3 months supply
- Can help with glucose toxicity, lowers A1C 1-2%



Sulfonylureas • Stimulates sustained insulin release	glyburide: (Diabeta) (Glynase PresTabs)	 1.25 – 20 mg 0.75 – 12 mg	Can take once or twice daily before meals. Low cost generic. **Side effects**: hypoglycemia and weight gain. Eliminated via kidney.
	glipizide: (Glucotrol) (Glucotrol XL)	2.5 – 40 mg 2.5 – 20 mg	**Caution**: Glyburide most likely to cause hypoglycemia.
	glimepiride (Amaryl)	1.0 – 8 mg	Lowers A1c 1.0% – 2.0%.

Meglitinides - Squirts

- **Action**: stimulates beta cells to release insulin –rapid and shorter duration than sulfonylureas
- **Names**:
  - Repaglinide (Prandin)
    - **Dosing**: 0.5 to 4 mg, 2-4 x daily with meals, max dose 16mg
    - Metabolized by liver and mostly excreted in feces (some via kidney)
  - Nateglinide (Starlix)
    - **Dosing**: 120 mg tid a.c. with meals
    - Metabolized by liver, excreted by kidney
- Take 1-30 minutes before the meal
- Efficacy:
  - Decreases peak postprandial glucose by 60-70mg/dL
  - Reduce A1C 0.5-1%

Case Study Ken – Poll 4

Ken is a 67yoM with type 2 diabetes x 5 years. He complains of dizziness/shakiness 3x/week. Last A1C=6.7%. Which of his medications is most likely causing hypoglycemia?

A. Metformin
B. Bexagliflozin
C. Repaglinide
D. Pioglitazone



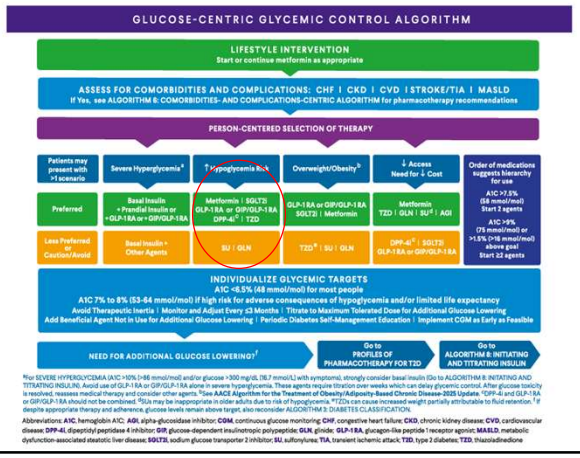
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Reducing Hypoglycemia

- Which are the only diabetes meds that directly cause hypoglycemia?



- ❑ Insulin
- ❑ Secretagogues (sulfonylureas, glitinides)



Quick Question 5

- JZ is excited about his A1c of 5.4%. He takes rapid acting insulin 3 times a day using a pen to keep his BG to target. Plus, he adjusts glargine as needed if his pm BG is elevated. What is your biggest concern?



A. Does he change his needle each time?

B. How is he adjusting glargine?

C. Is he adjusting insulin for exercise?

D. How many hypoglycemic events per week?

Preventing Hypoglycemia

In people taking insulin or secretagogues

Nocturnal Lows

- If bedtime glucose <110, reduce meds
- If increased daytime activity, may need extra snack
- Eval pre-dinner insulin/meds

Other

- Monitor kidney function / wt loss
- Monitor BG trends
- Too much meds?
- Skipped /delayed meals?
- Plan ahead
- Alcohol precautions
- Exercise planning
- CGM

Risk Factors for Hyperglycemic Crises

- Type 1 diabetes/absolute insulin deficiency
- Younger age
- Prior history of hyperglycemic crises
- Prior history of hypoglycemic crises
- Presence of other diabetes complications
- Presence of other chronic health conditions (particularly in people with type 2 diabetes)
- Presence of behavioral health conditions (e.g., depression, bipolar disorder, and eating disorders)
- Alcohol and/or substance use
- Elevated A1C level
- Insulin rationing
- SGLT2 (SGLT1/2) inhibitor use
- Social determinants of health



6. Glycemic Goals, Hypoglycemia, and Hyperglycemic Crises: Standards of Care in Diabetes—2026

Data are from McCoy et al. (194), Gibb et al. (195), Randall et al. (196), Thomas et al. (197), and Borden et al. (198)

DKA EDKA

Labs	DKA	EDKA
Glucose	200+	<200
Beta-hydroxybutyrate	3+	3+
Urine ketones	2+	2+
Blood pH	< 7.3	<7.3
Bicarb	<18	<18
Anion gap	>12	>12

16. Diabetes Care in the Hospital: Standards of Care in Diabetes—2026

ADA/EASD/AACE 2024 Hyperglycemic Crises in Adults Consensus Report

DiaBingo- G

G ADA goal for A1c is less than ____%

G People with DM need to see their provider at least every month

G Blood pressure goal is less than

G People with DM should see eye doctor every

G The goal for triglyceride level is less than

G Goal for LDL cholesterol if 40+ with diabetes is ____

G The goal for blood sugars 1-2 hours after a meal is less than:

G People with DM need this shot every year

G People with DM need to get urine tested yearly for _____

G Periodontal disease indicates increased risk for heart disease

G The goal for blood sugar levels before meals is:

G The activity goal is to do ___ minutes on most days

Case Study - Janet

Janet is a 36yoF with a history of GDM and newly diagnosed with type 2 diabetes. A1C=7.4%. Normal kidney function. Past medical history includes hypertension for which she takes HCTZ 25mg daily.



Weight: 140lbs, BMI=27kg/m^2

Social history

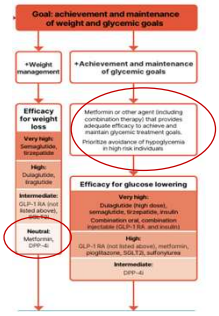
- Works full time as an accountant
- Skips breakfast, eats a small lunch, eats a large dinner, snacks in evening
- No Exercise
- Loves Starbucks Frappuccino's

Poll 6. What Treatment is recommended for Janet?



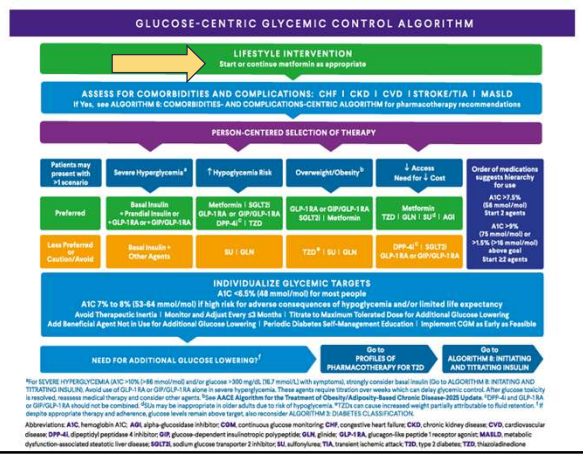
A. Semaglutide (GLP-1 inhibitor)
B. Linagliptin (DPP-4 inhibitor)
C. Empagliflozin (SGLT-2 inhibitor)
D. Metformin (Biguanide)
E. Lifestyle modifications only

Why Metformin?



- Longstanding evidence
- High efficacy and safety
- Inexpensive - 3 months for $12
- Weight neutral

- Reduces risk of microvascular complications, cardiovascular events, and death



Metformin Dosing and Mechanism

- Mechanism: decreases hepatic glucose production
- Do not <u>initiate</u> when eGFR < 45
- May be safely continued with eGFR of 30-45 mL/min/1.73m^2 with dose reductions
- Max effective dose: 2000mg/day, max dose 2550mg/day
- Monitor vitamin B12 levels and renal function
- GI issues: nausea, vomiting, diarrhea
  - Consider long-acting formulation, dose reduction

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Metformin

Class/Main Action	Name(s)	Daily Dose Range	Considerations
Biguanides • Decreases hepatic glucose output	metformin (Glucophage) Riomet (liquid metformin)	500 - 2550 mg (usually BID w/ meal) 500 - 2550 mg 500mg/5mL	**Side effects:** nausea, bloating, diarrhea, B12 deficiency. To minimize GI Side effects, use XR and take w/ meals. **Obtain GFR before starting.** • If GFR <30, do not use. • If GFR <45, don't start Meformin • If pt on Metformin and GFR falls to 30-45, eval risk vs. benefit; consider decreasing dose. **For dye study,** if GFR <60, liver disease, alcoholism or heart failure, restart metformin after 48 hours if renal function stable. **Benefits:** lowers cholesterol, no hypo or weight gain, cheap. Approved for pediatrics, 10 yrs + Lowers A1c 1.0%-2.0%.
	Extended Release-XR (Glucophage XR) (Glumetza) (Fortamet)	(1x daily w/dinner) 500 – 2000 mg 500 – 2000 mg 500 – 2500 mg	
Sulfonylureas • Stimulates sustained insulin release	glyburide: (Diabeta) (Glynase PresTabs)	1.25 – 20 mg 0.75 – 12 mg	Can take once or twice daily before meals. Low cost generic. **Side effects**: hypoglycemia and weight gain. Eliminated via kidney. **Caution**: Glyburide most likely to cause hypoglycemia. Lowers A1c 1.0% – 2.0%.
	glipizide: (Glucotrol) (Glucotrol XL)	2.5 – 40 mg 2.5 – 20 mg	
	glimepiride (Amaryl)	1.0 – 8 mg	

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Metformin – How Does it Rate?

Question	Answer
Cause hypoglycemia?	No
Cause weight gain?	No
Affordable?	Yes
Lowers CV risk?	Yes
Can most tolerate /use?	Yes/No (GI, CKD)

Cancer Treatment & Hyperglycemia

- Hyperglycemia due to chemotherapy may either be transient (improving upon treatment cessation) or represent permanent diabetes.
- Immune checkpoint inhibitors (ICIs) can cause autoimmune toxicities, including an autoimmune form of diabetes that results in β-cell destruction (incidence approximately ≤1%)



Hyperglycemia w/ Immunotherapy

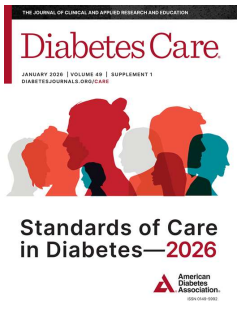
- Assess for hyperglycemia during treatment with immunotherapy
  - Including anti-PD-1 or anti-PD-L1 therapy, e.g., nivolumab, pembrolizumab, or avelumab)
  - Eval if need insulin therapy due to DKA risk
  - Perform additional testing to determine if the hyperglycemia is related to immunotherapy-associated diabetes.
  - Close monitoring, education, and dose adjustment are needed if insulin is started.

Treating Hyper due to P13k Inhibitor

- Metformin first-line oral agent to treat PI3K inhibitor–induced hyperglycemia, with up titration of the dose as tolerated.
- Pioglitazone is also an option as monotherapy or in combination with metformin, but its slow onset of action can limit its effectiveness
- SGLT2 inhibitors have also shown efficacy, but close monitoring is needed, as ketoacidosis has been reported.
- Insulin and sulfonylureas should be considered only as a last resort, as increased insulin levels may reactivate the PI3K pathway, counteracting the antitumor effects of PI3K inhibition.
- There is no direct evidence for the use of GLP-1 RAs for PI3K inhibitor–induced hyperglycemia.



Standard 12 - Microvascular Disease





12. Microvascular Complications - Eyes



- Optimize BG and B/P Control to protect eyes
- Screen with initial dilated and comprehensive eye exam by ophthalmologist or optometrist
  - Type 2 at diagnosis, then every year*
  - Type 1 within 5 years of dx, then every year*
  - *If **no** evidence of retinopathy **and** glycemic indicators within goal range, then screening every 1–2 years may be considered.
  - Type 1 or type 2 need eye exam before pregnancy and in the 1st trimester and may need monitoring every trimester and 1 year postpartum
- Appropriate to use retinal photography with remote reading or U.S. FDA of approved artificial intelligence algorithms to improve access to diabetes retinopathy screening – need follow-up.

12. Retinopathy, Neuropathy, and Foot Care: Standards of Care in Diabetes—2026

12. Microvascular Complications Nerves



- Nerve Disease
  - Optimize glucose to prevent/delay.
  - Optimize wt, BP, lipids *to slow* progression.
  - Screen for nerve disease using simple tests:
    - Type 2 at diagnosis, then annually
    - Type 1 diabetes 5 years, then annually
      - 10-g Monofilament - protective sense
      - Pinprick & temperature - small nerve fiber
      - Reflexes & vibration – Large nerves
  - Assess and treat to reduce pain, improve sleep, and address mood disorders.

Avoid opioids for pain management

12. Retinopathy, Neuropathy, and Foot Care: Standards of Care in Diabetes—2026

Lower Ext Annual Assessment



- Perform a comprehensive foot evaluation at least annually to identify risk factors for ulcers and amputations.
- Include inspection of the skin, assessment of foot deformities, neurological assessment (10-g monofilament testing or Ipswich touch test with at least one additional assessment: pinprick, temperature, or vibration), and vascular assessment, including pulses in the legs and feet.

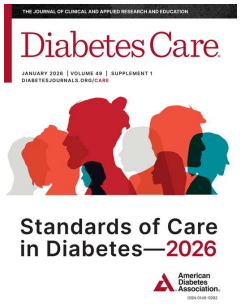
12. Retinopathy, Neuropathy, and Foot Care: Standards of Care in Diabetes—2026

Factors of at-risk Feet Include:

- Chronic hyperglycemia
- 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)
- Social determinants of health such as socioeconomic status, and access-to-care factors

12. Retinopathy, Neuropathy, and Foot Care: Standards of Care in Diabetes—2026

Standard 13 Older Folks





Poll Question 7

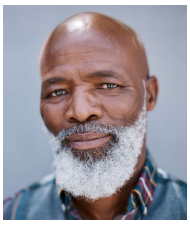
- What percent of the population over the age of 65 has prediabetes?



A. 50%
B. 18%
C. 29%
D. 34%

Older People and Diabetes Stats

- 29% of Americans age 65 or older have diabetes (11.8 million seniors)
- 50% of people with diabetes, 65 yrs plus
- 50% of older adults have prediabetes
- Rate of older population with type 1 diabetes growing due to increasing life expectancy.
- Diabetes prevalence to double in next 20 years, in part due to the aging population



Need regular assessment of medical, psychological, functional, and social domains

13. Older Adults: Standards of Care in Diabetes—2026

13. Older Adults Goals – Whole Picture

- Consider the assessment of medical, psychological and self-care domains to provide context to determine targets and therapeutic approaches for management.
- Screen for geriatric issues
  - polypharmacy,
  - cognitive impairment, depression
  - urinary incontinence, falls, and persistent pain

  that can affect diabetes self-management and diminish quality of life



See Level 2 Course, Older Adults and Diabetes

13. Older Adults: Standards of Care in Diabetes—2026

Treatment Goals Based On:

- Length of time living with diabetes (new onset, undiagnosed for many years or longer history)
- Presence or absence of complications
- Comorbidities
- Degree of frailty
- Cognitive function
- Life expectancy (often longer than expected)
- Functional status



Poll Question 8



- RT, is a healthy 74-year-old who is on metformin 1000mg BID. Has had diabetes for 11 years. Latest A1c was 7.3% What is best response?
  - A. Good job, let's get the A1c less than 7%
  - B. Have you been snacking more than usual?
  - C. What do you think about your A1c level?
  - D. Let's add on another medication to get your A1c to target.

13. Older Adults
Healthy & Good Functional Status

- Assess the medical, psychological, functional (self-management abilities), and social domains
- Screen annually for geriatric syndromes (e.g., cognitive impairment, depression, urinary incontinence, falls, persistent pain, and frailty), hypoglycemia, and polypharmacy
  - may affect diabetes management and diminish quality of life.
- If on insulin or hx of hypo, eval for CGM or AIDS
- **Goals:**
  - Reasonable A1c goal <7.0 - 7.5%
  - TIR ~ 70%, Below range ≤4%
  - Fasting BG 80 – 130
  - Bedtime Glucose 80-180
  - Blood Pressure < 130/80
  - Statin unless contraindicated or not tolerated



65 or older
- 29% have diabetes
- 50% have prediabetes

Please see Older Adults Level 2 Course

13. Older Adults: Standards of Care in Diabetes—2026

Older Adults and Medications

- In older **adults** at increased risk of hypoglycemia, meds with low risk of hypoglycemia are preferred.
- Overtreatment of diabetes is common in older adults and should be avoided.
- Deintensification (or simplification) of complex regimens is recommended to reduce the risk of hypoglycemia, if it can be achieved within the individualized A1C target.



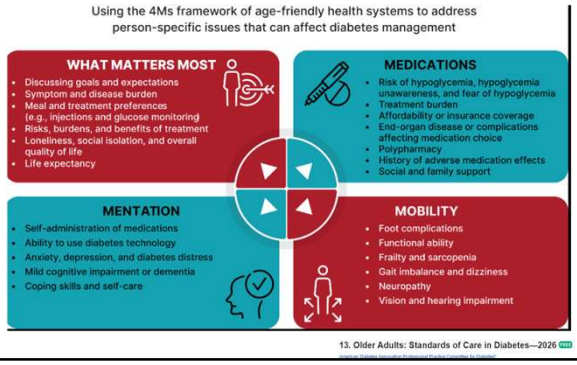
Older Adults with Complications and Reduced Functionality - Less Intense Goals

- Intermediate remaining life expectancy, high treatment burden, hypo and fall risk.
- Consider DE-Intensification
- Goals:
  - Reasonable A1c goal <8.0%
  - TIR ≥ 50%, Below range ≤1%
  - Fasting BG 90 – 150
  - Bedtime BG 100-180
  - Blood Pressure < 130/80
  - Statin unless contraindicated or not tolerated



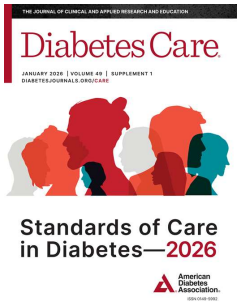
13. Older Adults: Standards of Care in Diabetes—2026

4 M's Framework of Age Friendly Health Systems



13. Older Adults: Standards of Care in Diabetes—2026

Standard 14 – Children & Diabetes





14. Children & Adolescents: Individualize Glycemic Goals

- Generally, goal is <7.0%
- A goal <6.5% may be considered for those at low risk of excessive hypoglycemia
- Less stringent goal of <7.5% may be needed for safety
- CGM metrics are recommended to be used in conjunction with or without A1C whenever possible.



Please see Peds and Diabetes Level 2 Course

Type 2 and Kids Goals

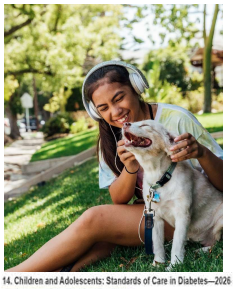
- A1c goal of 6.5% or less
- Individualize
- Initiate pharmacologic therapy, in addition to lifestyle therapy, at diagnosis
- Confirm diagnosis with antibody testing
- Treat glucose, B/P and lipids
- Engage in lifestyle coaching
- **Please see Kids and Diabetes Level 2 Course**

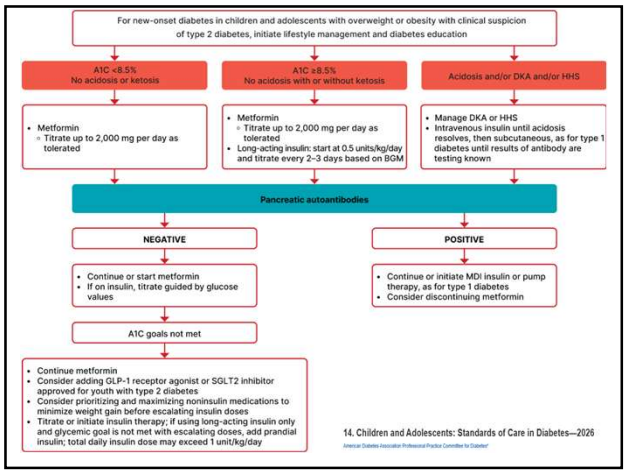
Tobacco, Electronic Cigarettes, Alcohol, and Cannabis

- Screen adolescents and young for tobacco or nicotine, electronic cigarettes, substance use, and alcohol use at diagnosis and regularly thereafter.

Discourage all youth with diabetes not to use cannabis recreationally in all form. Increase risks of hyperemesis syndrome.

- For adolescents with type 1 diabetes presenting with hyperglycemic emergencies, consider hyperglycemic ketosis-cannabis hyperemesis syndrome in individuals with pH ≥7.4 and bicarbonate >15 mmol/L in the presence of ketosis.





Standard 16 Hospitals & Hyperglycemia





16. Diabetes Care in the Hospital - What's the Big Deal?

- Hyperglycemia is associated with increased morbidity and mortality in hospital settings.
  - Acute Myocardial Infarction
  - Stroke
  - Cardiac Surgery
  - Infection
  - Longer lengths of stay



Hospital Admission and Diabetes

- The hospital readmission rate is 14% and 20% for people with diabetes – which is 2x the rate for for people without diabetes
- About 28% of people in hospitals at any given time have diabetes.
- Of people with diabetes who are hospitalized, 30% have two or more days of hospital stays.
- Hospitalization accounts for over 50% of care costs for diabetes



To prevent readmissions, monitor insulin adjustments for individuals admitted with A1C >9% or DKA and follow a transitional care model – plus other ideas

16. Diabetes Care in the Hospital: Standards of Care in Diabetes—2026

ADA Goals and Treatments for Hospitalized Patients

Once insulin therapy initiated, blood glucose goal is:

- 140-180 critical Care
- 100-180 non-critical care
  - Individualize based on pt status
  - More stringent goals may be appropriate in ICU, with careful consideration of preventing hypoglycemia.
- Critical Care:
  - Insulin drip preferred treatment



16. Diabetes Care in the Hospital: Standards of Care in Diabetes—2026

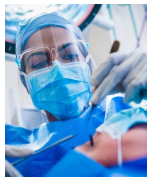
Glucose Monitoring & CGM

- If using a personal continuous glucose monitoring (CGM) device
  - Continue CGM during hospitalization if clinically appropriate
  - Use confirmatory point-of-care (POC) glucose measurements for insulin dosing decisions and hypoglycemia assessment
  - According to an institutional protocol.
- Monitor BG before meals and hs if eating
- If on Parenteral nutrition, monitor Q 4-6 hours



16. Diabetes Care in the Hospital: Standards of Care in Diabetes—2026

Diabetes and Surgery



- 20% of individuals undergoing major general surgery have diabetes,
- 23–60% have prediabetes or undiagnosed diabetes
- A1C target <8% for elective surgeries or Time in Range >50%.
- Perioperative glucose target of 100-180
- Postponing surgery based on A1C or TIR not recommended, as it may lead to unnecessary delay or denial of required surgery.

16. Diabetes Care in the Hospital: Standards of Care in Diabetes—2026

Preparation for Surgery



- Perioperative glucose target is 100-180
- Hold diabetes meds day of surgery
- Hold SGLT-2 for 3-4 days before surgery
- For individuals taking a GLP-1 RA or a dual GIP and GLP-1 RA, personalize approach.
- Basal Insulin injection or pump:
  - NPH – cut dose by 50% (type 2)
  - Basal insulin - give 75 - 80% (individualize, type 1 may need 100% of basal)
- Bolus insulin:
  - Monitor BG every 2-4 hours while NPO
  - Use mild insulin bolus coverage as needed

16. Diabetes Care in the Hospital: Standards of Care in Diabetes—2026

How Many Drug Options for Diabetes?

- Biguanide
- Sulfonylureas
- Meglitinides
- Glucagon-like-peptide-1 (GLP-1) receptor agonists
- GLP/GIP receptor agonist
- Sodium glucose cotransporter-2 (SGLT-2) inhibitors
- Thiazolidinediones (TZD's)
- Dipeptidylpeptidase-4 (DPP-4) inhibitors
- Alpha-glucosidase inhibitors
- Bile acid sequestrant
- Dopamine-2-agonist
- Insulin

GIP: glucose-dependent insulinotropic polypeptide

Dipeptidyl Peptidase-4 (DPP-4) Inhibitors

- Mechanism of action
  - Prevents the breakdown of GLP-1 and GIP, resulting in 2-3X increased endogenous incretin levels
- Efficacy
  - Hemoglobin A1C reduction by **0.6%–0.8%**
  - Primarily lowers postprandial glucose levels
  - Not as effective as GLP-1 agonists
  - CV neutral, increased HF hospitalization with alogliptin/saxagliptin
- Adverse effects
  - Generally well tolerated, dosed once daily
  - Avoid in combo with GLP-1 agonist
  - Caution with h/o pancreatitis
  - Potential joint pain

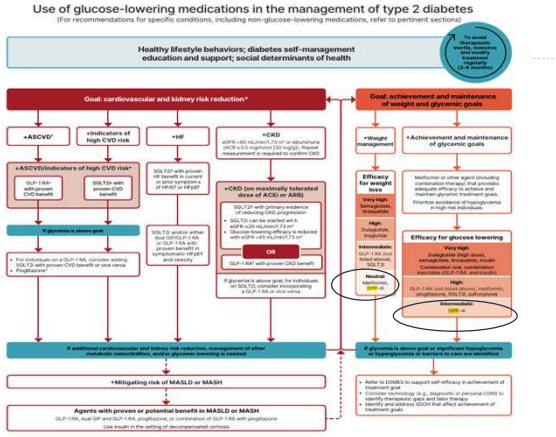
Dipeptidyl Peptidase-4 (DPP-4) Inhibitors

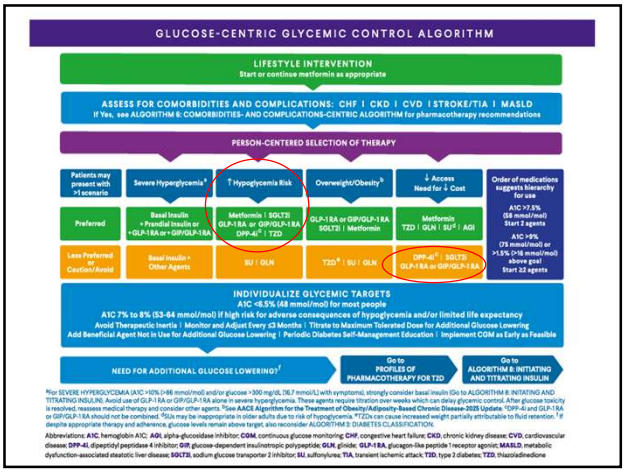
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DPP4 Inhibitor Dosing

Drug	Dose	Renal Adjustment
Sitagliptin	100 mg daily	50 mg/day eGFR 30–45 mL/min/1.73m^2 25 mg/day eGFR <30 mL/min/1.73m^2
Linagliptin	5 mg daily	None necessary
Saxagliptin	5 mg daily	2.5 mg/day eGFR < 45 mL/min/1.73m^2
Alogliptin	25 mg daily	12.5 mg/day eGFR 30–59 mL/min/1.73m^2 6.25 mg/day for eGFR <30 mL/min/1.73m^2

Where do DPP4 inhibitors fit within the treatment algorithm?





Alpha-glucosidase Inhibitors

- **Action**: blocks enzymes that digest starches in the small intestine
- **Name**: acarbose (Precose) or miglitol (Glyset)
  - Dosing: 25-100mg TID, max 300mg/day
- Efficacy
  - Decrease postprandial glucose 40-50 mg/dl
  - Decrease A1C 0.5-1.0%
- Other Effects
  - Flatulence or abdominal discomfort
  - Contraindicated in patients with inflammatory bowel disease or cirrhosis
- Special Consideration
  - In case of hypoglycemia, treat with glucose tabs or milk
  - (other starches are blocked by medication)



Non-Insulin Drug Comparison

Class	Efficacy	Hypo	Weight	Effect on MACE	Heart Failure	Kidney	MASH	Cost
Metformin	High	No	Neutral/ Loss	Potential benefit	Neutral	Neutral	Neutral	Low
SGLT2 Inhibitors	Intermediate to High	No	Loss, intermediate	Benefit	Benefit	Benefit	Unknown	High
GLP-1 RA	High to Very High	No	Loss, intermediate to very high	Benefit	Benefit: sema	Benefit	Benefit	High
GIP and GLP-1 RA	High to Very High	No	Loss, very high	Under investigation	Under investigation	Under investigation	Potential Benefit	High
DPP-4 Inhibitors	Intermediate	No	Neutral	Neutral	Risk: saxa/alogliptin	Neutral	Unknown	High
Pioglitazone	High	No	Gain	Potential benefit	Risk	Neutral	Potential Benefit	Low
Sulfonylurea	High	Yes	Gain	Neutral	Neutral	Neutral	Unknown	Low

PROFILES OF PHARMACOTHERAPY FOR TYPE 2 DIABETES

		METFORMIN	GLP-1 RA	GIP/GLP-1 RA	SGLT2i	TZD	DPP-4i	SU	GLN	AGI	INSULIN
EFFICACY FOR GLUCOSE LOWERING[a]		++	++/+++	++/++++	+/++	++	+/++	++/+++	+/++	+/++	+++
ASCVD	MACE		Benefit[b]	Benefit[b]	Benefit[c]						
	STROKE		Benefit[d]	Benefit[d]	Benefit[c]	Benefit					
CHF[e]			Potential Benefit[f]	Potential Benefit[f]	Benefit	Contraindicated NYHA Class III/IV[c]	Saxagliptin Alogliptin[g]				Moderate
CKD			Benefit[d]	Benefit	Benefit						
RENAL IMPAIRMENT		Decrease Dose for eGFR 30 to 45[h] Contraindicated for eGFR <30[h]	Exenatide for eGFR 30 to 45[i] Lixisenatide Contraindicated for eGFR <30		↓ Glycemic Efficacy at Lower eGFR Check Drug-Specific eGFR Thresholds[h]		Adjust Dose[j]	↑ Hypoglycemia Risk	↑ Hypoglycemia Risk	Contraindicated eGFR <15 or Serum Cr >3 mg/dL	↑ Hypoglycemia Risk
HYPOGLYCEMIA RISK								Moderate to High[k]	Low to Moderate		Moderate to High
WEIGHT		Slight Loss	Loss	Loss	Mild Loss	Gain[l]		Gain			Gain
MASLD[m]	HEPATIC STEATOSIS		Benefit[n]	Potential Benefit	Potential Benefit	Potential Benefit					Potential Benefit
	MASH		Benefit[n]	Potential Benefit		Potential Benefit					
	FIBROSIS PROGRESSION		Benefit[n]	Potential Benefit		Potential Benefit					
	FIBROSIS REGRESSION		Benefit[n]	Potential Benefit	Potential Benefit	Potential Benefit					
GI ADVERSE SYMPTOMS		Mild to Moderate	Moderate[o]	Moderate[o]						Moderate	
OTHER CONSIDERATIONS			MTC/MEN2	OA MTC/MEN2	GU Infections Euglycemic DKA[p] ↑ Fracture Risk[q]	↑ Fracture Risk[r] Bladder Cancer	Rare Arthralgias/ Myalgias				
ACCESS/COST		$	$$$	$$$	$$$	$	$-$$	$	$-$$	$-$$	$ - $$$

Benefits | Use with caution | Contraindicated | Neutral, not studied, or insufficient evidence

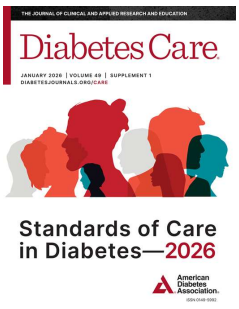
[a]Each "+" approximates 0.5% A1C lowering. [b]GLP-1 RA MACE benefits with liraglutide, dulaglutide, semaglutide (oral or subcutaneous). Tirzepatide is non-inferior to dulaglutide for MACE. [c]SGLT2i MACE benefits and potential hemorrhagic stroke benefit with empagliflozin, canagliflozin. [d]Stroke and CKD benefits with dulaglutide, semaglutide. Tirzepatide is non-inferior to dulaglutide for stroke. [e]Obesity-related HFpEF. [f]TZDs increase fluid retention and edema and are contraindicated in CHF NYHA Class III/IV. [g]Increased CHF hospitalization risk with saxagliptin and alogliptin. [h]Contraindicated in CKD4 (eGFR <30 ml/min/1.73 m²). For CKD3b (eGFR 30 to <45 mL/min/1.73 m²), do not initiate or initiate with caution to maximum 500 mg twice per day. Hold for acute kidney injury or intravenous contrast. [i]Exenatide CKD3b (eGFR 30 to <45 mL/minute/1.73 m²) use not recommended or monitor closely. [j]The eGFR thresholds for initiation and/or continuation in CKD vary among SGLT2i. Check drug-specific eGFR thresholds. Not for use for eGFR <20 ml/min/1.73 m². [k]Only linagliptin does not require adjustment. [l]Single-agent risks of hypoglycemia may be low but increases when combined with other agents or with CKD (glyburide > glipizide/glimepiride/gliclazide). [m]Adapted from Cusi et al. 2025. [n]Shown for semaglutide. [o]Use slow titration, portion control, and reduce to prior tolerated dose if disruptive. [p]Precipitants include significant concurrent illness, surgery, inappropriate/rapid insulin dose reduction, and fasting. [q]Reported with canagliflozin, dapagliflozin, and pioglitazone. [r]Reported with pioglitazone.

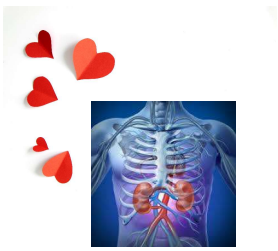
Combo Oral Medications PocketCard™

Medications	Doses in mg	Medications	Doses in mg	Medications	Doses in mg
Trijardy XR (3 meds) empagliflozin linagliptin metformin XR	5 - 25 2.5 -5 1000	Janumet (sitagliptin/ metformin)	50/500 50/1000	Prandimet (repaglinide/ metformin)	1/500 2/500
ACTOplus Met* (pioglitazone/ metformin)	15/500 15/850	Janumet XR (sitagliptin/ metformin)	50/500 50/1000 or 100/1000	Qtern (saxagliptin / dapagliflozin)	5/10
ACTOplus Met XR (pioglitazone/ metformin	15/1000 30/1000	Jentadueto (linagliptin/ metformin)	2.5/500 2.5/850 or 2.5/1000	Segluromet (ertugliflozin/ metformin)	2.5/500 or 2.5/1000 or 7.5/500 or 7.5/1000
Duetact* (pioglitazone/ glimepiride)	30/2 30/4	Kazano (alogliptin/ metformin)	12.5/500 12.5/1000	Steglujan (ertugliflozin/ sitagliptin)	5/100 or 15/100
Glucovance* (glyburide/ metformin)	1.25/250 2.5/500 5/500	Metaglip* (glipizide/ metformin)	2.5/250 2.5/500 or 5/500	Synjardy (empagliflozin/ metformin)	5/500 or 12.5/500 5/1000 or 12.5/1000
Glyxambi (empagliflozin and linagliptin)	10/5 25/5	Oseni (alogliptin/ pioglitazone)	12.5/15 or 25/15 12.5/30 or 25/30 12.5/45 or 25/45	Synjardy XR† (empagliflozin/ metformin XR)	5/1000 or 10/1000 12.5/1000, 25/1000 †Approved for peds
Invokamet (canagliflozin/ metformin)	50/500 or 50/1000 150/500 or 150/1000			Xigduo XR (dapagliflozin/ metformin)	5/500 or 10/500 5/1000 or 10/1000

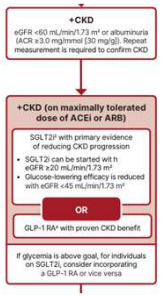
*Available in generic. Observe precautions of each component drug.

Standards 10, 11 | CKD & Cardiovascular Disease Risk Managment





Chronic Kidney Disease - Choosing glucose-lowering medication



New in 2026: In adults with T2D and advanced CKD (eGFR <30), a GLP-1 RA is preferred for glycemic management due to lower risk of hypoglycemia and for CV event reduction

In kidney disease, use SGLT-2 in people with GFR ≥ 20 and continue until initiation of dialysis or transplantation. (When GFR <45, SGLT-2's don't lower BG much.)

Or

GLP-1 RA with proven CVD CKD benefit

*Semaglutide improves kidney function (FLOW trial)

Risk of CKD Progression, CVD

11. Chronic Kidney Disease and Risk Management: Standards of Care in Diabetes—2026

CKD is classified based on:
- GFR (G)
- Albuminuria (A)

GFR categories (mL/min/1.73 m²) Description and range				Albuminuria categories Description and range: A1 Normal to mildly increased <30 mg/g <3 mg/mmol	A2 Moderately increased 30-299 mg/g 3-29 mg/mmol	A3 Severely increased ≥300 mg/g ≥30 mg/mmol
	G1	Normal or high	≥90	Screen 1	Treat 1	Treat and refer 2
	G2	Mildly decreased	60-89	Screen 1	Treat 1	Treat and refer 2
	G3a	Mildly to moderately decreased	45-59	Treat 1	Treat 2	Treat and refer 3
	G3b	Moderately to severely decreased	30-44	Treat 2	Treat and refer 3	Treat and refer 3
	G4	Severely decreased	15-29	Treat and refer 3	Treat and refer 3	Treat and refer 4+
	G5	Kidney failure	<15	Treat and refer 4+	Treat and refer 4+	Treat and refer 4+

Low risk (if no other markers of kidney disease, no CKD)
Moderately increased risk
High risk
Very high risk

Treating CKD



- Use max tolerated ACEI or ARB
- Optimize glucose and BP to protect kidneys
- Aim to reduce urinary albumin by ≥30% in people with CKD
  - *SGLT-2i's with proven benefit
    - Empagliflozin (Jardiance), canagliflozin (Invokana), dapagliflozin (Farxiga)
  - *GLP-1 RA's with proven benefit
    - Semaglutide (Ozempic)-has indication, liraglutide (Victoza), dulaglutide (Trulicity)

11. Chronic Kidney Disease and Risk Management: Standards of Care in Diabetes—2026

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New in 2026: GLP-1 in Kidney Disease

- In adults with T2D and advanced CKD (eGFR <30), a GLP-1 RA is preferred for glycemic management due to lower risk of hypoglycemia and for CV event reduction.
- Individuals on dialysis can be safely initiated or continued on GLP-1 based therapy to reduce CV risk and mortality
- Reminder: only GLP-1 with renal restrictions are exenatide and lixisenatide

11. Chronic Kidney Disease and Risk Management: Standards of Care in Diabetes—2026

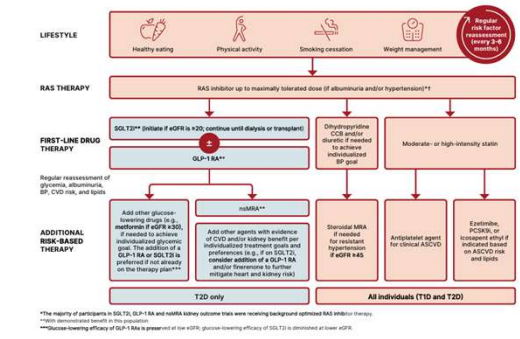
Kidney Goals and MNT



- Nutrition Recommendations
- For people with non–dialysis-dependent stage 3 or higher chronic kidney disease
  - dietary protein intake aimed to a target level of 0.8 g/kg body weight per day.
- For those on dialysis,
  - consider protein intake of 1.0–1.2 g/kg/day since protein energy wasting is a major problem in some individuals on dialysis
- Refer to nephrology
  - If GFR < 30 or uncertain CKD etiology

11. Chronic Kidney Disease and Risk Management: Standards of Care in Diabetes—2026

Figure 11-12 Holistic Approach to Diabetes + CKD



11. Chronic Kidney Disease and Risk Management: Standards of Care in Diabetes—2026

Finerenone

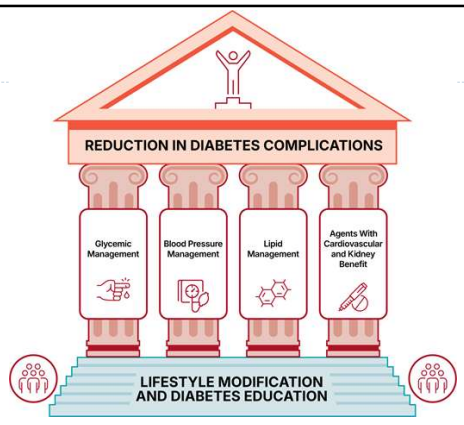
- Indications: to reduce the risk of
  - sustained eGFR decline, end-stage kidney disease, CV death, non-fatal MI, and HHF in adult patients with CKD associated with T2D and T1D
  - CV death, HHF, and urgent heart failure visits in adult patients with heart failure with left ventricular ejection fraction (LVEF) ≥ 40%.
- Dosing
  - Do not initiate if potassium > 5.0 mEq/L
  - Monitor potassium levels

eGFR (mL/min/1.73m²)	Starting Dose
≥ 60	20 mg orally once daily
≥ 25 to < 60	10 mg orally once daily
< 25	Initiation is not recommended

		Current Kerendia Dose	
		10 mg once daily	20 mg once daily
Current Serum Potassium (mEq/L)	< 4.8	Increase the dose to 20 mg once daily.	Maintain 20 mg once daily.
	> 4.8 – 5.5	Maintain 10 mg once daily.	Maintain 20 mg once daily.
	> 5.5	Withhold Kerendia. Consider restarting at 10 mg once daily when serum potassium < 5.0 mEq/L.	Withhold Kerendia. Restart at 10 mg once daily when serum potassium < 5.0 mEq/L.

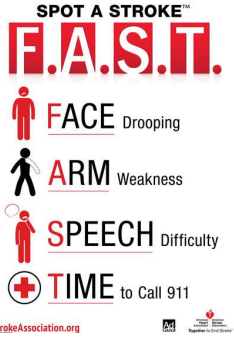
1 If eGFR has decreased by more than 30% compared to previous measurement, maintain 10 mg dose.

DailyMed - KERENDIA- finerenone tablet, film coated KERENDIA- finerenone tablet



10. Cardiovascular Disease and Risk Management: Standards of Care in Diabetes—2026

Stroke and Heart Attack



- Pain or discomfort in your arms, back, jaw, neck, or stomach
- Shortness of breathing
- Sweating
- Nausea
- Light-headedness



Make sure people with diabetes know the signs and seek immediate help.

People with diabetes may not experience intense chest or jaw pain during heart attack due to neuropathy.

10. Cardiovascular Disease and Risk Management

- CVD includes ASCVD and heart failure
- ASCVD
  - Acute coronary syndrome
  - Myocardial infarction (MI)
  - Stable or unstable angina
  - Coronary or other arterial revascularization
  - Stroke, transient ischemic attack
  - Peripheral artery disease (PAD) including aortic aneurysm
- CVD is the leading cause of morbidity and mortality in people with diabetes



Large benefits are seen when multiple CV risk factors are addressed simultaneously

With more aggressive goals, rates of CVD have decreased.
CV Risks predicted to increase in future.

10. Cardiovascular Disease and Risk Management: Standards of Care in Diabetes—2026

Assess ASCVD and Heart Failure Risk

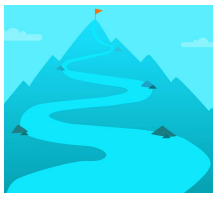
- Duration of diabetes
- BMI
- Hypertension
- Dyslipidemia
- Smoking
- Family history of premature coronary disease
- Chronic kidney disease – presence of albuminuria
- ASCVD risk factors and 10-year ASCVD risk assessment



Treat modifiable risk factors as described in ADA guidelines.

Reducing CV Risk Factors

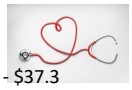
- Modifiable
  - Sleep
  - Smoking
  - Oral Care
  - Weight
  - Dietary Habits
  - Glucose
  - Blood Pressure
  - Lipids
  - UACR



- Make small, achievable goals. We are in this for the long run.

ASCVD Targets

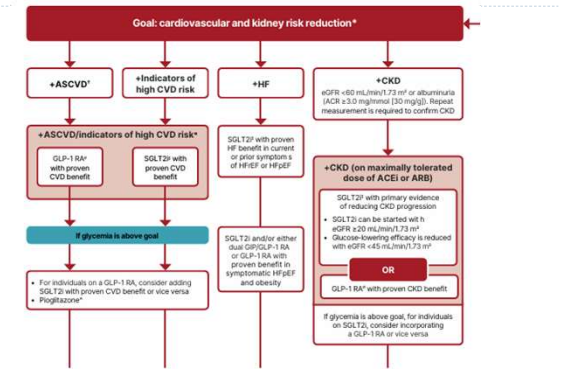
- Targets Achieved in US Adults 2015-2018
  - A1C <7% by 50.5%
  - BP target of <130/80 achieved by 47.7%
  - Lipid control (non-HDL cholesterol) <130 mg/dL, achieved by 55.7%
- 22.2% met targets for all three risk factors



  - Largest contributor to direct and indirect costs - $37.3 billion/year
  - Rates of heart failure hospitalization are 2x higher in people with diabetes.

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High Risk or Establish CVD, CKD, HF



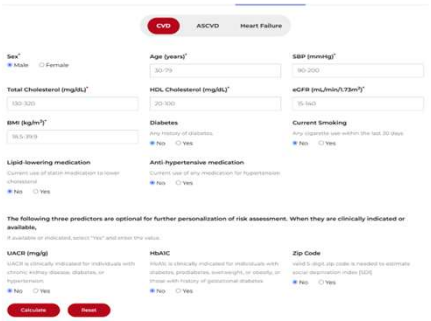
Indicators of High CV Risk

- Over 55 years with 2 or more additional risk factors:
  - Obesity
  - Hypertension
  - Smoking
  - Dyslipidemia
  - Albuminuria

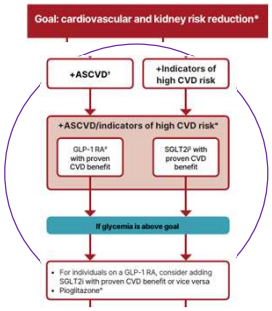


Calculating ASCVD Risk

- The American Heart Association PREVENT™ Online Calculator - Professional Heart Daily | American Heart Association



Cardiovascular Disease or High Risk



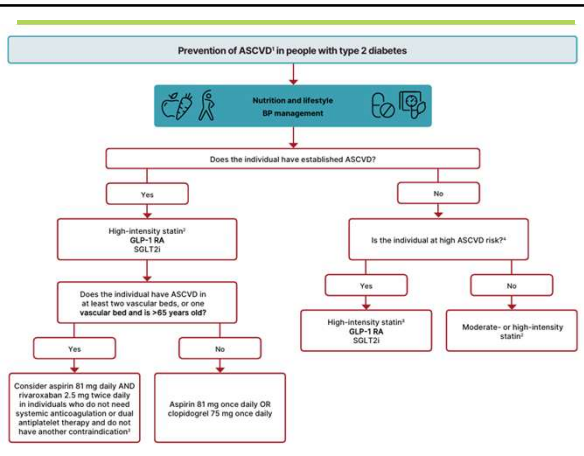
ASCVD = atherosclerotic cardiovascular disease
MACE: major adverse cardiovascular events

Most effective meds based on Cardiovascular Outcomes Trial (CVOT) to Reduce MACE

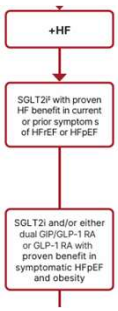
GLP-1 RA's Preferred
semaglutide (Ozempic),
liraglutide (Victoza),
dulaglutide (Trulicity)
Tirzepatide (Mounjaro)

~ Or~

SGLT2i
empagliflozin (Jardiance),
canagliflozin (Invokana),
dapagliflozin (Farxiga)



Heart Failure



In people with heart failure, use SGLT2i because they improve heart failure and kidney outcomes.

New for 2026:
9.9 In adults with T2D, obesity, and symptomatic HFpEF, the glucose-lowering treatment plan should include a GIP/GLP-1 agonist or GLP-1 agonist with demonstrated benefits for HF-related symptoms and reduction in HF events (irrespective of A1C).

GLP-1 RA
Semaglutide
GLP-1/GIP RA
Tirzepatide

SGLT2i
Empagliflozin
Canagliflozin
Dapagliflozin
Ertugliflozin

HFpEF Heart failure with preserved ejection fraction ≥40%)

(HFrEF) Heart failure with reduced ejection fraction ≤40%)

Sotagliflozin (Impefa)

- SGLT1/SGLT2 inhibitor
- Indicated to reduce risk of CV death, hospitalization for HF, and urgent HF visit in adults with:
  - HF or
  - T2D, CKD, and other CV risk factors
- Dose: 200mg once daily not more than 1 hour before first meal
- Titrate up to 400mg daily after at least 2 weeks
- Studied in the SCORED and SOLOIST trials.
- SCORED: A total of 10.584 people with T2D and additional CV risk factors
  - After 16 months, rate of primary endpoint (death from CV causes, hospitalization for HF and urgent visits for GF) was reduced (5.6 events/100 patient years with sotagliflozin compared to 7.5/100 patient years with placebo)

SGLT-2 Inhibitor Dosing & Indication

Once an SGLT2i is initiated, it is reasonable to continue an SGLT2i even if the eGFR falls below 20 ml/min/1.73 m2 , unless it is not tolerated or kidney replacement therapy is initiated.

Drug	Dose	FDA Approved Indications
Ertugliflozin (Steglatro)	5-15 mg daily	As an adjunct to diet and exercise to improve glycemic control in adults with T2DM (All)
Dapagliflozin (Farxiga)	5-10 mg daily	• To reduce the risk of hospitalization for HF in adults with T2DM and established CVD or multiple CV risk factors. • To reduce the risk of CV death and hospitalization for HF, and urgent HF visit in adults **with HF.** • To reduce the risk of sustained eGFR decline, ESKD, CV death, and hospitalization for HF in **adults with CKD** at risk of progression.
Empagliflozin (Jardiance)	10-25 mg daily	• To reduce the risk of CV death in adults with T2DM and established CVD. • To reduce the risk of CV death and hospitalization for HF in **adults with HF** • **To reduce the risk of sustained decline in eGFR, ESKD, CV death, and hospitalization in adults with CKD at risk of progression.**
Canagliflozin (Invokana)	100-300mg daily	• To reduce MACE in adults with T2DM and established CVD. • To reduce the risk of ESKD, doubling of serum creatinine, CV death, and hospitalization for HF in adults with T2DM and diabetic nephropathy with albuminuria >300 mg/day.
Bexagliflozin (Brenzavvy)	20mg daily	As an adjunct to diet and exercise to improve glycemic control in adults with T2DM

› Package inserts, dailymed.nlm.nih.gov

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Meet Alice

Alice is a 56yo AAF presenting for follow-up for type 2 diabetes. Alice reports that her blood pressure has been higher lately. Denies s/sx of hypoglycemia.

- **PMH**
  - Type 2 diabetes x5 years
  - HTN x 5 years
  - Depression
- **Meds**
  - Metformin1000mg PO bid
  - Glipizide 10mg PO qam
  - Chlorthalidone 25mg PO daily
  - Escitalopram 10mg PO daily
- **PE**
  - Ht: 5'3" Wt: 185lbs , BMI:32.8kg/m^2
  - BP: 140/88mmHg
  - A1c=6.9%, K: 4.5mEq/L, Scr:0.8mg/dL, ACR 202 mg/g
  - Tchol=204mg/dL, HDL=34mg/dL, LDL=120mg/dL, TG=250mg/dL

- Social history
  - (+)Alcohol: 1-2 drinks/week
  - (+) Tobacco use: 1/2ppd
  - Exercise: walks 15 min twice/week
  - Occ: receptionist
- Home monitoring
  - FBG and pre-meal: 110-130 mg/dL
  - BP: 140-150/80-90mmHg

Questions to Think About

- What are Alice's blood pressure, cholesterol and glucose targets?
- What lifestyle changes should be advised to reduce cardiovascular risk?
- What changes should be made to optimize Alice's medication regimen?





Hypertension Management in People with Diabetes

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Classifying Hypertension

BP Category	SBP		DBP
Normal	<120 mmHg	And	<80mmHg
Elevated	120-129mmHg	And	<80mmHg
Hypertension			
Stage 1	130-139 mmHg	Or	80-89mmHg
Stage 2	≥140mmHg	Or	≥90mmHg

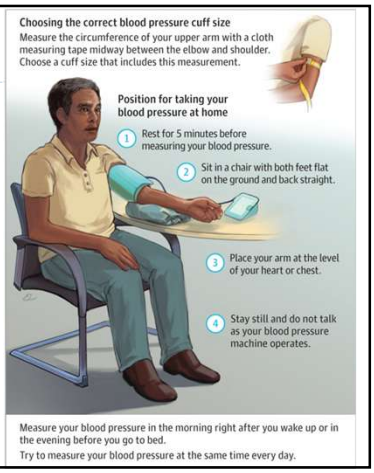
Individuals with SBP and DBP in 2 categories should be designated to the higher BP category

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Taking an accurate Blood Pressure





BP and Diabetes Targets 2026

- **BP target <130/80**
  (if it can be safely attained)



- A systolic BP <120 should be encouraged in individuals with high CV or kidney risk
- Confirm systolic BP ≥ 130 or diastolic BP ≥ 80 using multiple readings, including measurements on a separate day, to diagnose hypertension.
- If BP ≥ 180/110, can be diagnosed at single visit
- BP target based on individual assessment, shared decision making and potential adverse effects
- Monitor BP at each office visit and home for those with HTN
- During pregnancy, BP Target of 110 -135/85

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Cost vs Benefit of Lower BP Targets

- Consider potential adverse effects of BP medications
  - Hypotension, syncope, falls, acute kidney injury, and electrolyte abnormalities
  - Older people, those with CKD, and frailty have been shown to be at higher risk
  - People with orthostatic hypotension, substantial comorbidity, functional limitations, or polypharmacy higher risk and may prefer relaxed BP targets to enhance quality of life.



10. Cardiovascular Disease and Risk Management: Standards of Care in Diabetes—2026

BP Treatment in addition to Lifestyle

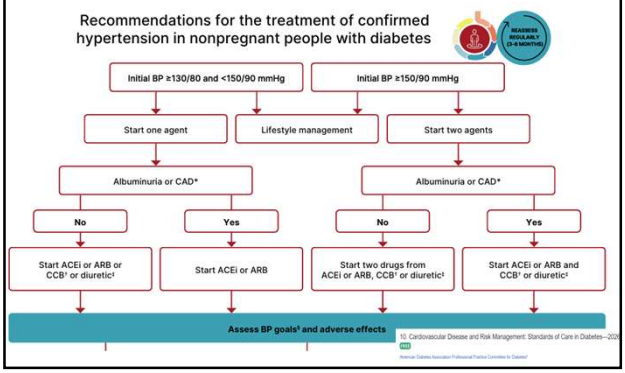
- **First Line BP Drugs if 130/80 +**
  - With albuminuria or CAD
    - Start either ACE or ARB*
  - No albuminuria - Any of the 4 classes of BP meds can be used:
    - ACE Inhibitors, ARBs, thiazide-like diuretics or calcium channel blockers.
    - Monitor K+/Scr 7-14 days after initiation and dose increase for diuretics, ACEI/ARB
  - Avoid ACE and ARB at same time
  - Multiple Drug Therapy often required
- **If BP ≥ 150 /90 start 2 drug combo**



*Albuminuria = Urinary albumin creatinine ratio of 30+

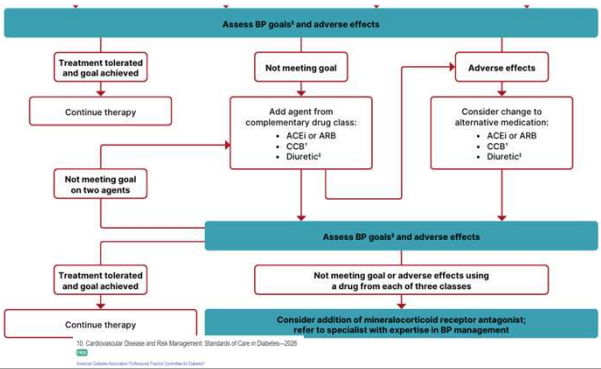
10. Cardiovascular Disease and Risk Management: Standards of Care in Diabetes—2026

Hypertension Management



10. Cardiovascular Disease and Risk Management: Standards of Care in Diabetes—2026

Hypertension Management (Cont)



10. Cardiovascular Disease and Risk Management: Standards of Care in Diabetes—2026

HTN Lifestyle Treatment Strategies



- If BP > 120/80, start with lifestyle
- DASH Diet
- Weight loss if indicated
- Sodium intake <2,300mg/day
- Eat more fruits & veggies (8-10 a day)
- Low fat dairy products (2-3 servings/day)
- Limit alcohol 1-2 drinks a day
- Increase activity level

10. Cardiovascular Disease and Risk Management: Standards of Care in Diabetes—2026

Cardiac and Renal Disease



- The combination of 3 comorbidities has been termed *cardiorenal metabolic disease* or *cardiovascular-kidney-metabolic* health
  - ASCVD, heart failure, and chronic kidney disease (CKD)
- Recognized interrelationship of cardiometabolic risk factors leading to cardiovascular disease and adverse kidney outcomes in people with diabetes.
  - 3 comorbidities frequently associated with metabolic risk factors & extra weight
  - Incidence of all three conditions rises with *increasing* A1C levels.

Back to Alice

Alice is a 56yo AAF presenting for follow-up for type 2 diabetes. Alice reports that her blood pressure has been higher lately. Denies s/sx of hypoglycemia.

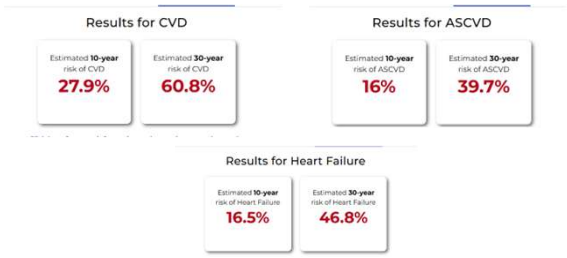
- **PMH**
  - Type 2 diabetes x5 years
  - HTN x 5 years
  - Depression
- **Meds**
  - Metformin1000mg PO bid
  - Glipizide 10mg PO qam
  - Chlorthalidone 25mg PO daily
  - Escitalopram 10mg PO daily
- **PE**
  - Ht: 5'3" Wt: 185lbs , BMI:32.8kg/m^2
  - BP: 140/88mmHg
  - A1c=6.9%, K: 4.5mEq/L, Scr:0.8mg/dL, ACR 202 mg/g, eGFR=88
  - Tchol=204mg/dL, HDL=34mg/dL, LDL=120mg/dL, TG=250mg/dL



- Social history
  - (+)Alcohol: 1-2 drinks/week
  - (+) Tobacco use: 1/2ppd
  - Exercise: walks 15 min twice/week
  - Occ: receptionist
- Home monitoring
  - FBG and pre-meal: 110-130 mg/dL
  - BP: 140-150/80-90mmHg

Calculating ASCVD Risk

- The American Heart Association PREVENT™ Online Calculator - Professional Heart Daily | American Heart Association
- What is Alice's Risk?



Poll 9 - What is the blood pressure goal for Alice?

A. BP<120/80 mmHg
B. BP<130/80 mmHg
C. BP<140/80 mmHg
D. BP<140/90 mmHg





What drugs should we use to treat?

BP & Lipid Meds Cheat Sheet

Antihypertensive Medications

ACE and ARBs are preferred therapy if experiencing hypertension and albuminuria – If B/P not at goal with either of these agents, add a diuretic or other class. Do not use during pregnancy or in persons w/ renal or hepatic dysfunction. Start w/ low dose, gradually increase. If one class is not tolerated, the other should be substituted. For those treated with an ACE inhibitor, angiotensin receptor blocker, or diuretic, serum creatinine/estimated glomerular filtration rate and serum potassium levels should be monitored at least annually. ADA Standards CV Disease Risk Management

Class / Action	Generic / Trade Name	Usual Daily Dose Range	Frequency	Considerations
ACE Inhibitors Angiotensin Converting Enzyme Action - Block the conversion of AT-I to AT-II. Also stimulates release of nitric oxide causing vasodilation.	benazepril / Lotensin†	10 – 40 mg	1 x a day	Try to take same time each day. Effects seen w/in 1 hr of admin, max effects in 6 hrs. Side effects: Can cause cough (due to increased bradykinin) – can try different med in same class. Also can cause fatigue, dizziness, hypotension. †These meds are also available as a combo w/ low dose HCTZ (hydrochlorothiazide). ‡These meds are also available as a combo w/ CCB (calcium channel blocker) usually amlodipine
	captopril /Capoten*†	12.5 - 150 mg	2-3 x a day	
	Enalopril/ Vasotec*†	2.5 - 40 mg	1-2 x a day	
	Fosinopil / Monopril†	10- 40 mg	1 x a day	
	Lisinopril *† Prinivil Zestril	10 – 40 mg 10 - 40 mg		
	Ramipril / Altace*†	2.5 – 10 mg		
	Moexipril / Univasc†	3.75 - 15 mg		
	Perindopril/Aceon‡ Perindopril/ Indapamide combo (Coversyl)	2-16 mg 2 - 8 mg 0.625 - 2.5 mg		
	Quinapril /Accupril†	5 – 40 mg		
	Trandolapril/ Mavik Trandolapril/ Verapamil combo (TARKA)	1.0 – 4 mg 1-4 mg 180 to 240 mg		
ARBs -Angiotensin Receptor Blockers Action -Block AT-I receptor which reduces aldosterone secretion and vasoconstriction	Azilsartan/Edarbi Azilsartan/ Chlorthalidone combo (Edarbyclor)	40 - 80 mg 40 mg 12.5 - 25 mg	1 x daily	Try to take same time each day Side effects- Can cause dizziness, drowsiness, diarrhea, hyperkalaemia, hypotension.
	Candesartan/Atacand†	8 – 32 mg		
	Eprosartan/Teveten†	400 - 600 mg		

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ACE Inhibitors

Class / Action	Generic / Trade Name	Usual Daily Dose Range	Frequency	Considerations
ACE Inhibitors Angiotensin Converting Enzyme **Action** - Block the conversion of AT-I to AT-II. Also stimulates release of nitric oxide causing vasodilation.	benazepril / Lotensin†	10 – 40 mg	1 x a day	Try to take the same time each day. **Side effects**: Can cause cough (due to increased bradykinin) may cause hypotension. Monitor: changes in potassium and renal function †These meds are also available as a combo w/ low dose HCTZ (hydrochlorothiazide). ‡These meds are also available as a combo w/ CCB (calcium channel blocker) usually amlodipine
	captopril /Capoten*†	12.5 - 150 mg	2-3 x a day	
	Enalopril/ Vasotec*†	2.5 - 40 mg	1-2 x a day	
	Fosinopil / Monopril†	10- 40 mg	1 x a day	
	Lisinopril *† Prinivil, Zestril	10 – 40 mg		
	Ramipril / Altace*†	2.5 – 20 mg		
	Moexipril / Univasc†	3.75 - 30 mg		
	Perindopril/Aceon‡ Perindopril/ Indapamide combo (Coversyl)	2-16 mg 2 - 8 mg 0.625 - 2.5 mg		
	Quinapril /Accupril†	5 – 80 mg		
	Trandolapril/ Mavik Trandolapril/ Verapamil combo (TARKA)	1.0 – 4 mg 1-4 mg 180 to 240 mg		

Initial dose adjustment may be needed for renal dysfunction or elderly

See Med Cheat Sheets

Angiotensin Receptor blockers (ARB's)

Class / Action	Generic / Trade Name	Usual Daily Dose Range	Frequency	Considerations
ARBs -Angiotensin Receptor Blockers **Action** -Block AT-I receptor which reduces aldosterone secretion and vasoconstriction	Azilsartan/Edarbi	40 - 80 mg	1 x daily	Try to take the same time each day. **Side effects**- may cause hypotension. Monitor: changes in potassium and renal function ‡†These meds are also available as a combo w/ low dose HCTZ (hydrochlorothiazide) or w/ CCB (calcium channel blocker) usually amlodipine. For Sacubitril/Valsartan (Entresto): 36hr washout period required if previously on ACE
	Azilsartan/ Chlorthalidone combo (Edarbyclor)	40 mg 12.5 - 25 mg		
	Candesartan/Atacand†	8 – 32 mg		
	Eprosartan/Teveten†	400 - 600 mg		
	Irbesartan/ Avapro†	75 – 300 mg		
	Losartan / Cozaar*†	25 – 100 mg		
	Olmesartan / Benicar†‡ Tribenzor (triple combo)	20 – 40 mg		
	Telmisartan / Micardis	20 – 80 mg		
	Valsartan / Diovan†‡ Exforge HCT(combo)	80 – 320 mg		
Inhibits neprilysin	Sacubitril/Valsartan (Entresto)	24/26-97/103 mg	2x daily	
	Valsartan/Nebivolol (Byvalson) (combo)	80 mg 5 mg		

Initial dose adjustment may be needed for renal dysfunction or elderly Med Cheat Sheets

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ACEI/ARB Adverse Effects

- Adverse effects
  - Dry cough with ACEI
    - Caused by inhibition of bradykinin breakdown
  - Hyperkalemia
  - Angioedema (< 1%)
    - Occurs 2-4x more frequently in African Americans
  - Bump in SCr
    - Up to 30% is acceptable
  - Orthostatic hypotension (initial dose)
  - Skin rash (captopril)



- Contraindications
  - Pregnancy
  - Bilateral renal artery stenosis

Thiazide diuretics

Class	Drug	Usual Dose, Range (mg/d)*	Daily Frequency	Comments
Agents recommended for initial therapy				
Thiazide-type diuretics	Chlorthalidone	12.5-25	1	Chlorthalidone has a longer half-life and is more potent than hydrochlorothiazide on a mg-to-mg basis. Monitor for hyponatremia and hypokalemia, increased glucose, uric acid, and calcium levels. Monitor patients with history of acute gout unless patient is on uric acid-lowering therapy.
	Hydrochlorothiazide	25-50	1	
	Indapamide	1.25-2.5	1	

See Med Cheat Sheets

Calcium Channel Blockers

Class / Action	Generic / Trade Name	Usual Daily Dose Range	Frequency	Considerations
Calcium Channel Blocker *Nondihydropyridine* Relaxes coronary blood vessels to decrease heart rate and cardiac output.	**Diltiazem immediate release formulation***	30 – 360 mg	4 x day	**Monitor** BP, heart rate, liver enzymes and cardiac function a baseline and periodically. Take at the same time each day (with meals if possible). Take in evening if experience drowsiness. **Side Effects**: Watch for cardiac conduction abnormalities, bradycardia, CHF and edema. Can cause peripheral edema and constipation. Metabolized through CYP3A4, so review package insert for drug and food interactions (ie grapefruit).
	Diltiazem twice daily formulation*	120 – 480 mg	2 x day	
	Diltiazem once daily formulation* Cardizem CD Tiazac Dilacor, Diltia		1 x day	
	Verapamil immediate release* Calan	80 -480 mg	3 x day	
	Verapamil sustained release* Calan SR, Veralan	120 mg – 480 mg	1 -2 x day	
	Verapamil extended release* Covera-HS Verelan PM	120 – 480 mg 100 – 400 mg	1 x day	
Calcium Channel Blocker – *Dihydropyridine* Causes vasodilation and decreases peripheral vascular resistance.	Amlodipine/Norvasc	2.5 – 10 mg	1 x day	
	Felodipine / Plendil	2.5 – 10 mg	1 x day	
	Isradipine controlled release DynaCirc CR	2.5 – 10 mg	1 x day	
	Nicardipine sustained release / Cardene SR	30 – 60 mg	2 x day	
	Nifedipine long-acting* Adalat CC /Procardia XL	30 – 120 mg	1 x day	
	Nisoldipine / Sular	10 – 40 mg	1 x day	

Beta Blockers

- Use in recurrent MI, heart failure, angina
- Side effects: depression, sexual dysfunction, exercise intolerance, sedation, dizziness
- Monitor BP, lipids, heart rate, glucose
- When stopping, taper dose gradually
- Can elevate glucose and mask adrenergic symptoms of hypoglycemia (ex. tachycardia)
  - Sweating will still occur (cholinergic mediated)



Beta blockers—cardioselective	Atenolol	25-100	2	Beta blockers are not recommended as first-line agents unless the patient has CHD or HF. These are preferred in patients with bronchospastic airway disease requiring a beta blocker. Bisoprolol and metoprolol succinate are preferred in patients with HFrEF. Avoid abrupt cessation.
	Betaxolol	5-20	1	
	Bisoprolol	2.5-10	1	
	Metoprolol tartrate	100-200	2	
	Metoprolol succinate	50-200	1	
Beta blockers—cardioselective and vasodilatory	Nebivolol	5-40	1	Nebivolol induces nitric oxide-induced vasodilation. Avoid abrupt cessation.
Beta blockers—noncardioselective	Nadolol	40-120	1	Avoid use in patients with reactive airways disease. Avoid abrupt cessation.
	Propranolol IR	80-160	2	
	Propranolol LA	80-160	1	
Beta blockers—intrinsic sympathomimetic activity	Acebutolol	200-800	2	Generally avoid, especially in patients with CHD or HF. Avoid abrupt cessation.
	Penbutolol	10-40	1	
	Pindolol	10-60	2	
Combined alpha and beta blockers	Carvedilol	12.5-50	2	Use of carvedilol is preferred in patients with HFrEF. Avoid abrupt cessation.
	Carvedilol phosphate	20-80	1	
	Labetalol	200-1200	2	

AHA/ACC/AANP/AAPA/ABC/ACCP/ACPM/AGS/AMA/ASPC/NMA/PCNA/SGIM Guideline for the Prevention, Detection, Evaluation and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. Aug 14, 2025.

Resistant hypertension

- Not meeting BP targets on 3 classes of antihypertensive meds (including a diuretic) at optimal doses
- Add mineralocorticoid receptor antagonist
  - Spironolactone (Aldactone®) 25-100mg daily
  - Eplerenone (Inspira®) 50-100mg daily
- Monitor serum creatinine, potassium
- Avoid use **with** finerenone



Poll 10 - What Changes are Best to Make to Alice's Hypertension Regimen?

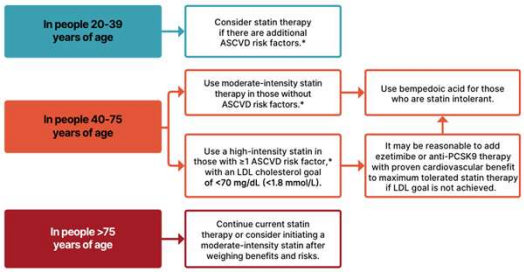


A. Add lisinopril
B. Replace chlorthalidone with lisinopril
C. Add amlodipine
D. Replace chlorthalidone with amlodipine

Assume all choices include lifestyle modifications

Lipid Therapy for Primary Prevention

Lipid management for primary prevention of atherosclerotic cardiovascular disease events in people with diabetes in addition to healthy behavior modification



Higher cardiovascular risk*
(*HTN, Smoke, CKD, BMI 30+ albuminuria, family hx ACSVD)

Poll Question 11

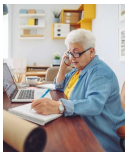
RZ is 47 years old with type 2 diabetes and hypertension. RZ takes metformin 1000 mg BID, plus lisinopril 20mg daily. RZs LDL is 140 mg/dL. Based on the most recent ADA Standards, what is the LDL Cholesterol target for RZ?



A. LDL less than 100 mg/dL.
B. LDL less than 70mg/dL
C. LDL less than 55mg/dL
D. Determine LDL target based on ASCVD risk.

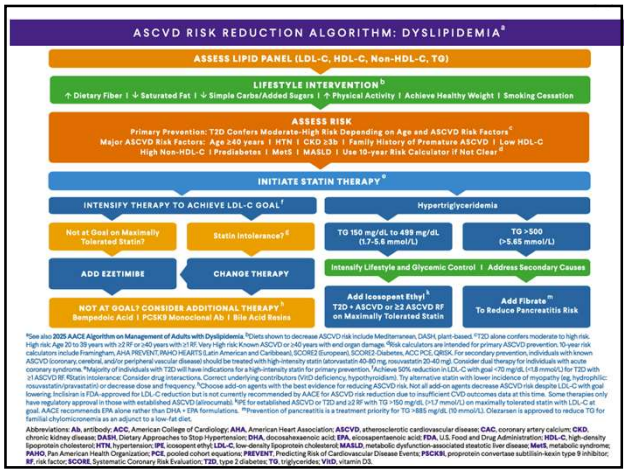
Lipid Goals/Therapy for People *with* ASCVD

- For people of all ages with diabetes and ASCVD:
  - Add high-intensity statin to lifestyle therapy.
  - **Reduce LDL cholesterol by 50% or greater from baseline with LDL goal <55.**
  - Addition of ezetimibe or a PCSK9 inhibitor with proven benefit is recommended if goal is not achieved on max tolerated statin therapy.



Lipid management for secondary prevention of atherosclerotic cardiovascular disease events in people with diabetes

Use lifestyle and high-intensity statin therapy to reduce LDL cholesterol by ≥50% from baseline to a goal of <55 mg/dL (<1.4 mmol/L).	Add ezetimibe or anti-PCSK9 therapy with proven cardiovascular benefit if LDL cholesterol goals are not met on maximum tolerated statin therapy.	Use an alternative lipid-lowering treatment for those who are statin intolerant: • PCSK9 monoclonal antibody with proven cardiovascular benefit • Bempedoic acid • PCSK9 inhibition with siRNA inclisiran



[a]See also **2025 AACE Algorithm on Management of Adults with Dyslipidemia**. [b]Diets shown to decrease ASCVD risk include Mediterranean, DASH, plant-based. [c]T2D alone confers moderate to high risk. High risk: Age 20 to 39 years with ≥2 RF or ≥40 years with ≥1 RF. Very High risk: Known ASCVD or ≥40 years with end organ damage. [d]Risk calculators are intended for primary ASCVD prevention. 10-year risk calculators include Framingham, AHA PREVENT, PAHO HEARTS (Latin American and Caribbean), SCORE2 (European), SCORE2-Diabetes, ACC PCE, QRISK. For secondary prevention, individuals with known ASCVD (coronary, cerebral, and/or peripheral vascular disease) should be treated with high-intensity statin (atorvastatin 40-80 mg, rosuvastatin 20-40 mg). Consider dual therapy for individuals with acute coronary syndrome. [e]Majority of individuals with T2D will have indications for a high-intensity statin for primary prevention. [f]Achieve 50% reduction in LDL-C with goal <70 mg/dL (<1.8 mmol/L) for T2D with ≥1 ASCVD RF. [g]Statin intolerance: Consider drug interactions. Correct underlying contributors (Vit D deficiency, hypothyroidism). Try alternative statin with lower incidence of myopathy (eg, hydrophilic: rosuvastatin/pravastatin) or decrease dose and frequency. [h]Choose add-on agents with the best evidence for reducing ASCVD risk. Not all add-on agents decrease ASCVD risk despite LDL-C with goal lowering. Inclisiran is FDA-approved for LDL-C reduction but is not currently recommended by AACE for ASCVD risk reduction due to insufficient CVD outcomes data at this time. Some therapies only have regulatory approval in those with established ASCVD (alirocumab). [k]IPE for established ASCVD or T2D and ≥2 RF with TG >150 mg/dL (>1.7 mmol/L) on maximally tolerated statin with LDL-C at goal. AACE recommends EPA alone rather than DHA + EPA formulations. [m]Prevention of pancreatitis is a treatment priority for TG >885 mg/dL (10 mmol/L). Olezarsen is approved to reduce TG for familial chylomicronemia as an adjunct to a low-fat diet.

Abbreviations: **Ab**, antibody; **ACC**, American College of Cardiology; **AHA**, American Heart Association; **ASCVD**, atherosclerotic cardiovascular disease; **CAC**, coronary artery calcium; **CKD**, chronic kidney disease; **DASH**, Dietary Approaches to Stop Hypertension; **DHA**, docosahexaenoic acid; **EPA**, eicosapentaenoic acid; **FDA**, U.S. Food and Drug Administration; **HDL-C**, high-density lipoprotein cholesterol; **HTN**, hypertension; **IPE**, icosapent ethyl; **LDL-C**, low-density lipoprotein cholesterol; **MASLD**, metabolic dysfunction-associated steatotic liver disease; **MetS**, metabolic syndrome; **PAHO**, Pan American Health Organization; **PCE**, pooled cohort equations; **PREVENT**, Predicting Risk of Cardiovascular Disease Events; **PSCK9i**, proprotein convertase subtilisin-kexin type 9 inhibitor; **RF**, risk factor; **SCORE**, Systematic Coronary Risk Evaluation; **T2D**, type 2 diabetes; **TG**, triglycerides; **VitD**, vitamin D3.

Statin Dosing

High Intensity: Lowers LDL ≥50%	Moderate Intensity: Lower LDL 30-<50%
Atorvastatin (lipitor) 40-80mg	Atorvastatin (lipitor) 10-20mg
Rosuvastatin (crestor) 20-40mg	Rosuvastatin (crestor) 5-10mg
	Simvastatin (zocor) 20-40mg
	Pravastatin (pravachol) 40 – 80mg
	Lovastatin (mevacor) 40 mg
	Fluvastatin (lescol/XL) 80mg
	Pitavastatin (livalo) 2-4mg

*****If person can't tolerate intended statin dose, use maximally tolerated dose**

See Med Cheat Sheets

Additional Agents to Lower LDL

Bempedoic acid (Nexletol)

- Novel LDL cholesterol lowering agent acting in the same pathway as statin but without activity in skeletal muscle, which limits the muscle-related adverse effects
- Lowers LDL cholesterol levels by 15% for those on statins and 24% for those not taking statins
- CLEAR Outcomes trial found a reduction in 4 point MACE events by 13% compared with placebo for individuals with established ASCVD or high ASCVD risk
- Dose: 180mg orally once daily
- Available with ezetimibe as Nexlizet
- Once daily with or without food

Additional Agents to Lower LDL

Injectable PCSK9 Inhibitors

- Evolucumab (Repatha) 140mg SC q2 weeks or 420mg SC q 4 monthly
- Alirocumab (Praluent) 75-150mg SC q 2 weeks or 300mg SC q monthly
- When added to max tolerated statin, decreases LDL from 52-65%
- For secondary prevention, significantly reduced the risk of MACE by 15-20% in FOURIER (evolucumab) and ODYSSEY (Alirocumab)
- For primary prevention, evolocumab 140 mg SC every 2 weeks significantly reduce MACE in the **VESALIUS-CV trial**
- Fewer skeletal muscle adverse effects compared to statins

New Oral PCSK9 Inhibitor

- Lifendra (enlicitide)
- Dosing
  - 20 mg tablet once daily
  - Take on an empty stomach in the morning with water, black coffee, or plain tea
  - Swallow the tablet whole. Do not split, crush, or chew the tablet
  - Wait at least 30 minutes before eating food or drinking beverages other than water, black coffee, or plain tea
  - No CV outcome data yet

lipfendra_pi.pdf

Additional Agents to Lower LDL

Iclisiran (Leqvio)

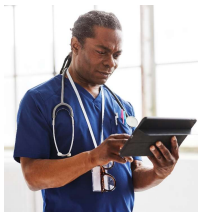
- Indicated as adjunct to diet and statin therapy to lower LDL
- Lowers LDL by ~50% when added to statin
  - Targets PCSK9
  - SC injection, day 1, 90 days, then every 6 months
- Exploratory analysis showed reduced CV events vs. placebo
- Ongoing CV outcome trial in people with established CVD and primary prevention

Treating High TG

- In adults with high fasting TG>150, evaluate secondary causes: diabetes, chronic liver or kidney disease, hypothyroidism, alcohol, meds that raise TG
- Consider fibrates or fish oil when TG>500mg/dL and definitely when TG>1000mg/dL
  - High TG puts people at increased pancreatitis risk
- In People with ASCVD or other CV risk factors on a statin with managed LDL but elevated TG (150-499mg/dL), adding icosapent ethyl (Vascepa) can be considered to reduce CV risk (REDUCE-IT trial)
  - Individuals randomized to 2g BID who had either established CVD or diabetes + at least 1 risk factor, icosapent ethyl demonstrated a 25% risk reduction in 3 point MACE

Fibrates

- Statin plus **fibrate** combination therapy has not been shown to improve ASCVD outcomes and is generally not recommended. (A)
  - Fibrates include fenofibrate and gemfibrozil
  - May be appropriate for a person with very high TG
- Statin plus **niacin** combination therapy has not been shown to provide additional cardiovascular benefit above statin therapy alone, may increase the risk of stroke with additional side effects, and is generally not recommended. (A)



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For exam, be familiar with content on Cheat Sheets

Cholesterol Medications

LDL Lowering Medications

Class / Action	Generic / Trade Name	Usual Daily Dose Range	LDL % Lowering	Considerations
"Statins" HMG- CoA Reductase Inhibitors Inhibits enzyme that converts HMG-CoA to mevalonate - limits cholesterol production	Atorvastatin / Lipitor*	10 – 80 mg	20- 60	Lowers TGs 7-30% Raise HDL 5-15% Take at night. **Side effects**: weakness, muscle pain, elevated glucose levels. Review package insert for specific dosing adjustments based on drug, food interactions (ie grapefruit).
	Fluvastatin / Lescol* Lescol XL	20 – 80 mg 80 mg	20- 35	
	Lovastatin* Mevacor Altoprev XL	20 - 80 mg 10 - 60 mg	20- 45	
	Pravastatin / Pravachol*	10 - 80 mg	20- 45	
	Rosuvastatin / Crestor	5 – 40 mg	20- 60	
	Simvistatin / Zocor*	20 – 80 mg	20- 55	
	Pitavastatin / Livalo	2 – 4 mg		
Bile Acid Sequestrants **Action:** Bind to bile acids in intestine, decreasing cholesterol production. Secondary action – raise HDL	Cholestyramine/ Questran*	4 to 16 g per day powder – 1 scoop 4g	Lower LDL by 15-30%	May raise TG levels. Raise HDL 3-5%. Avoid taking in same timeframe w/ other meds – may affect absorption (see package insert). Side effects: GI in nature
	Colesevelam / Welchol **Lowers A1c 0.5%**	3.75 x 1 daily 1.875 x 2 daily (625mg tablets)		
	Colestipol / Colestid	2 - 16 gms per day tabs Powder – 1 scoop – 5g 5 to 20 gm per day Mix w/ fluid		
Cholesterol Absorption Inhibitors	Ezetimibe / Zetia	10 mg – 1x daily	15-20%	Usually used in combo w/statin. Headache, rash.
Plant Stenols	Benecol	3 servings daily	14%	Well tolerated
Plant Sterols	Take Control	2 servings daily	17%	

- For CDCES – be familiar with the action, side effects and monitoring for the main BP meds and lipid meds.
- For BC-ADM, be familiar with list above, plus dosing parameters and be comfortable looking at research results.

Lipid Monitoring and Lifestyle Treatment Strategies

- Lipid Goals
  - HDL >40 (men), >50 (women)
  - Triglycerides <150
  - LDL target based on risk

Monitoring:
If **not** taking statins and underage of 40.
- check at time of diagnosis and every 5 yrs.

On statin
Monitor lipids at diagnosis, 4-12 weeks after starting statin or dose adjustment and yearly

- Weight loss if indicated
- Mediterranean or DASH Diet
- Reduction of saturated fat intake
- Increase of omega-3 fatty acids, viscous fibers and plant stanols/sterols
- Increase activity level
- BG lowering
- Reduce alcohol

Back to Alice

- Alice's lipid panel is as follows:
  - Total cholesterol: 204mg/dL
  - LDL: 120mg/dL
  - HDL: 34mg/dL
  - Triglycerides: 250mg/dL
- Which ASCVD risk factors does Alice have?
  Low HDL, smokes, obesity, HTN, albuminuria
- 27.9%, 10 year ASCVD risk



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Poll 12 - What is the best Lipid Recommendation for Alice?

A. Optimize lifestyle modifications only
B. Lifestyle + initiate a moderate intensity statin
C. Lifestyle + initiate a high intensity statin
D. Lifestyle + initiate high intensity statin + icosapent ethyl
E. Lifestyle + initiate high intensity statin + bempedoic acid



10 - ADA Antiplatelet Agents

- Use aspirin therapy (75–162 mg/day) as a secondary prevention strategy in those with diabetes and a history of atherosclerotic cardiovascular disease.
  - Aspirin therapy dose (75–162 mg/day)
  - Increased bleeding risk
  - Dual antiplatelet therapy with a P2Y12 inhibitor for 1 year after acute coronary syndrome and may have benefits beyond
- Aspirin may be considered as a primary prevention strategy in diabetes (usually over age 50) with increased CV risk.
  - Requires **comprehensive discussion** w/ person on benefits versus increased risk of bleeding.
- Aspirin allergy, consider different agent



Should Alice start aspirin?

A. Yes
B. No

Individualized discussed with shared decision making



Would you change Alice's Diabetes Regimen?

- Current meds
  - Metformin1000mg PO bid
  - Glipizide 10mg PO qam
  - Chlorthalidone 25mg PO daily
  - Escitalopram 10mg PO daily
- Home monitoring
  - FBG and pre-meal: 110-130mg/dL
  - Denies s/sx hypoglycemia.
- A1C=6.9%

Which of the Following Changes Would you Make to Alice's regimen? Poll 13

A. No changes since A1C is at target
B. Add pioglitazone
C. Add semaglutide (Ozempic)
D. Add linagliptin (Tradjenta)



If you add an agent, would you stop or decrease any of the others?

Poll 14- What Lifestyle Modifications are Recommended for Alice?

A. Tobacco cessation
B. Weight loss
C. Increase physical activity
D. Reduce alcohol intake
E. Reduce salt intake



- Social history
  - (+)Alcohol: 1-2 drinks/week
  - (+) Tobacco use: 1/2ppd
  - Exercise: walks 15 min twice/week
  - Occ: receptionist
- BMI:32.8kg/m^2

Select all that apply

ADA 2026 ABC Goal Summary

A1c less than 7% (individualize)

- Pre-meal BG 80-130
- Post meal BG <180
- Time in Range (70-180) 70% of time

Blood Pressure
<130/80
<120/80 for high risk



Cholesterol

- Statin therapy based on age & risk status
- If 40+ with ASCVD Risk, decrease LDL by 50%, LDL <70
- If 40+ with ASCVD, decrease LDL by 50%, LDL <55

Thank You



Questions:
We are here to help!
info@diabetesed.net
www.DiabetesEd.net
530 /893-8635

DiabetesEd Training Conference

Insulin Therapy, Diabetes Tech, Medical Nutrition Therapy, Case Studies

Day 2 | Oct 23, 2026 | 7.5 CEs | Marriott San Diego Airport/Liberty Station

Co-Instruction by Beverly Thomassian, RN, BC-ADM, MPH, CDCES, Diana Isaacs, PharmD, CDCES, BC-ADM, FADCES, & Christine Craig, MS, RDN, CDCES

Time	Topic Schedule*
7:30 – 8:00 AM	Enjoy Breakfast / Sign-In / Welcome
8:00 – 10:00 AM	Incorporating Insulin Therapy into Practice Insulin Dosing for Effective Outcomes Calculating Correction Factors & Sensitivity
10:00 – 10:15 AM	Break
10:15 AM – 12:00 PM	ADA and AACE Treatment Algorithms for Insulin Therapy Pattern Management: Solving Glucose Mysteries Latest Diabetes Technologies: Show and Tell
12:00 – 1:00 PM	Lunch Break
1:00 – 2:30 PM	Medical Nutrition Therapy - Latest Updates Macronutrients: Carbs, Fats and Protein
2:30 – 2:45 PM	Break
2:45 – 3:30 PM	Special Populations: Nutrition Considerations Lifting People Up through Person-Centered Care
3:30 – 4:45 PM	Case Studies and Group Activities Summary and Wrap-Up

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Day 2 | October 23, 2026
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Director of Operations
& Customer Happiness

Ashlie Sabourin
Customer Happiness
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Scan QR Code to Chat

If you have questions, You can chat with Ashlie or Bryanna. Scan code on the contact cards at your table.

Insulin – Ultimate Hormone Replacement Therapy



Diana Isaacs, PharmD, BCPS, BCACP, CDCES, BC-ADM, FADCES, FCCP

Endocrine Clinical Pharmacy Specialist

Co-Director Endocrine Disorders in Pregnancy

Director, Education & Training in Diabetes Technology

Cleveland Clinic Diabetes Center

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Conflict of Interest

Partners for Advancing Clinical Education

Diabetes Education Services

Faculty and Disclosure of Conflicts of Interest

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All relevant financial relationships for anyone with the ability to control the content of this educational activity are listed below and have been mitigated according to Partners policies. Others involved in the planning of this activity have no relevant financial relationships.

Faculty	Disclosures
Beverly Thomassian	Has no relevant financial relationships.
Diana Isaacs	Consultant, Advisor, Speaker: Abbott, Dexcom, MiniMed, Novo Nordisk, Insulet, Lilly, Cequr, Sanofi, Beta Bionics, and Sequel
Christine Craig	Diabetes Devices, Product Trainer: Tandem & Medtronics

Objectives – Insulin –The Ultimate Hormone Replacement Therapy

Objectives:

- Discuss the actions of different insulins
- Describe how to use the ADA algorithm for insulin management
- Counsel a person with diabetes on safe and effective insulin use
- Discuss strategies to determine and fine-tune basal and bolus insulin settings based on glucose pattern management
- Describe how insulin settings are used to program insulin pumps and connected insulin pens

History of insulin

- Insulin is produced by beta cells in the pancreas
- Discovered in 1921 by Frederick Banting and his assistant Charles Best from a dog's pancreas
- First used in a dog with diabetes and kept him alive for 70 days until they ran out of extract
- With the help of JB Collip and John Macleod, insulin was derived from the pancreas of cattle and in January 1922, given to a 14-year-old dying from diabetes in a Toronto hospital
- In 1923, Banting and Macleod received the Nobel Price in Medicine which they shared with Best and Collip
- Soon after, Eli Lilly started large-scale production of insulin

ADA. The history of a wonderful thing we call insulin (accessed 2020 Aug 29).

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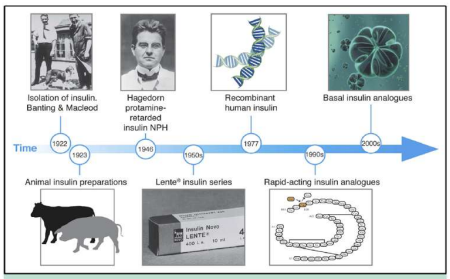
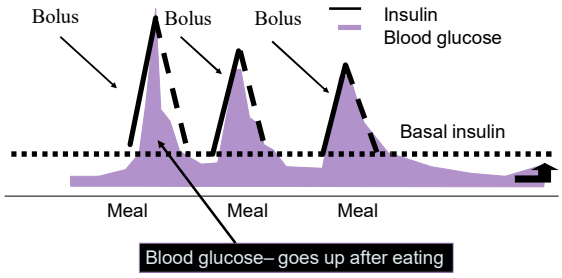


Figure 1 Milestones in the evolution of insulin therapy. NPH = neutral protamine Hagedorn.

Evolution of Insulin: From Human to Analog. Joseph M. Tibaldi, MD
American Journal of Medicine, 2014

100 Years of Insulin | FDA

Physiologic Insulin Release:
Individuals without diabetes



Physiologic Insulin at Meals

- **1st phase:** peak 1-2 minutes, duration 10 minutes, suppresses hepatic glucose production
- **2nd phase:** duration 1-2 hours

The perfect insulin would be fast enough to match the absorption of carbohydrates

Freeman JS. J Am Osteopath Assoc. 2009;109:26-36.

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Insulin Overview

- None of the commercially available insulins are as fast as true physiologic insulin
- Almost all insulin is injected (SC or IV) with 1 inhaled option
- All people with T1D require basal + bolus insulin or insulin pump therapy
- Many people with T2D require insulin due to the progressive nature of the condition
  - Start with basal (long-acting), then add bolus if needed

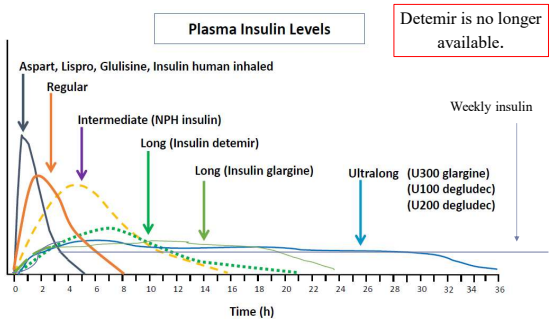
Insulin PocketCard™

Action		Insulin Name	Onset	Peak	Duration	Considerations
Bolus	Very Rapid Acting Analogs	Aspart (Fiasp)	16 - 20 min	1 - 3 hrs	5 - 7 hrs	Bolus insulin lowers after-meal glucose. Post meal BG reflects efficacy.
		Lispro-aabc (Lyumjev)	15 - 17 min	2 - 3 hrs	5 - 7 hrs	
	Rapid Acting Analogs	Aspart (Novolog / Merilog/ Kirsty)	20 - 30 min	1 - 3 hrs	3 - 7 hrs	
		Lispro (Humalog*/ Admelog)	30 min	2 - 3 hrs	5 - 7 hrs	Basal insulin controls BG between meals and nighttime. Fasting BG reflects efficacy.
		Glulisine (Apidra)	15 - 30 min	1 - 3 hrs	3 - 4 hrs	
	Short Acting	Regular*	30 - 60 min	2 - 4 hrs	5 - 8 hrs	
Basal	Intermediate	NPH	2 - 4 hrs	4 - 10 hrs	10 - 16 hrs	Side effects: hypoglycemia, weight gain.
	Long Acting	Glargine (Lantus*/ Basaglar/ Semglee/ Rezvoglar/ Langlara)	2 - 4 hrs	No Peak	20 - 24 hrs	
		Degludec (Tresiba)*	~ 1 hr		< 42 hrs	Typical dosing range: 0.5-1.0 units/ kg body wt/day.
	Ultra Long	Icodec (Awiqli) Once Weekly U-700	16 - 18 hrs	2 - 4 days	≥ 7 days	
Basal + Bolus	Intermediate + short	Combo of NPH + Reg 70/30 = 70% NPH + 30% Reg 50/50 = 50% NPH + 50% Reg	30 - 60 min	Dual peaks	10 - 16 hrs	Discard most open vials after 28 days. For pen storage guidelines, see package insert.
	Intermediate + rapid	Novolog® Mix - 70/30 Humalog® Mix - 75/25 or 50/50	5 - 15 min		24 hrs	

Concentrated insulins available - see Concentrated Insulin Card for details. Insulin action times vary; time periods are general guidelines only. All PocketCard content is for educational purposes only. Please consult prescribing information for detailed guidelines. ©5/2026

www.DiabetesEd.net FREE > PocketCards

Insulin Profiles



Detemir is no longer available.

Hirsch IB. NEJM 2005;352:174-183.
Lexicomp Online, Lexi-Drugs Online, Hudson, Ohio: UpToDate, Inc; 2020; August 21, 2020.

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Insulin Concentration

- Most insulin is U100: 100 units/mL
- There is also concentrated insulin
  - U500 insulin, 500 units/mL, U300, 300 units/mL, U200, 200 units/mL, and /u700, 700 units/mL
- Insulin is available in a vial, pen, or cartridge
- U100 insulin:
  - 1 vial =10mL = 1000 units
  - 1 pen =3 mL = 300 units
  - 1 cartridge = 3 mL = 300 units
  - 1 box of pens = 5 pens = 1500 uni
- Inhaled insulin
  - 4, 8, 12 units cartridges



Insulin package inserts.

Concentrated and Inhaled Insulin

Concentrated & Inhaled Insulins

Name/Concentration	Insulin/Action	Considerations
Humulin Regular U-500 • 500 units insulin/mL • KwikPen	Regular Bolus / Basal	Indicated for those taking 200+ units of total daily insulin. 3 mL pen holds 1,500 units. Max dose 300 units. Once opened, good for 28 days.
Humalog KwikPen U-200 200 units insulin/mL	Lispro (Humalog) Bolus	3 mL pen holds 600 units. Max dose 60 units. Once opened good for 28 days.
Lyumjev KwikPen U-200 200 units insulin/mL	Lispro (Lyumjev) Bolus	3 mL pen holds 600 units. Max dose 60 units. Once opened good for 28 days.
Toujeo Solostar U-300 Pen 300 units insulin/mL	Glargine (Lantus) Basal	1.5 mL pen holds 450 units. Max dose 80 units. 3 mL Max Solostar pen holds 900 units. Max dose 160 units. Once opened good for 56 days.
Tresiba FlexTouch U-200 Pen 200 units insulin/mL	Degludec (Tresiba)	3 mL pen holds 600 units. Max dose 160 units. Once opened good for 56 days.
All concentrated insulin pens automatically deliver correct dose (in less volume). No conversion, calculation or adjustments required. Important – never withdraw concentrated insulin from the pen using a syringe.		

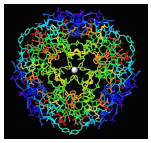
Inhaled Insulins

Action	Insulin Name	Dose Range	Onset	Peak	Duration	Considerations
Bolus – Rapid-acting	Afrezza Inhaled regular human insulin†	4, 8, and 12 unit cartridges before meals	~ 12 min	35 - 45 mins	1.5 - 3 hrs	Assess lung function, avoid if lung disease, bronchospasm or smoking. **Side effects:** hypoglycemia, throat irritation, cough. †Approved for pediatrics 6+ years.

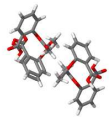
The information listed here are not guidelines. Please consult prescribing information for details. DiabetesEd.net ©6/2026

Follow-On Insulin & Biosimilars

- These follow-on insulin products require a separate prescription (not directly interchangeable):
  - Insulin glargine (Lantus), follow-on product (Basaglar)
  - Insulin lispro (Humalog), follow-on product (Admelog)
- However, these have demonstrated bioequivalence and are interchangeable with the reference product:
  - Insulin glargine-yfgn (Semglee), Insulin glargine-aglr (Rezvoglar), insulin glargine-aldi Langlara) are interchangeable with Lantus
  - Insulin aspart-szjj (Merilog) and insulin aspart-xjhz (Kirsty) are interchangeable with Novolog



Insulin – Large Molecule



Aspirin – Small Molecule

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Generic Insulins

- Insulin aspart
- Insulin lispro
- Insulin glargine
- About half the cost of the brand name
- Exact same formulation, produced by same manufacturer, interchangeable at pharmacy

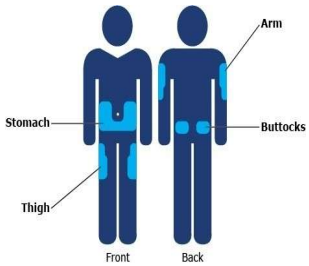


Which Insulin is Interchangeable with Lantus (Insulin glargine U100)? Poll 1

A. Toujeo (Insulin glargine U300)
B. Basaglar (Insulin glargine U100)
C. Rezvoglar (Insulin glargine U100)
D. Tresiba (Insulin degludec U100)
E. All of the above



Insulin Injection Sites



Sites should be rotated

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Insulin Key Counseling Points

- Do not shake insulin
- Cloudy insulin (NPH or pre-mixed) should be rolled before use so suspension is uniform
- Skin thickness is usually 2mm regardless of person's size, so shortest needles (4mm) work well for most
- Take outer and inner covering off for pen needles
- Leave the needle/syringe in the body for 5-10 seconds
- Change needle or syringe with each injection
- Dispose of needles/syringes in a sharps container or per local regulations



Dang DK. Taking medication. In: Cornell S et al, eds. The art and science of diabetes self-management education desk reference. 5th ed.

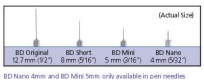
Priming insulin

- Prime pens before every use to get air bubbles out
- Hold vertically with needle at the top
- Turn dial to 2 units
- Push plunger
- Repeat until insulin comes out of the top
- May have to do multiple times for a new pen
- This will ensure all air is out and that pen needle works
- Do this every time an insulin pen injection is given



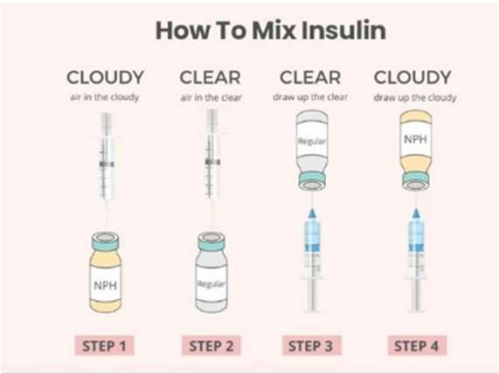
Needle Size Matters

- Use shortest needles – 4 mm
- Effective for almost ALL patients
- Keeps it subq
- If thin, inject at angle
- To avoid leakage, count to 10 before withdrawing needle
- For needle phobias, consider insulin pumps, patches, iport, and/or inhaled insulin



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Mixing NPH & Regular Insulin



Storage Options





Side Effects of Insulin

Weight Gain

Lipodystrophy/ Lipohypertrophy

Hypoglycemia



Dang DK. Taking medication. In: Cornell S et al, eds. The art and science of diabetes self-management education desk reference. 4th ed.

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Sharps Disposal: Product and Info



- Search for household hazardous waste listing for your city or county.
- Call 1-800-CLEANUP (1-800-253-2687)

Polling Question 2

- After how many days should an open vial of insulin degludec be discarded?

A. 28 days
B. 30 days
C. 42 days
D. 56 days



Inhaled Insulin (Afrezza)



- **FDA approved for ages over 6 years**
- **Comes in 4, 8 and 12 units cartridges**

AFREZZA® Dosing and Prescribing | Starting Dose and Titration Information

Initial dosing: Multiply by 2 and round down to the nearest cartridge.

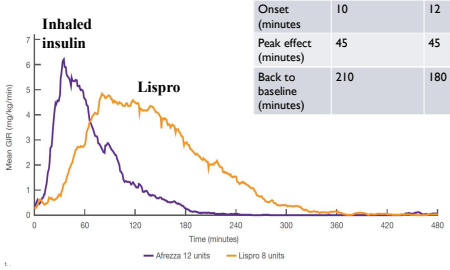
Example, Person takes 6 units at meals. This would be 12 units of Afrezza

In T1D on injections often a 50/50 split with basal/bolus
With inhaled, often a 30/70 split with 70% bolus

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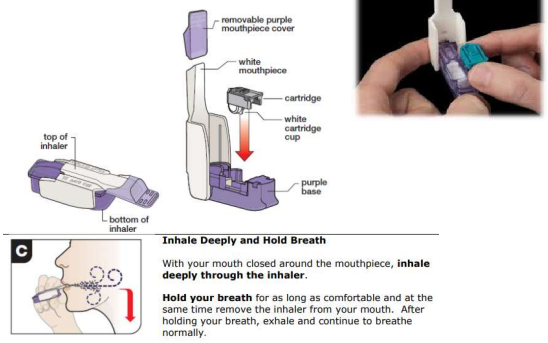
Inhaled Insulin Vs. Insulin lispro

	Insulin in Healthy Individuals	Inhaled Insulin	Injectable Insulin
Onset (minutes	10	12	17-30
Peak effect (minutes)	45	45	90-120
Back to baseline (minutes)	210	180	275-320



Grant M, Heise T, Baughman R. *Clin Pharmacokinet*. 2022;61(3):413-422.
Caumo A, Bergman RN, Cobelli C. *J Clin Endocrinol Metab*. 2000;85(11):4396-4402.
Afrezza (insulin human) Inhalation Powder Prescribing Information. MannKind Corporation.

Inhaled Insulin



Inhaled Insulin Storage



- Opened inhaler: use in 15 days
- Sealed foil packages: refrigerate until expiration date on package
- Sealed blister card strips: room temp-use within 10 days, fridge-30 days
- Opened strips: room temperature, use within 3 days
- Before using, inhaler and strips should be at room temperature for at least 10 minutes

Storage-and-Handling-with-ISI-Afrezza-Assist-Update.pdf

Inhaled Insulin Dosing and Counseling

- Bolus insulin – inhaled at meals
- Usually requires 2-3x injected dose
- May inhale more 1-2 hours after a meal as needed
- Use with a basal insulin
- Lung function test before start (FEV1)
  - Not for those w/ chronic lung issues
    - Asthma, COPD, history of lung cancer, smoking within past 6 months
    - Can cause acute bronchospasm – Black box warning
- Side effects:
  - Sore throat, cough
  - Less hypoglycemia than injected insulin

Inhaled Insulin Tip Sheet - DiabetesSisters

Weekly Insulin

Rationale for Developing Once-Weekly Insulin

Potential benefits from prolonged, flatter pharmacokinetic and pharmacodynamic profiles

- Reduced glycemic variability
- Longer duration makes them more forgiving of missed doses
- Reduced injection frequency, potentially improving medication taking behavior and patient satisfaction

Rosenstock J et al. *Endocr Rev.* 2024;45(3):379-413.

Icodec (Awiqli)

- Icodec
  - An ultra long acting insulin – lasts 7 days
  - Approved for adults with T2D
  - Binds reversibly to albumin allowing for slow release
  - Peaks in 2-4 days
  - Takes 3-4 weeks to reach steady state
- Available in U-700 pens dosed in 10 units increments
- Max 700 units/injection
- Dose changes take longer, make them less often (Ex. 3-4 weeks instead of 3-4 days)



Icodec Dosing Considerations

- When initiating **insulin icodec:**
- Multiply existing **daily basal dose by 7** to estimate the initial once-weekly dose, followed by careful titration based on fasting glucose trends.
- Consider a loading dose of 50% more in the 1st week when switching



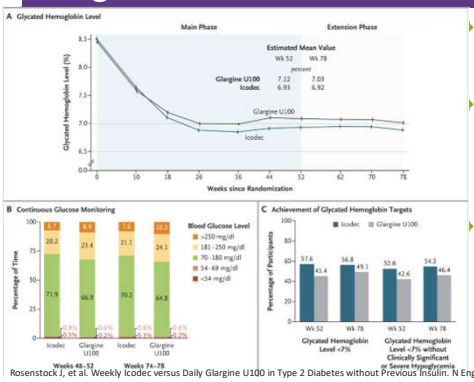
- 70 units for those new to insulin
- Individualization is key—consider factors such as hypoglycemia risk, renal function, ability to monitor glucose when determining and adjusting the dose.

Polling Question 3

- Janet is starting insulin icodec. She currently takes insulin degludec 30 units qpm. What should be her starting dose in the 1st week, assume a loading dose.
- A. 70 units
- C. 110 units
- C. 210 units
- D. 320 units

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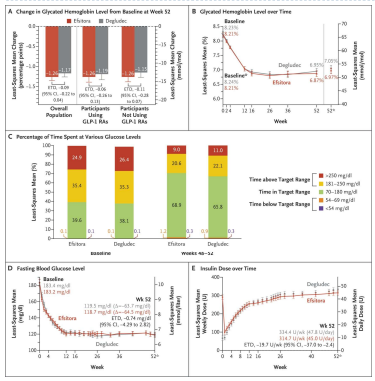
Glargine vs. Icodec in T2D



- 492 pts in each group
- Primary outcome: change in A1C
- Conclusion: glycemic control better with icodec

Rosenstock J, et al. Weekly Icodec versus Daily Glargine U100 in Type 2 Diabetes without Previous Insulin. N Engl J Med. 2023 Jul 27;389(4):297-308.

Degludec vs. Efsitora in T2D



- **Insulin efsitora alfa:** once-weekly, Fc-fusion basal insulin with ~17-day half-life
- 928 pts
- Primary outcome: change in A1C
- Efsitora non-inferior

How to Dose Insulin? T1D

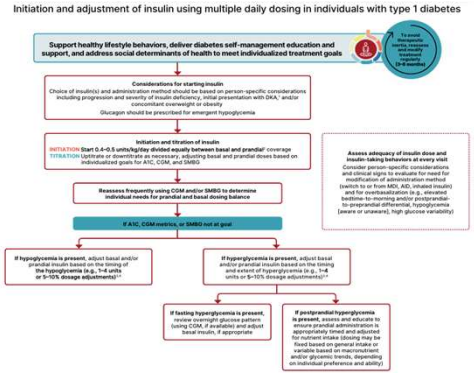
- Newly diagnosed T1D
  - Total insulin dose: 0.4-0.5 units/kg/day
  - 50% basal
  - 50% bolus
- Bolus can initially start with set doses or calculations can be used to determine initial carbohydrate ratio and correction factor

9. *Pharmacologic Approaches to Glycemic Treatment: Standards of Care in Diabetes—2026 Diabetes Care 2026;49(Suppl. 1):S183–S215*

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T1D Initiation & Adjustment

Initiation and adjustment of insulin using multiple daily dosing in individuals with type 1 diabetes



1. Pharmacologic Approaches to Glycemic Treatment: Standards of Care in Diabetes—2026 Diabetes Care 2026;49(Suppl. 1):S183–S215

Insulin PocketCard™

Action		Insulin Name	Onset	Peak	Duration	Considerations
Bolus	Very Rapid Acting Analogs	Aspart (Fiasp)	16 - 20 min	1 - 3 hrs	5 - 7 hrs	Bolus insulin lowers after-meal glucose. Post meal BG reflects efficacy. Basal insulin controls BG between meals and nighttime. Fasting BG reflects efficacy. Side effects: hypoglycemia, weight gain. Typical dosing range: 0.5-1.0 units/kg body wt/day. Discard most open vials after 28 days. For pen storage guidelines, see package insert.
		Lispro-aabc (Lyumjev)	15 - 17 min	2 - 3 hrs	5 - 7 hrs	
	Rapid Acting Analogs	Aspart (Novolog / Merilog/ Kirsty)	20 - 30 min	1 - 3 hrs	3 - 7 hrs	
		Lispro (Humalog*/ Admelog)	30 min	2 - 3 hrs	5 - 7 hrs	
		Glulisine (Apidra)	15 - 30 min	1 - 3 hrs	3 - 4 hrs	
	Short Acting	Regular*	30 - 60 min	2 - 4 hrs	5 - 8 hrs	
Basal	Intermediate	NPH	2 - 4 hrs	4 - 10 hrs	10 - 16 hrs	
	Long Acting	Glargine (Lantus*/ Basaglar/ Semglee/ Rezvoglar/ Langlara)	2 - 4 hrs	No Peak	20 - 24 hrs	
		Degludec (Tresiba)*	~ 1 hr		< 42 hrs	
	Ultra Long	Icodec (Awiqli) Once Weekly U-700	16 - 18 hrs	2 - 4 days	≥ 7 days	
Basal + Bolus	Intermediate + short	Combo of NPH + Reg 70/30 = 70% NPH + 30% Reg 50/50 = 50% NPH + 50% Reg	30 - 60 min	Dual peaks	10 - 16 hrs	
	Intermediate + rapid	Novolog® Mix - 70/30 Humalog® Mix - 75/25 or 50/50	5 - 15 min		24 hrs	

*Concentrated insulins available - see Concentrated Insulin Card for details. Insulin action times vary; time periods are general guidelines only.
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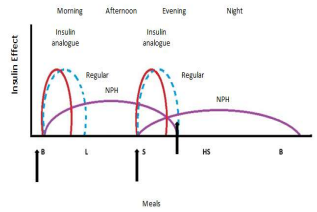
T1D: Insulin Dosing Regimens

Time of Insulin Administration	Before breakfast	Before lunch	Before dinner	Bedtime
Method 1	Intermediate: Regular (2/3 TDD) 2:1 ratio		Intermediate: Regular (1/3 TDD) 2:1 ratio	
Method 2	Regular/ analog (1/2 TDD ÷ by 3)	Regular/ analog (1/2 TDD ÷ by 3)	Regular/ analog (1/2 TDD ÷ by 3)	Long-acting (1/2 TDD)

***These are starting regimens and are adjusted based on ability to carbohydrate count and glycemic management as determined by A1C, BGM and/or CGM

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Intermediate-acting Insulin + Regular Insulin or Insulin Analog

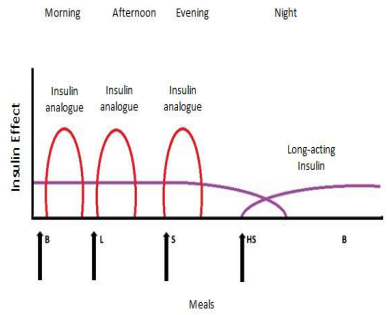


Intermediate insulin serves as basal while regular or insulin analog serves as bolus

Regular insulin: Novolin R, Humulin R
Intermediate insulin: Novolin N, Humulin N
Insulin analogue: aspart, lispro, glulisine

Dipiro JT et al, eds. Pharmacotherapy: a pathophysiologic approach. 11th ed. 2020.

Long-acting Insulin with Insulin analog



Long-acting serves as basal insulin analog serves as bolus

Carbohydrate Ratio

- Insulin to carbohydrate ratio (ICR)
  - 1 unit of insulin is expected to cover X grams of carbohydrates
- Rule of 450 or 500 can be used
  - 450/TDD = estimated carbohydrate ratio

Trujillo J et al. Diabetes mellitus. In: Dipiro JT et al., eds. Pharmacotherapy: a pathophysiologic approach. 12th ed.

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Correction Factor

- Insulin correction factor (ICF)
  - Also known as insulin sensitivity factor (ISF)
  - 1 unit of insulin is expected to lower glucose by Y points
- Rule of 1700 or 1800 can be used
  - 1700/TDD = estimated ICF
- For regular insulin, the rule of 1500 is typically used

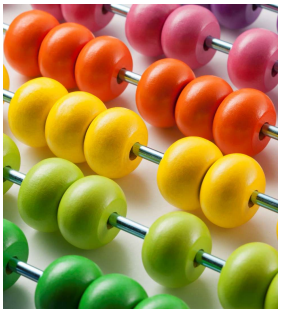
Trujillo J et al. Diabetes mellitus. In: Dipiro JT et al., eds. Pharmacotherapy: a pathophysiologic approach. 11th ed.

An Example: Meet Austin

- Austin is a 12-year-old newly diagnosed with T1D, he weighs 40kg
- He is started on 0.5 units/kg/day of total insulin
  - 40*0.5=20 units
  - 50% basal=10 units
  - 50% bolus=10 units
- Austin is prescribed 10 units of long-acting insulin and 3 units of rapid-acting insulin at meals
- The insulin doses will be adjusted based on glucose data

Austin Calculation cont'd

- Austin is ready for carbohydrate counting
- Based on the rule of 450 and rule of 1700, what should his ICR and ICF be?



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Poll Question 4

- Based on the rule of 450 and rule of 1700, what should Austin's ICR and ICF be? (TDD=20 units/day)

A. ICR=22, ISF=85
B. ICR=20, ISF=60
C. ICR=15, ISF=50
D. ICR=30, ISF=75
E. I am not sure



Answer and Explanation

- ICR=450/20=22.5
  - This means that 1 unit of insulin covers 22 grams of carbohydrate
  - If Austin eats 45 grams of carbohydrate, he should inject 2 units
- ISF=1700/20=85
  - This means that 1 unit of insulin is expected to lower glucose by 85 mg/dL
  - Austin's glucose target is 100
  - If his current glucose is 185, he should take 1 extra unit of insulin

Correction Scale 1

Rapid/Fast Acting Insulin (1 unit:50 mg/dl>150)

Less than 70	Subtract 1 unit
70-150 mg/dl	0 units
151-200 mg/dl	1 unit
201-250 mg/dl	2 units
251-300 mg/dl	3 units
301-350 mg/dl	4 units
351-400 mg/dl	5 units

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Correction Scale 2

Rapid/Fast Acting Insulin (2 units:50 mg/dl>150)

Less than 70	Subtract 1 unit
70-150 mg/dl	0 units
151-200 mg/dl	2 unit
201-250 mg/dl	4 units
251-300 mg/dl	6 units
301-350 mg/dl	8 units
351-400 mg/dl	10 units

Poll Question 5

- How much insulin would you start on a a child with T1D that weighs 66lbs?
  - A. 10 units/day
  - B. 15 units/day
  - C. 30 units/day
  - D. 40 units/day



Hint: To calculate Kg, take the weight in pounds and divide by 2.2

U500 Insulin



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More than 200 units a day?

DRUG NAME	AVAILABILITY	PEN UNITS	EXPIRATION	ONSET	PEAK EFFECT	DURATION OF ACTION	CLINICAL PEARLS
INSULIN HUMAN REGULAR (HUMULIN R U500)	Pen	5 unit	28 days	0.25-0.5 hours	4-8 hr	13-24 hr	This insulin is 5 time as concentrated. If using a vial, use the special U500 syringe.

DailyMed: https://dailymed.nlm.nih.gov/dailymed/index.cfm
Stahnke AM et al. ADCES in Practice. March, 2020. https://doi.org/10.1177/2633559X20896414

Switching to U500 insulin

- Typically reserved for people requiring insulin >200 units/day
- U500 acts like an intermediate acting insulin but replaces both the basal and bolus doses
  - If A1C< 8%, recommend to reduce TDD by 10-20%
  - If A1C≥ 8%, consider 1:1 conversion
- Typically dosed 2-3 times daily
- Take 30 minutes prior to meals
- Often initiated as a 60/40 or 40/30/30 split

Reid TS, et al. Postgrad Med. 2017;129(5):554-562.

U500 Example: Let's Practice

- A woman with obesity, T2D, and insulin resistance takes insulin glargine 120 units BID and insulin aspart 60 units TID a.c. Her most recent A1C=9%. How would she switch to U500?
  - Will it be a 1:1 conversation or dose reduce?
  - How to split: 60/60 or 40/30/30?
- New Dose:
  - Must round to nearest 5 unit increment



Reid TS, et al. Postgrad Med. 2017;129(5):554-562.

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U500 Example: Answer

- Previous dosing: insulin glargine 120 units BID and insulin aspart 60 units TID a.c. A1C=9%.
- Answer
  - 1:1 conversion since A1C ≥ 8%
  - TDD=180+240=420 units split as 40/30/30
- New Dose:
  - U500 165 units QAM, 125 units at lunch, 125 units at dinner
  - Must round to nearest 5 unit increment
  - Inject 30 minutes before each meal

Reid TS, et al. Postgrad Med. 2017;129(5):554-562.

How To's of Adding Insulin in Type 2 DM

1st Injectable: GLP-1 if Possible

In adults with T2D without severe hyperglycemia or hyperglycemic crisis, a GLP-1 based therapy is preferred to insulin for initial or add-on glucose lowering therapy (A)



ADA SOC 2026

9. Pharmacologic Approaches to Glycemic Treatment: Standards of Care in Diabetes—2026 FREE

American Diabetes Association Professional Practice Committee for Diabetes*

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Insulin + GLP-1? YES!

- If insulin is used, combination therapy with a GLP-1RA or GIP/GLP-1RA, is recommended for greater glycemic effectiveness and beneficial effects on weight and hypoglycemia risk
- In adults with T2D who are initiating insulin therapy, continue glucose-lowering agents (unless contraindicated or not tolerated) for ongoing glycemic and metabolic benefits (i.e., weight, cardiometabolic, or kidney benefits).



9. Pharmacologic Approaches to Glycemic Treatment: Standards of Care in Diabetes—2026

Insulin With Other Glucose-Lowering Agents

Drug class/name	Recommendations for use with insulin
Metformin	• Continue use when initiating basal insulin
GLP-1 RA or GLP-1/GIP RA	• Combination with basal insulin limits weight gain, poses relatively low hypoglycemia risk, and may reduce need for prandial insulin • Consider for people with ASCVD/indicators of high ASCVD risk, CKD, HF, and obesity
SGLT2i	• May reduce need for insulin and limit weight gain • Reduced insulin dose may be needed to prevent hypoglycemia • Consider for people with ASCVD/indicators of high ASCVD risk, CKD, or HF
DPP-4i	• Continue with basal insulin; discontinue if patient is also using a GLP-1 RA
TZDs	• Can be combined with insulin; consider reducing dose or stopping if problems with weight gain, edema, or is at risk for HF
Sulfonylureas and meglitinides	• Stop when initiating basal insulin to reduce hypoglycemia risk

American Diabetes Association Professional Practice Committee for Diabetes. *Diabetes Care*. 2026;49(Supplement_1):S183-S215
; Forst T, et al. *Diabetes Metab Res Rev*. 2021;37(6):e3418; Mehta R et al. *Ann Med*. 2021;53(1):998-1009.

CKD, chronic kidney disease; GIP, glucose-dependent insulinotropic polypeptide; HF, heart failure; TZDs, thiazolidinediones.

ADA Recommendations for Initiating and Adjusting Basal Insulin

- Initiate with a single daily dose of basal insulin
- Daily dose: 10 units or 0.1-0.2 units/kg
- Consider glucagon, CGM

Bedtime or morning long-acting insulin OR bedtime intermediate-acting insulin

Adjust dose 10%-15% or 2-4 units once to twice weekly to reach FBG target of 80-130 mg/dL

In the event of hypoglycemia or FBG level <70 mg/dL, determine the cause. If there is no clear reason, reduce the insulin dose by 10%-20%.

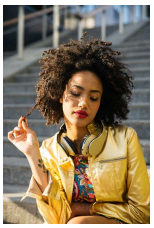
- Assess adequacy of insulin dose at every visit
- Assess for overbasalization

FBG, fasting blood glucose.

Diabetes. *Diabetes Care*. 2026;49(Supplement_1):S183-S215 ■

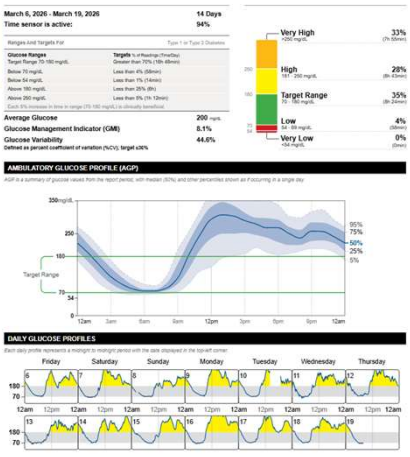
Overbasalization

- Clinical signals of overbasalization include:
  - high bedtime-to-morning or preprandial-to-postprandial glucose differential
    - (e.g., bedtime to AM glucose ≥50 mg/dL),
  - hypoglycemia (aware or unaware)
  - high glucose variability

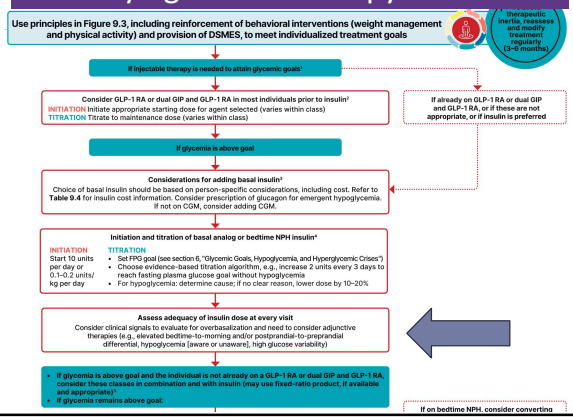


Patient Case

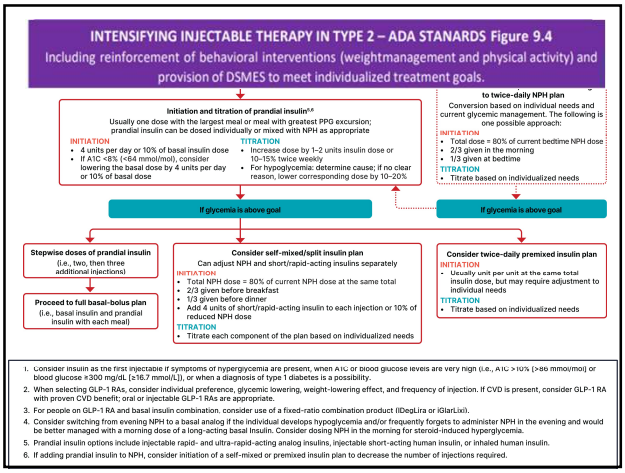
Overbasalization on CGM



Intensifying Insulin Therapy



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Insulin/Injectable Combos

Name	Combines	Considerations
IDegLira* Xultophy 100/3.6	Insulin degludec (IDeg or Tresiba) Ultra long insulin + Liraglutide (Victoza) GLP-1 Receptor Agonist (GLP-1 RA)	**Xultophy 100/3.6 pre-filled pen** = 100 units IDeg / 3.6 mg liraglutide per mL Once daily injection – Dose range 10 to 50 = 10 – 50 units IDeg + 0.36 -1.8 mg liraglutide **Recommended starting dose:** • 16 IDegLira (= 16 units IDeg + 0.58 mg liraglutide) Titrate dose up or down by 2 units every 3-4 days to reach target. Supplied in package of five single-use 3mL pens. Once opened, good for 21 days.
iGlarLixi* Soliqua 100/33	Insulin glargine (Lantus) Basal Insulin + Lixisenatide (Adlyxin) GLP-1 Receptor Agonist	**Soliqua 100/33 Solostar Pen** = 100 units glargine / 33 µg lixisenatide per mL Once daily injection an hour prior to first meal of day. Dose range 15 – 60 = 15-60 units glargine + 5 – 20µg lixisenatide **Recommended starting dose:** • 15 units if not meeting glucose target on 30 units basal insulin or GLP-1 RA • 30 units if not meeting glucose target on 30-60 units basal insulin or GLP-1 RA Titrate dose up or down by 2-4 units every week to reach target. Supplied in package of five single-use 3mL pens. Once opened, good for 14 days.

***Discontinue basal insulin /GLP-1 RA therapy before starting. If dose missed, resume with next usual scheduled dose.**

Observe precautions of each component drug. DiabetesEd.net © 2025

Case Study: Jenny

Jenny is a 50-year-old woman that takes glipizide 10mg BID, metformin 1000mg BID, and linagliptin 5mg daily. A1C is 8.5%. She weighs 110kg. She checks glucose in the AM only. She reports fingersticks ranging from 120-200mg/dL and denies symptoms of hypoglycemia. Her eGFR is 70 and BMI=34kg/m2. She previously had UTI's with empagliflozin.

How should her medications be adjusted?

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Polling Question 6

- What medication would be best to add for Jenny?

A. Insulin glargine
B. Semaglutide
C. Dapagliflozin
D. Pioglitazone



Any meds that you would consider stopping with this addition?

Case Study: Jenny-5 Years Later

Jenny is a 55-year-old woman that takes glipizide 10mg BID, metformin 1000mg BID, Tirzepatide 15mg weekly, and dapagliflozin 10mg daily. A1C is 8.2%. She weighs 100kg. She reports fingersticks range from 150-250mg/dL and denies symptoms of hypoglycemia. Her eGFR is 70 and BMI=31kg/m2. UACR is 335mg/g. (elevated)

- Insulin will be added at today's visit, how should the other meds be adjusted?

How to Switch Basal Insulin

- When going from twice daily NPH to long-acting insulin, reduce dose by 20%
- Switching Insulin glargine U100:
  - To glargine U300: 1:1, higher dose 10-18% may be needed
  - To degludec or NPH: 1:1 or consider 20% reduction
- Switching Insulin degludec to other basal insulins:
  - To degludec, NPH or glargine: reduce by 20%
- Switching insulin glargine U300:
  - To degludec: 1:1 or consider 20% reduction
  - To NPH or insulin glargine U100: reduce dose by 20%
- Switching NPH to other insulins:
  - If twice daily, decrease dose by 20%
  - If once daily, 1:1 or consider 20% reduction
- Need to use clinical judgement
  - For example, if A1C, FBG, and pre-meal BG are all above target, then may not be necessary to reduce basal insulin dose

Clinical Resource, How to Switch Insulin Products. Pharmacist's Letter/Pharmacy Technician's Letter/Prescriber Insights. January 2025.

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Poll 7 - Making the switch: Meet Joan

Joan is taking insulin NPH 30 units twice daily. Her endo wants her to switch to degludec. Her current A1C is 6.9%. What is the best dose recommendation?



A. Insulin degludec 30 units twice daily
B. Insulin degludec 60 units once daily
C. Recommend against the switch since her A1C is at goal
D. Insulin degludec 48 units once daily

Switching Meal time Insulin

- This is a 1:1 conversion when switching between regular insulin, aspart, lispro, and glulisine including Fiasp® and Lyumjev™.
- The exception is when switching to inhaled insulin (Afrezza), multiple dose by 2 and round down to nearest cartridges
  - Often 2-3x is actually needed

Clinical Resource, How to Switch Insulin Products. Pharmacist's Letter/Pharmacy Technician's Letter/Prescriber Insights. January 2025.

Poll 8. Patient Case: Lumy

- Lumy's insurance formulary changed from insulin lispro to insulin aspart. Her A1C is 7%.
- She was following an insulin to carbohydrate ratio of 1:12 and a correction factor of 1:50.
- How should she dose insulin aspart when she switches?

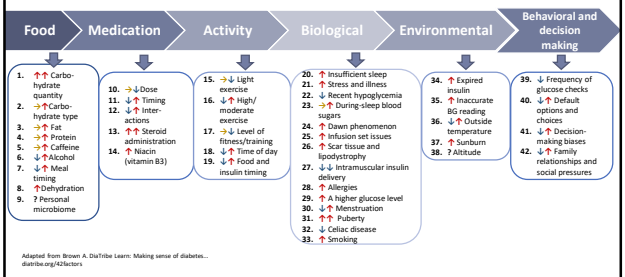


A. Reduce all doses by 10%
B. Increase all doses by 10%
C. Same dosing
D. Submit prior authorization so she doesn't change insulin

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Insulin Pattern Management

At Least 42 Factors Affect Glucose!



Poll Question 9

- When looking at glucose patterns, which problem do you fix first?
  - a. Hyperglycemia
  - b. Hypoglycemia
  - c. Adherence
  - d. Frequency of glucose checking



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Pattern Management

- Safety 1st!! - Evaluate 3 day patterns
- **Hypo:** eval 1st and fix:
  - If possible, decrease medication dose
  - Timing of meals, exercise, medications
- **Hyperglycemia:** evaluate 2nd
  - Identify patterns
  - Before increase insulin, make sure not missing something (carbs, exercise, omission)



Adjusting Insulin Doses in a Basal/Bolus regimen (T1D or T2D)

Out of Range Glucose	Insulin to Adjust
Fasting	Long acting insulin or bedtime NPH
Post-breakfast/pre-lunch	Pre-breakfast rapid/regular insulin
Post lunch/pre-dinner	Pre-lunch rapid/regular insulin or morning NPH
Post-dinner/before bedtime	Pre-dinner rapid/regular insulin

Adjusting Insulin Doses: Let's Practice

Example
Insulin degludec 20 units QAM
Insulin lispro 5 units TID before meals

Out of Range Glucose	Insulin to Adjust
Fasting	
Pre-lunch	
Post lunch	
Before bedtime	

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Bolus Insulin Timing

- How is the effectiveness of bolus insulin determined?
  - 1-2 hours post meal
  - Before next meal blood glucose



- Glucose goals (may be modified based on pt specific factors)
  - 1-2 hours peak post meal <180 mg/dL (ADA)
  - 2 hour post meal <140 mg/dL (AACE)
  - Before next meal 80 – 130 mg/dL

Poll Question 10

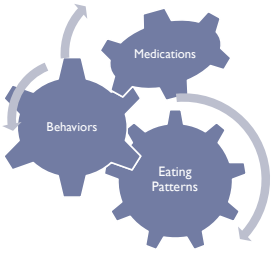
- Mary takes 4 units of insulin lispro before breakfast. Which BG result reflects that the dose was the right dose?



1. Before breakfast BG of 97
2. 1 hour post lunch BG of 160
3. Before lunch BG of 94
4. 2 hour post breakfast BG of 185

Tips for Data Interpretation

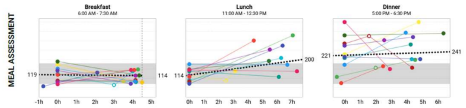
- Start by asking the person what they've experienced and noticed with their glucose patterns
- Avoid judgment
- Learn from 1 time episodes, but make changes based on patterns
- Fix lows first but some amount is expected (<1-4%) and if you remove all lows, you may end up with too many highs
- If it's not making sense, dig deeper (ex. missed doses, rationing, injection technique, food insecurity, etc)



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Meal Time Data Review

- Glucose data before and after breakfast, lunch and dinner
- "Ideally", 2 hour post-meal should not rise above 180mg/dL or 50mg/dL from the pre-meal start
  - Remember though, CGM goal <25% above 180mg/dL
- By 4-5 hours, glucose should return to pre-meal level (<130mg/dL)

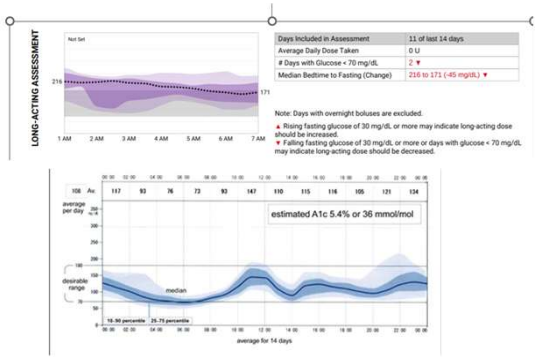


Bolus Pattern Management

- Does glucose go low after a correction dose?
  - May need a higher sensitivity
  - Ex. 1:60 instead of 1:50
- Does glucose remain high after a correction dose?
  - May need a lower sensitivity
  - Ex. 1:40 instead of 1:50
- Often people are more sensitive overnight (less insulin needed)
- Does the person spike high after eating?
  - Is the person bolusing BEFORE the meal
  - Counting carbs correctly?
  - May need a more intensive carb ratio
  - Ex. 1:6 instead of 1:8
- Does the person go low after eating?
  - Counting carbs correctly?
  - May need a less intensive carb ratio
  - Ex. 1:10 instead of 1:8

Adjustments typically made 10-20% at a time

Basal Insulin Review



Case Study: Larry Poll Question 11

Larry takes metformin 1000mg BID, insulin glargine 50 units once daily, empagliflozin 10mg daily. His A1C is 7.8%. His BMI is 32kg/m2. FBG averages 110 mg/dL. 2 hr PP breakfast=190mg/dL, 2 hr PP lunch=210mg/dL, and 2 hr PP dinner is 240mg/dL. What is the best recommendation for an agent to add to the regimen to achieve A1C target<7%?



A. Initiate insulin aspart 5 units at dinner, decrease insulin glargine to 45 units daily
B. Initiate insulin aspart 5 units with all meals, decrease insulin glargine to 35 units daily
C. Initiate insulin aspart 5 units at dinner, continue insulin glargine 50 units daily
D. Initiate tirzepatide 2.5mg weekly, decrease insulin glargine to 45 units daily

Summary

- Many different types of insulin
- Basal + bolus needed for T1D
- Weight based dosing and rules of 1700/1800 and 500/450 can be used to calculate correction factor and carb ratio respectively
- GLP1 agonist preferred 1st injectable in T2D
- Avoid overbasalization, utilize GLP1 agonist +/- prandial insulin if large bedtime-AM glucose drop
- Counsel patients on injection site technique, administration and storage
- Fine tune insulin settings based on BGM and CGM data

DiaBingo - I

I Inhaled insulin
I Glargine, Icodec, NPH are types of
I Breakdown of glycogen into glucose
I Anabolic hormone made by pancreatic beta cells
I Insulin is released when glucose levels are low
I In which injection site is insulin most rapidly absorbed?
I Elevated post-prandial glucose indicate need for pre-meal
I Epinephrine increases insulin resistance
I Creation of glucose from amino acids and lactate
I Decreasing renal function for people on insulin can cause
I Bolus insulins
I A hormone that increases blood glucose levels

Integrating Technology: CGM, Connected Pens, and Insulin Pumps DiabetesEd Training Seminar 2026 – Day 2

Diana Isaacs, PharmD, BCPS, BC-ADM, BCACP CDCES, FADCES, FCCP

Director, Education & Training in Diabetes Technology

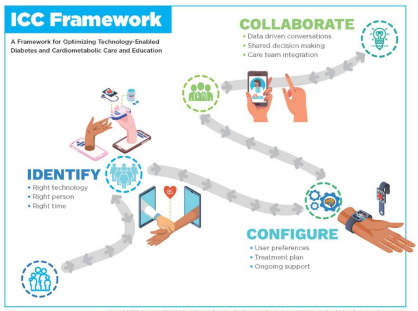
Co-Director, Endocrine Disorders in Pregnancy

Learning Objectives

- Discuss continuous glucose monitoring (CGM) and the clinical benefits for managing diabetes
- Compare and contrast different CGM, insulin pump, and connected pen devices
- Describe critical teaching content for insulin pump, connected pen and CGM use
- Describe appropriate candidates for insulin pump therapy
- List inpatient considerations for insulin pump therapy and CGMs

ICC Framework – Identify-Configure-Collaborate

A framework to overcome barriers to technology use and therapeutic inertia



Greenwood DA, Howell F, Scher L, et al. A Fran
Diabetes Care and Education Specialist. The Diabetes Educator. 2020;46(4):315-322. doi:10.1177/0145721720935125

Technology is Here



CONTINUOUS GLUCOSE MONITORS (CGM)



INSULIN PUMPS

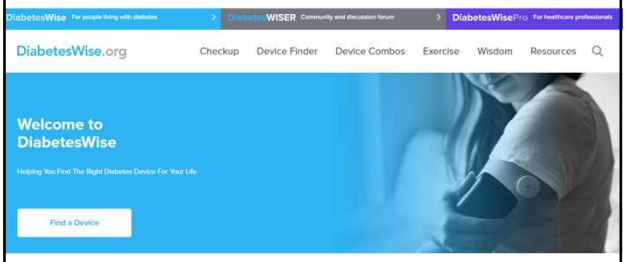


CONNECTED PENS AND CAPS



MOBILE APPS

Identify: PWD Identify the "Right" Technology



Diabeteswise.org, providers.diabeteswise.org/#/

The Importance of Education & Training

"No device used in diabetes management works optimally without education, training, and ongoing support."

ADA. Diabetes Care.

Continuous Glucose Monitors



CGM: Real-Time Data



ADA Standards of Care 2026

American Diabetes Association.

- Diabetes devices should be offered to people with diabetes **(A)**
- Use of CGM is recommended at diabetes onset and anytime thereafter for children, adolescents and adults with diabetes who are on insulin (A) on nonsinulin therapies that can cause hypoglycemia (C) and on any diabetes treatment where CGM helps in management (C).
- The specific CGM device and method for use should be made based on the individual's circumstances, preferences and needs. (E)
- In people with diabetes on insulin therapy, CGM devides should be used as close to daily as possible for maximal benefit (A)
- People who wear CGM devices should be educated on potential interfering substances and other factors that may affect accuracy.

American Diabetes Association. *Diabetes Care*. 2026;

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Types of CGM

	Professional	Personal	OTC
How to obtain	Owned by the clinic	Requires a prescription	Available without a prescription
Type	Blinded and unblinded (real-time feedback)	Real-time	Real time
Wear duration	Short-term use (10 days)	Long-term use	Short- or long-term use
Access	Insurance coverage for most people living with diabetes or prediabetes	Insurance coverage more focused on people taking insulin , although expanding	Cash pay, available to all adults
Compatibility	Smartphone app	Smartphones, reader/receiver, connected pens, mobile apps, insulin pumps	Smartphone app, mobile apps/Oura ring

Personal CGM Options (Rx)

Freestyle Libre 2+

Freestyle Libre 3+

Eversense 365

Dexcom G7

Instinct

Simplera



Personal CGM Comparison

	Dexcom G7	Dexcom G7 15 Day	Libre 3+	Instinct	Simplera Sync	Eversense 365
Max wear time	10.5 d	15.5 d	15 d		7 d	365 d
Warm-up time	30 min	1 h	1 h		Up to 2 h	24 h
Calibrations	Optional		None		Optional,	After 14 d, weekly
Water depth	8 ft, 24 h		3 ft, 30 min		8 ft, 30 min	3.28 ft, 30 min
Data platforms	Dexcom Clarity		LibreView	Carelink		Eversense Data Management System
Mobile apps	Dexcom G7, Clarity, Dexcom Follow		Libre, LibreLinkUp	CareLink connect, MiniMed mobile		Eversense
Reader, receiver, smartphone compatibility	Receiver, smartphone, watch		Reader, smartphone	Smartphone		Smartphone
Integrations	T:slim X2, Mobi, Omnipod 5, iLet		T:Slim X2, iLet, Omnipod 5, Twiist	MiniMed Flex, 780G, MiniMed Go		Twiist, iLet

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Personal CGM Comparison (cont'd)

	Dexcom G7	Dexcom G7 15 Day	Libre 3+	Instinct	Simplera Sync	Eversense
FDA-approved sites	Upper arm (age 7+ y) Upper buttocks (age 2-6 y)		Upper arm		Upper arm, abdomen Upper buttocks (age 2-13 y)	Upper arm
Approved in pregnancy	Yes		Yes		No	No
Transmitter	Disposable		Disposable		Charge weekly	Charge daily
FDA-approved ages (years)	≥ 2		≥ 2		≥ 7	≥ 18
Alarms	High, low, predictive (20 min), rise/fall rates, delayed first alert		High, low		High, low, predictive (60 min), rise/fall rates	High, low, predictive (30 min), rise/fall rates
Drug interactions	Hydroxyurea, acetaminophen (> 4 g/d)		Vitamin C (> 1 g/d)		Acetaminophen, hydroxyurea	Tetracycline antibiotics, mannitol
Max distance for signal	33 ft		33 ft		20 ft	24.9 ft, on body vibration alerts

Poll Question 1

Which of the following sensors is sold over the counter without a prescription?

A. Simplera Sync
B. Dexcom G7
C. Libre 3
D. Dexcom Stelo



Over-The-Counter CGM

- Available without a prescription
- Ordered online
- Intended for people not taking insulin
- No alerts for hypoglycemia
- Works with mobile apps that incorporate education on lifestyle and glucose goals





Zahalka SJ, et al. Endocr Pract. 2025 May 21:S1530-891X(25)00893-6

OTC CGM Options

	Dexcom Stelo	Abbott Lingo
Intended audience	Ages >2 yrs not on insulin with T2D, prediabetes, or who are interested in tracking their glucose	Adults not on insulin interested in understanding how to improve their metabolic health
Wear time	15.5 days	14 days
Ability to share data	Dexcom Clarity	No
Glucose range	70-250mg/dL	55-200mg/dL
Real-time alerts	Spike detection	No
Special features	"Spike Alerts" – notified that your glucose is rising at a rate the app determines to be a "Spike" Daily insights	Lingo Count – points assigned for elevations in glucose throughout the day, goal is to get fewer total points, Coaching program
Frequency of glucose readings	15 minutes	1 minute
Education within App	Yes	Yes
Age	≥ 18 yr	≥ 18 yr
Cost	$99/month or $85-$89/month with subscription plans	$49-1 sensor, $89-2 sensors, $249-6 sensors, subscription plan

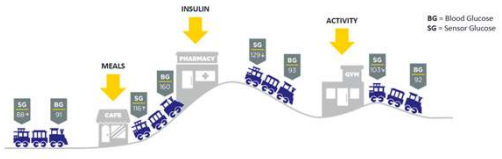
Information from manufacturers websites: https://www.stelo.com/en-us, Lingo - Made by Abbott: Your body has the answers (hellolingo.com).

CGM Counseling Points

- Important to check glucose when indicated
  - Symptoms do not match sensor value
  - During warm-up period for treatment decisions
- Sensors are waterproof
  - Showering, bathing, swimming OK
  - Check water depth criteria for individual sensor
- Overlays and skin preps to help it stay on
- Avoid with MRI, CT, diathermy
  - Exception: Eversense implantable, transmitter should be removed
  - Libre is ok for MRI/CT
- Not FDA approved
  - Dialysis, critically ill
  - Pregnancy-Simplera eversense
  - If people choose to use, it is important they know it is off-label

Lag Time

- Refers to a delay in CGM sensor readings compared to finger stick blood glucose readings
  - Estimated CGM sensor reading ~5 minutes behind
- Most apparent when glucose is changing rapidly
- Counsel patients on the train analogy



Causes of Falsely High or Low Readings

- Interfering substances
  - Falsely high
    - Vitamin C (Libre)
    - Acetaminophen (high dose Dexcom, Simplera)
    - Tetracycline antibiotics (Eversense)
- Compression Lows
- Dehydration
- Faulty sensor

When to Check BGM?



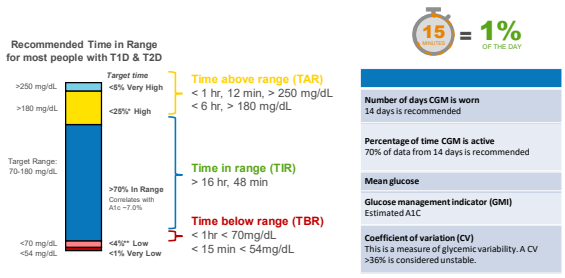
- A calibration or blood glucose symbol appears on the device
  - If making a dosing decisions
- Symptoms or expectations do not match CGM readings
- Off-label indications to ensure accuracy: dialysis, inpatient use
- Possibly after correcting a low
- If taking an interfering substance
- Counsel pwd about “lag time”

Per ADA, every person using CGM should have access to a meter and test strips

Downloading CGM Data

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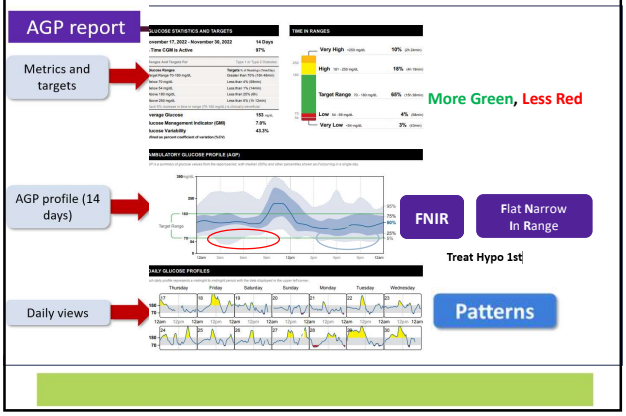
CGM Key Metrics



15 MINUTES = 1% OF THE DAY

Number of days CGM is worn 14 days is recommended
Percentage of time CGM is active 70% of data from 14 days is recommended
Mean glucose
Glucose management indicator (GMI) Estimated A1C
Coefficient of variation (CV) This is a measure of glycemic variability. A CV >36% is considered unstable.

1. Battelino T et al. *Diabetes Care.* 2019;42(8):1593-1603. 2. American Diabetes Association. *Diabetes Care* 2021;44(Suppl. 1):S73–S84 | https://doi.org/10.2337/dc21-S006



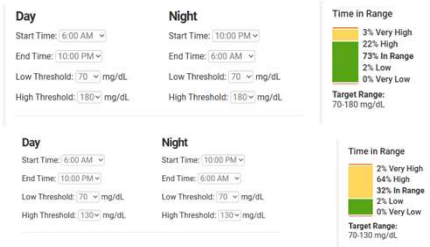
Poll 2. What is the goal time in range for most adults with type 1 or 2 diabetes?

A.≥50%
B.≥70%
C.≥80%
D.≥90%



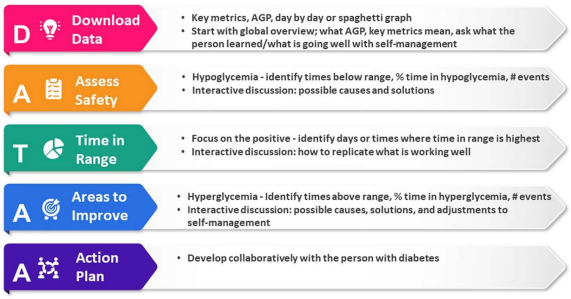
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Target Glucose Ranges



Same person, same data, look at the difference in time in range!

Review of CGM - DATAA



At each step, express that this is information, not good or bad

Isaacs D, Cox C, Schwab K, et al. Technology Integration: The Role of the Diabetes Care and Education Specialist in Practice. The Diabetes Educator. 2020;46(4):323-334. doi:10.1177/0145721720935123

Case 1

Terrance is a 60-year-old man with T2D x 12 years

Current DM2 meds:

- Metformin 1000 mg twice daily
- Glimepiride 8mg daily

Other conditions

- CKD
- Hyperlipidemia
- Hypertension

Checks BGM once daily

Pertinent Labs

- SCr = 1.38 mg/dL, eGFR = 55
- A1C = 8.2%, BMI = 34 kg/m^2

- Unemployed, has Medicaid
- Eats 3 meals/day, snacks at night, no regular exercise
- Glucose log

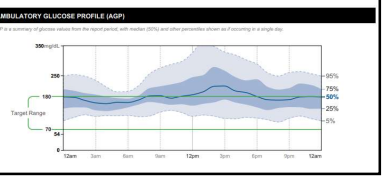
Day	FBG, mg/dL
1	125
2	123
3	110
4	108
5	99
6	81
7	134

Starts CGM

D Download Data

A Assess Safety





- Which CGM key metrics are at goal?
- Which are not?
- Overall patterns?

Poll Question 3

Which CGM key metrics are at goal?

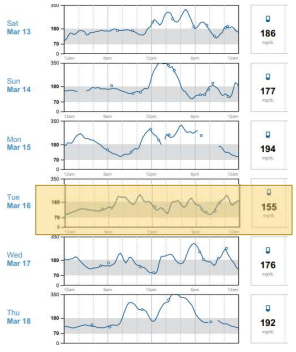
A. Time in range
B. Time above range
C. Time below range
D. Glucose management indicator



Time in Range

T Time in Range

- Focus on the positive: what's worked well on Tue 3/16?
- Time in range is high this day
- Ate a granola bar for breakfast, grilled chicken salad at lunch, steak, greens, potato at dinner
- No missed medication doses
- Good night's sleep, low stress

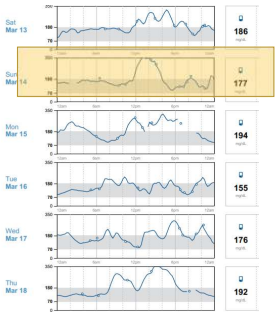


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Areas for Improvement

A Areas to Improve

- Sun 3/14 glucose went high 12 pm
- Reports eating rice bowl and coke
- Silver lining
  - Walked around 3 pm (helped to lower glucose)
  - Avoided afternoon snacking
  - Ate low-carb dinner (salmon, salad, small potato)
  - Denies missed doses



Poll Question 4

What is the most appropriate medication adjustment for Terrance?



A. Add DPP4 inhibitor
B. Add GLP-1 receptor agonist
C. Add SGLT2 inhibitor
D. Lifestyle modifications only
E. More than 1 right answer

Action Plan

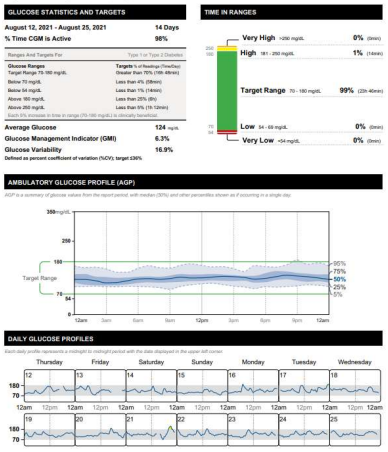
A Action Plan

- In collaboration with Terrance
  - Lifestyle changes
    - Incorporate a brisk walk 3 days per week
    - Reduce high-carbohydrate foods like fries
  - CGM optimization
    - Alerts, high for 280
  - Medication adjustments
    - Add a medication to help his CKD + optimize glucose → SGLT2 inhibitor
  - Follow-up in 3-4 weeks

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3 Months Later

T2D Meds:
Dapagliflozin 10mg qday
Metformin 1000mg BID

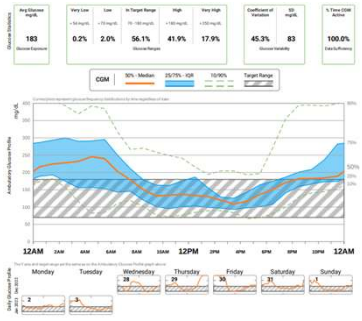


Case 2

75 yo F with 25 year h/o T2D. PMH includes HTN, hyperlipidemia, hypothyroid, obesity, ASCVD.

Current DM Meds
-Insulin glargine inject 50 units QAM and 40 at night
-Insulin aspart 8-10-10 units plus correction scale
-Metformin 1000 mg daily
-Semaglutide, 0.25mg weekly (2 doses so far)

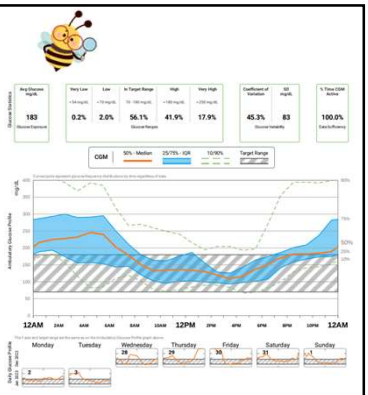
Download Data



Clarity report obtained from Diana Isaacs

Poll 5. Which of the following CGM key metrics is at target?

A. Time in range
B. Time above range
C. Coefficient of variation
D. Time below range



Clarity report obtained from Diana Isaacs

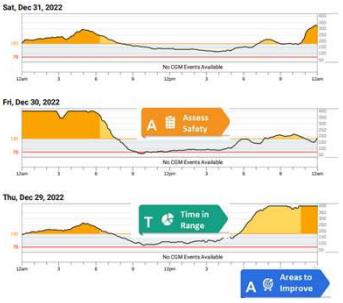
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Using DATAA

Assess Safety — Less of an appetite since taking semaglutide, often going low during the day

Time in Range — During the day, glucose often steady, but also having to drink juice to keep from going low

Areas to Improve — Skipping aspart doses because running low, leading to rebound highs



Clarity report obtained from Diana Isaacs

Action Plan

Action Plan

- Continue semaglutide 0.25mg weekly x 2 more weeks, then titrate up to 0.5mg weekly
- Decrease insulin glargine to 40 units qam and 30 units qpm
- Continue insulin aspart 8-10-10 + correction scale
- Continue metformin 1000mg daily

Follow-Up

1 month later

- Average glucose improved
- Time in range increased
- Glucose variability improved
- Less hypoglycemia



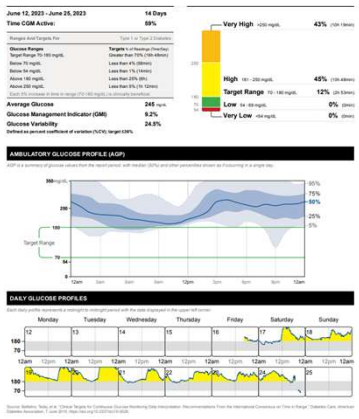
Clarity report obtained from Diana Isaacs

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Case 3

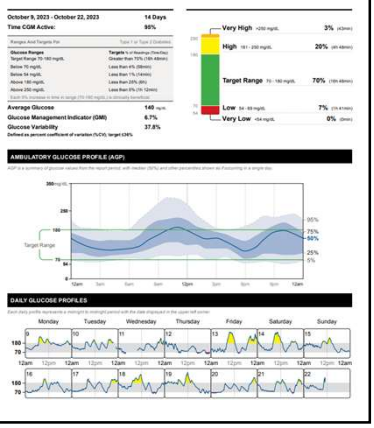
- Person with T2D taking metformin 1000mg twice daily and insulin glargine 20 units daily

Is TIR at goal?
What to ask?
What changes to make?



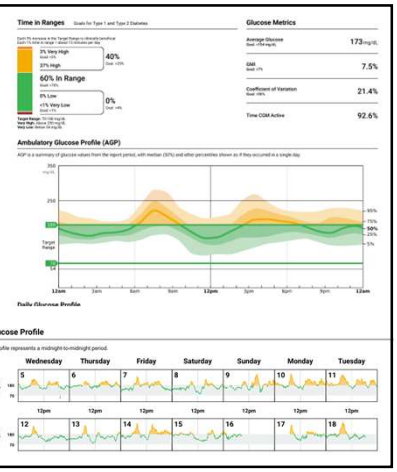
Case 4

- Person with T2D
- 56yo, BMI=33, A1C=7%
- Meds:
  - Degludec 40 units daily
  - Dulaglutide 4.5mg weekly
  - Dapagliflozin 10mg daily
  - Metformin 1000mg twice daily



Case 5

- 40yo F with T2D, lost 20lbs since starting Semaglutide 6 months ago, A1C=7.4%, also has HTN, dyslipidemia, BMI=34kg/m2
- DM Meds:
  - Metformin 1000mg twice daily
  - Empagliflozin 25mg daily
  - Semaglutide 2mg weekly
- Is data at goal?
  - TBR?
  - TIR?
  - TAR?
- Action plan?

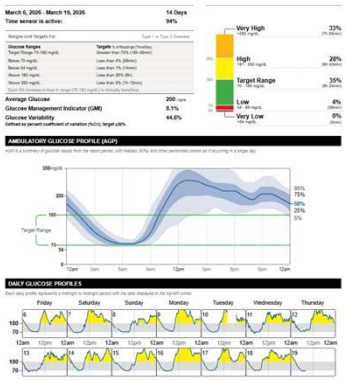


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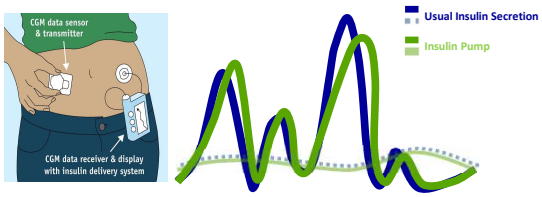
Patient Case 6

- 72yo with type 2 diabetes
- Lispro 6 units three times daily with meals + SS#2
- Glargine 12 units daily
- Goal: transition to GLP-1

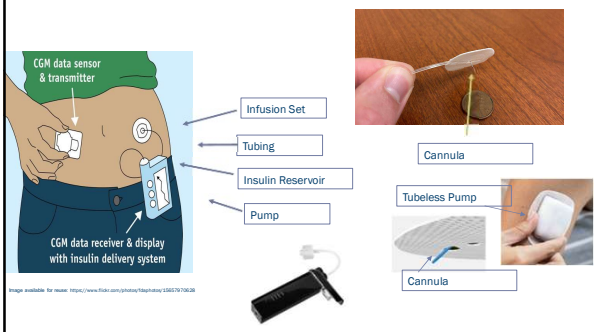
- DATAA model for interpretation
  - Download data
  - Assess hypoglycemia
  - Time in range: what's working well?
  - Areas for improvement
  - Action plan



How a Pump Delivers Insulin



Insulin Pump Basics



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Definitions: Mix & Match

Definition	Meaning
1. Basal rates	A. Glucose number trying to reach with the pump
2. Glucose targets	B. Rate of insulin administration per hour (units/hour)
3. Extended bolus	C. A bolus extended given over a longer time period
4. Carbohydrate ratio	D. How long insulin works in the body
5. Suspend before low	E. How many carbs needed for 1 unit of insulin

Definitions (Cont) Mix & Match

Definition	Meaning
1. Temp basals	A. The most insulin that can be given at one time
2. Correction factor	B. Less intensive insulin delivery to protect against lows
3. Max bolus	C. A temporary increase or reduction in insulin delivery
4. Activity mode	D. Predictive stop of insulin to prevent lows
5. Suspend before low	E. How much 1 unit of insulin will lower glucose

Insulin Pump Info

Uses U100 rapid-acting insulin
- Minimizes insulin variability
- Must have dexterity to fill cartridge or device

Bolus calculator incorporating settings

Active insulin to prevent stacking

Multiple basal rates or automated delivery

Small dose increments

Temporary basal rates or temporary glucose targets

Alarms and reminder features



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Ideal Pump Candidates

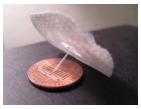


- Require meal-time insulin
- Wearing CGM or frequently checking BGM
- Carbohydrate awareness
- Willing to follow up regularly with health care team
- Can afford the pump/supplies
- Problem solving skills (eg, troubleshoot and treating high or low glucose)
- Able to use the device independently or with caregiver support

Diabetes Care. 2025;48(Supplement_1):S146-S166. doi:10.2337/dc25-S007.

Infusion Sets





- Infusion sets are usually Teflon
  - Available in different sizes (ex. 9mm vs 6mm)
  - Silhouette (angled) may be better for kids/thinner/very active people
  - Steel infusion sets a good option for people with frequent site occlusions



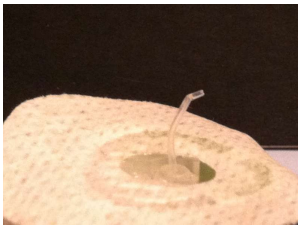
- Longer tubing options
  - Good if connected on leg, arm or wearing pump further from site



- Caution with kids/babies/pets-pouches available to hide pump
- When changing out infusion set, check glucose or CGM 1-2 hours after
  - Don't change right before bed



What Happens with a Bent Cannula?



A. Hyperglycemia
B. Hypoglycemia
C. No effect

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Where to Wear?



Patch Pumps

Cequr Simplicity



- **Bolus pump patch only**
  - Can replaced meal time injections
  - Still need separate basal insulin
- Approved for adults with T1D or T2D
- **Holds up to 200 units of rapid acting insulin**
- On-demand bolus doses in 2-unit increments (1 unit coming soon)
- Doses administered via clicks directly on the device
- Must be changed every 4 days (7 day and 240 units coming soon)
  - Can change sooner if using >200 units in 4 days

V-Go



- **24 hr. basal/bolus patch pump**
- Approved for adults with T1D or T2D
- Uses rapid acting insulin only
- **Basal rate dosing options: 20-, 30-, 40-units per 24 hrs**
- On-demand bolus doses in 2-unit increments
  - Up to 36 units (bolus) /24 hrs
    - **Max: 12u with meals + 40u basal**
- Doses administered via clicks directly on the device

May improve adherence → discreet, always with you

Coming Soon: Pivot

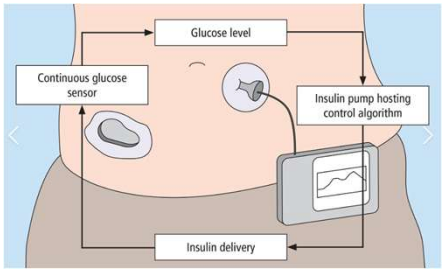
- Holds 300 units
- Basal can be set from 0.5 to 4 units/hour
- Bolus button through clothing
- 3 month use, 3mLcartridges are changed out, disposable battery, detach for shower/swimming
- Works with pivot app on iphone for data sharing, no CGM connectivity



https://pivotpump.com. Accessed 7/17/26

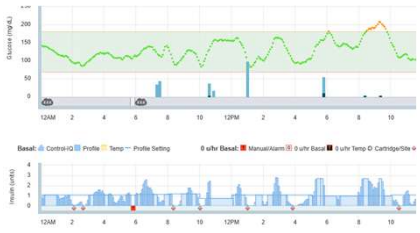
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Automated Insulin Delivery Systems



- Insulin pump
- iCGM
- Algorithm

Current AID Systems are Hybrid-Closed Loops



- Automated insulin delivery (AID)
- Auto adjust background insulin
- Some systems give auto corrections
- Maximize time 70-180mg/dL

Automated Insulin Delivery Systems

Omnipod 5 (Insulet)

T:slim X2 (Tandem) Control IQ+

780G (Minimed)

iLet (Beta Bionics)

Mobi (Tandem) Control IQ+

Twiist Loop (Sequel)

Flex (MiniMed)

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Current State of Pumps

- Every insulin pump has a cloud-based option to obtain data
- Every insulin pump is available with CGM as AID
- Insulin pump coverage for people with T1D is amazing
- 3 FDA approved algorithms for T2D
- 1 FDA approved AID system for T1D pregnancy

2026 ADA Standards of Care and AID

7.25a AID systems are the preferred insulin delivery method over multiple daily injections (MDI), CSII, and sensor- augmented pump in people with type 1 diabetes, A adults with type 2 diabetes, **A** children and adolescents with type 2 diabetes**, E** and other forms of insulin-deficient diabetes. **B–E** Choice of an AID system should be made based on the individual's circumstances, preferences, and needs. **E**

7.25b Consider AID systems for select people with type 2 diabetes treated with basal insulin not achieving individualized glycemic goals. **B** Choice of an AID system should be made based on the individual's circumstances, preferences, and needs. **E**

American Diabetes Association. *Diabetes Care*. 2026;

Custom Foods



AID System Comparison

	Omnipod 5	Control IQ+	780G/Flex	iLet	Twiist
Max fill	200 units	300 units (T:Slim X2) 200 units (Mobi)	300 units	180 units	300 units
CGM compatibility	Dexcom G6, G7, Libre 2+	Dexcom G7, Libre 3+	Simplera Sync, Instinct	Dexcom G7, Libre 3+	Libre 3+, Eversense
Lowest algorithm target/range	110mg/dL 100mg/dL (coming soon)	112.5-120mg/dL	100mg/dL	110mg/dL	87mg/dL 67mg/dL (pre-meal preset)
Basal automation	Calculated from total daily insulin, updated each pod change, 60 min prediction	Increases or decreases from **programmed basal rates**, 30 min prediction	Calculated based on total daily insulin from past 2-6 days	Initiated based on user weight and adapts with glucose profile	Increases or decreased from **programmed basal rates**, 6 hour prediction
Automated correction bolus	No	1/hour if glucose predicted >180mg/dL, 60% of calculated dose	If glucose > 120 mg/dL and at max "auto basal" delivery, up to every 5 min	Yes	No
Extended Bolus	No	Yes, up to 8 hours	No	No	No, carb absorption time up to 8 hours
Temp Basals	No	Yes	No	No	No

ICR: insulin to carbohydrate ratio, IAT: insulin action time, ISF: insulin sensitivity factor, NA: not available
Data obtained from user manuals

Considerations with Device Selection



Case Study: Transition from MDI to Insulin Pump

- PT: AJ is a 60 year old
- Current Medications:
  - Insulin degludec 40 units once daily
  - Insulin aspart 15 units TID a.c
  - Tirzepatide 15 mg once weekly
  - Aspirin 81 mg once daily, metoprolol succinate 100 mg once daily, rosuvastatin 40 mg once daily, lisinopril 20 mg once daily
- Current Weight: 211 lbs ≈ 96 kg

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Case Study: Transition from MDI to Insulin Pump

- Current Total Daily Insulin (TDI): 40+45=85 Units
- Weight = 96 kg

- 1. (Current TDI) * 0.75
- 2. Weight (kg) * 0.5

Take Average of 1 and 2 for TDI that will be used for pump calculations.

Case Study: Transition from MDI to Insulin Pump, Basal Rates

- Basal rate expressed in Units/hr
- Approximate 50% of insulin to be basal
- TDI /2/24 or TDI/ 48:

Case Study: Transition from MDI to Insulin Pump, Bolus Settings

- Insulin Carb Ratio: 400 / TDI (recommended for omnipod) or
- 450/TDI (recommended for others)
- Correction Factor: 1700 / TDI
- Other settings:
  - Target glucose
  - Duration of Insulin Action
  - Max basal
  - Max bolus
  - Reverse correction

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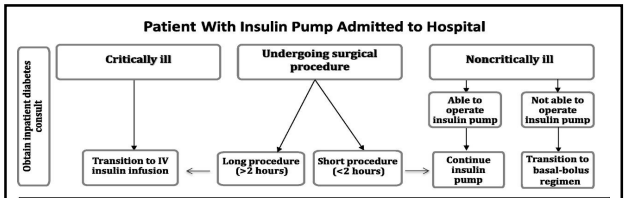
Case Study: Transition from MDI to Insulin Pump, Bolus Settings

- Insulin Carb Ratio: 400 / TDI
- Correction Factor: 1700 / TDI
- Other settings:
  - Target glucose (as low as 100mg/dL)
  - Duration of Insulin Action: usually 3 hours
  - Max basal
  - Max bolus

- 400/56 = 7.14 g/U (round to 7)
- 1700/56 = 30.36 mg/dL/U (round to 30)

Accessing Cloud-Based Data

System:	Associated Mobile Apps	Website to Access Portal	Data Sources
Glooko	Omnipod 5, Glooko	glooko.com	Omnipod 5
Carelink	MiniMed mobile, Carelink mobile	carelink.medtronic.com/login	Minimed pumps, MiniMed Go
Tidepool	Tidepool mobile, Twiist AID system, twist insight	tidepool.org	Twiist, Open-source Loop
Source	T:slim mobile, Mobi mobile	source.tandemdiabetes.com	Tandem pumps
Beta Bionics User Portal	Bionic circle, iLet app	report.betabionics.com/	iLet



Changes to Pump Therapy With Imaging Studies	
X-ray/CT	Pump should be covered by lead apron
MRI	Pump and metal infusion set should be removed
Ultrasound	No need to remove pump but transducer should not be pointed directly at the pump
Cardiac catheterization	Pump should be covered by lead apron
Pacemaker/automatic implantable cardioverter defibrillator (AICD)	Pump should be covered by lead apron
Colonoscopy/EGD	Pump can remain in place
Laser surgery	Pump can remain in place

Umpierrez G et al. Diabetes Care 2018 Aug; 41(8): 1579-1589.

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Contraindications to Insulin Pumps in the Hospital

Impaired level of consciousness (except during short-term anesthesia)
Patient's inability to correctly demonstrate appropriate pump settings
Critical illness requiring intensive care
Psychiatric illness that interferes with a patient's ability to self-manage diabetes
Diabetic ketoacidosis and hyperosmolar hyperglycemic state
Refusal or unwillingness to participate in self-care
Lack of pump supplies
Lack of trained health care providers, diabetes educators, or diabetes specialist
Patient at risk for suicide

Umpierrez G et al. Diabetes Care 2018 Aug; 41(8): 1579-1589.

Connected Insulin Pen Basics

- A reusable pen or pen cap paired with a smartphone mobile app
- Calculates and tracks insulin doses
- Tracks active insulin time
- Pairs with connected BGM and CGM
- Cloud-based data access
- Dose reminders
- Insulin expiration
- Temperature indicator

ADA SOC 2026: Who Should Use Connected Pens?

7.23 Offer connected insulin pens for people with diabetes taking multiple daily insulin injections when appropriate. B

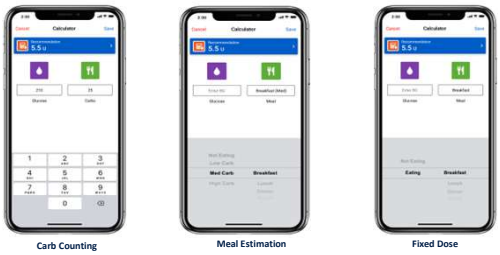
7.24 FDA-approved insulin dose calculators/decision support systems may be helpful for calculating insulin doses. B

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InPen

- Reusable pen for up to 1 year without charging
- InPen app – Bluetooth connected
  - Integrated with Dexcom G7 (original inpen)
  - Integrated with Instinct (Minimed Go)
- Works with Fiasp, Humalog, NovoLog cartridges
- Delivers boluses in 0.5 unit increments up to 30 units/dose
- Monitors insulin temperature excursions
- Dose calculator, records exact doses, priming doses

Dose Calculator

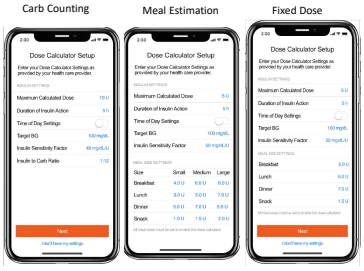


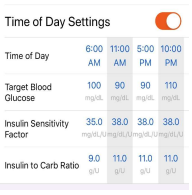
Carb Counting | Meal Estimation | Fixed Dose

Therapy Settings

- Customize insulin settings:
  Duration of Insulin Action
- Target Blood Glucose
- Insulin Sensitivity Factors
- Insulin/carbohydrate ratios or meal-size dose

Carb Counting | Meal Estimation | Fixed Dose





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In Summary

- There are several CGM, connected pen and insulin pump options, and the DCES can help PWD select the best device for their individual needs
- New era of hybrid closed loops
- No artificial pancreas yet, but we are getting closer to closing the loop
- Connected data can be used to discussion diabetes self-management with the person with diabetes and help to make meaningful changes-think DATAA

How to Share Data

System:	Associated Mobile Apps	Data Sources
Glooko	Glooko	Omnipod 5, Dexcom, Libre, Eversense, many glucose meters, InPen
Clarity	Dexcom G7, Clarity, Dexcom Follow,	Dexcom, InPen
LibreView	Libre, Libre 2, Libre 3, LibreLinkUp	Libre
Carelink	MiniMed Connect, Carelink Connect	780G, Simplera, Instinct, MiniMed Go, Flex
Tidepool	Tidepool Mobile	Twiist,, Dexcom, Libre, many glucose meters, InPen
Source	Tandem t:slim mobile app, Tandem mobi mobile app	T:Slim X2, Mobi
Eversense Data Management System	Eversense	Eversense

Simulation Apps/Websites to Try it Out



MiniMed Virtual Pumps



T:simulator app





Virtual Pump Demo | Medtronic
https://www.medtronicdiabetes.com/minimed-virtual-pump

Mobi
https://main.dugvvq4v5elvs

Omnipod 5 Simulator



iLet simulator
https://simulatorapp.betabio



twiist™ AID System Interactive Demo

Learn All About the Tech



https://pro.diabeteswise.org/



https://www.diabeteseducator.org/danatech/home)/

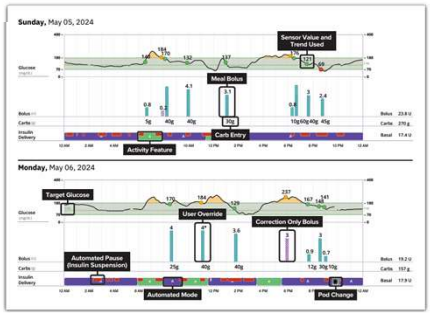
A Great Resource: Panther Tools



Panther Tools

Data Interpretation

Use the **Daily View** and discussion with the user to identify causes of the glycemic patterns identified in STEP 1 (hypoglycemia or hyperglycemia).



Diabetes Technology. Deciphered. | PANTHER Program
https://www.pantherprogram.org

Cleveland Clinic

Every life deserves world class care.

Diana Isaacs, PharmD
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Podcast: https://www.hcplive.com/podcasts/diabetes-dialogue

DIABETES DIALOGUE

Medical Nutrition Therapy - Latest Updates Macronutrients: Carbs, Fats and Protein

2026 Live Seminar

Christine Craig, MS, RDN, CDCES has No Relevant Conflicts of Interest

- Information is based on:
  - The ADA Standards of Care in Diabetes

Christine is the Founder of Nutrition for Daily Living, where her mission to increase access to compassionate and evidenced-based nutrition and diabetes care.

She authors a very popular monthly blog and question of the week for our company.

Her experience is vast and includes providing diabetes care within Primary, Telemedicine and Endocrinology clinics.

"Nutrition therapy for diabetes is not one-size-fits-all;

it must be personalized to meet the unique needs, preferences, and circumstances of each individual,

helping them manage their condition and improve overall health."



Alison B. Evert, Michelle Dennison, Christopher D. Gardner, W. Timothy Garvey, Ka Hei Karen Lau, Janice MacLeod, Joanna Mitri, Raquel F. Pereira, Kelly Rawlings, Shamera Robinson, Laura Saslow, Sacha Uelmen, Patricia B. Urbanski, William S. Yancy; Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report. *Diabetes Care* 1 May 2019; 42 (5): 731–754

Medical Nutrition Therapy (MNT)

- Evidence-based **treatment of a disease or condition through the modification of nutrient or whole-food intake**
- Nutrition-based treatment provided by an RDN or similarly qualified professional

All healthcare team members should complement MNT, providing guidance on healthy food choices for the individual and behavioral support



Goals of MNT for All Persons with PreDiabetes

Prevent or delay progression to T2DM by:

1. Improving glycemia
2. Address risk factors - obesity, hypertension, disorders of lipid metabolism

Refer those at risk for diabetes to an intensive lifestyle program
Ex: Diabetes Prevention Program and/or individualized MNT



Briggs Early, Kathaleen et al. Position of the Academy of Nutrition and Dietetics: The Role of Medical Nutrition Therapy and Registered Dietitian Nutritionists in the Prevention and Treatment of Prediabetes and Type 2 Diabetes. *Journal of the Academy of Nutrition and Dietetics*, Volume 118, Issue 2, 343 - 353

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MNT Outcomes: Diabetes Prevention

Primary Goal: Prevent/Delay Progression to T2DM

- Fasting glucose reduction
- Healthy lifestyle changes: healthy eating & physical activity
- Energy balance - Reduced body weight & waist circumference
- Blood Pressure reduction
- Increased quality of life

Greater outcomes with increased visit frequency



Briggs Early, Kathaleen et al. Position of the Academy of Nutrition and Dietetics: The Role of Medical Nutrition Therapy and Registered Dietitian Nutritionists in the Prevention and Treatment of Prediabetes and Type 2 Diabetes. *Journal of the Academy of Nutrition and Dietetics*, Volume 118, Issue 2, 343 - 353

The Power of Prevention Programs

Diabetes Prevention Program (DPP) showed lifestyle changes over 3 years **reduced risk of T2DM by 58%**	• **> 60 y/o more benefit**, decrease risk of T2DM by 71% • Effective for both sexes, across all racial & ethnic groups, & in people predisposed to diabetes
10-year Follow-Up	• Participants were 1/3 less likely to develop T2DM • Those who did develop T2DM delayed onset by ~ 4 yrs

- The Diabetes Prevention Program Research Group. (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *New England Journal of Medicine*, *346*(6), 393–403. https://doi.org/10.1056/nejmoa012512
- Diabetes Prevention Program Research Group; Knowler WC, Fowler SE, Hamman RF, Christophi CA, Hoffman HJ, Brenneman AT, Brown-Friday JO, Goldberg R, Venditti E, Nathan DM. 10-year follow-up of diabetes incidence and weight loss in the Diabetes Prevention Program Outcomes Study. Lancet. 2009 Nov 14;374(9702):1677-86.

DPP: The Power of Prevention

Lifestyle intervention/goals in DPP included:

- Increase physical activity: goal of 150 minutes of physical activity per week
- Decrease fat and calorie intake*
- Decrease weight: sustained loss of 7% of initial body weight**

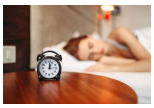
*DPP initially encouraged a lower fat/calorie eating plan but current data suggests there is no ideal percentage of calories from carbs, protein, and fat to prevent diabetes. A variety of eating patterns may be appropriate.

**Currently ≥5-7% wt loss/maintenance is recommended as part of DPP.

- Diabetes Prevention Program (DPP) Research Group. (2002). The Diabetes Prevention Program (DPP): Description of lifestyle intervention. *Diabetes Care, 25*(12), 2165-2171. doi:10.2337/diacare.25.12.2165
- American Diabetes Association Professional Practice Committee for Diabetes; 3. Prevention or Delay of Diabetes and Associated Comorbidities: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S50–S60

Newer Updates: Power of Prevention

- Prescribe an **evidenced-based eating pattern**
  - Individualize based on current eating patterns, preferences & metabolic goals
  - Overall quality of food is associated with lower risk of type 2 diabetes
- **Sleep:** quantity, quality & timing (6-9 hrs)
- **Delivery:** Consider technology-assisted diabetes prevention programs, CHW support DDP-like interventions



American Diabetes Association Professional Practice Committee for Diabetes; 3. Prevention or Delay of Diabetes and Associated Comorbidities: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S50–S60

Lifestyle Factors and Type 1 Progression

- Factors that increase beta-cell demand, progression to T1:
  - Lower physical activity, higher glycemic index eating patterns, total sugar intake.
- **Reduced time to progression to T1D for children with + antibodies**
  - Daily vigorous activity
  - Lower consumption of high glycemic foods and sugar

American Diabetes Association Professional Practice Committee for Diabetes; 3. Prevention or Delay of Diabetes and Associated Comorbidities: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S50–S60

MNT Goals in All Persons with Diabetes

1. Support healthful eating patterns
- Emphasize eating a variety of nutrient dense foods in appropriate portions to:
  - Attain individualized BP, glycemic and lipid goals
  - Attain and maintain body wt goals
  - Delay and/or prevent complications

2. Individualize nutrition care based on:
- Personal and cultural preferences
- Health literacy and numeracy
- Access to healthful foods
- Willingness and ability to make behavioral changes
- Barriers to Change

3. Maintain pleasure of eating. Provide positive, nonjudgmental messages about food
- Limit food choices only when backed by science

4. Provide practical tools for developing healthful eating patterns

American Diabetes Association Professional Practice Committee for Diabetes*; 5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S89–S131

Benefit of MNT for Individuals With Diabetes

Decrease in A1C After 3-6 Months of Receiving MNT	
Type 1 Diabetes	1.0% - 1.9%
Type 2 Diabetes	0.3% - 2.0%

- Refer people with diabetes to RDN at dx, as need throughout lifespan
  - Sustained A1C improvement with ongoing support from RD/RDN
  - MNT is cost-effective

Franz, M. J., MacLeod, J., Evert, A., Brown, C., Gradwell, E., Handu, D., Reppert, A., & Robinson, M. (2017). Academy of Nutrition and Dietetics Nutrition practice guideline for type 1 and type 2 diabetes in adults: Systematic review of evidence for medical nutrition therapy effectiveness and recommendations for integration into the Nutrition Care Process. *Journal of the Academy of Nutrition and Dietetics, 117*(10), 1659–1679. https://doi.org/10.1016/j.jand.2017.03.022

Individualize Nutrition Care

Effective nutrition therapy tailors to individual needs

"During clinical encounters assess/address SDOH- including food security- to inform treatment decisions"

Food Insecurity

- Unreliable availability of nutritious food & inability to consistently obtain nutritious food
- Lack of consistent access to enough food for an active, healthy life



American Diabetes Association Professional Practice Committee for Diabetes*; 5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S89–S131

Assess for Food Insecurity

Any member of the health care team can screen for food insecurity using

The Hunger Vital Sign.



Households are considered at risk if they answer either or both of the following statements as "often true" or "sometimes true"

- "Within the past 12 months, we worried whether our food would run out before we got money to buy more."
- "Within the past 12 months, the food we bought just didn't last, and we didn't have money to get more."

https://childrenshealthwatch.org/public-policy/hunger-vital-sign/

Food Insecurity: Providing Support

- Assess & Collaborate:
  - Consider **completing demands**: economic, behaviors, mental health
  - **Balance**
    - **budget-friendly meal planning with assessment of time to prepare foods, access to foods/refrigeration & cooking means**
  - Support shifts in foods by problem solving specific situations & finding solutions
- Refer to food programs when possible
  - Shopping smart:
    - seasonal produce, frozen or canned fruits and vegetables, low-cost proteins (beans, peas, lentils, canned tuna, eggs), grains like brown rice & oatmeal are often more affordable

American Diabetes Association Professional Practice Committee for Diabetes*; 5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S89–S131



Effectiveness of Weight Loss in T2D

Percent Weight Loss from Initial Weight	Results
≥5-7%	Benefits glycemia, lipids, and blood pressure. Recommended for most people w/ T2D and BMI ≥25
≥10%* *When feasible, sustainable, & safe	May lead T2DM remission, improved CVD & metabolic comorbidities & reduced mortality Reduced need for medications Optimal, especially in those who are newly diagnosed.
Clinical benefit of weight loss is progressive, more intensive loss maximizes benefit "In DM2 and overweight/obesity any magnitude of weight loss may benefit."	

American Diabetes Association Professional Practice Committee for Diabetes*; 8. Obesity and Weight Management for the Prevention and Treatment of Diabetes: Standards of Care in Diabetes–2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S166–S182.

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Knowledge Check: Poll Question #1

JC is 5'9" and weighs 202 lbs. (BMI 29.8). They were just diagnosed with prediabetes with an A1C at 6.3%. They do not want to start medication. What is the best option?

A. Lose 5-10 lbs
B. Lose 10-20 lbs
C. Decrease his fat intake by 5-10%
D. Reconsider medications and try Metformin

BMI and Diabetes Risk

WHO defines Obesity as: *abnormal or excessive fat accumulation that presents a risk to health*

TABLE 3.1 Criteria to screen for excess adiposity and diagnose overweight and obesity in nonpregnant adults

Condition	Criteria for people with non-Asian background	Criteria for people with Asian background[a]
Excess adiposity	BMI ≥25 kg/m^2	BMI ≥23 kg/m^2
Overweight	BMI 25–29.9 kg/m^2 with WHtR <0.5 or BMI 25–29.9 kg/m^2 with WC <88 cm in women; BMI 25–29.9 kg/m^2 with WC <102 cm in men	BMI 23–27.4 kg/m^2 with WHtR <0.5 or BMI 23–27.4 kg/m^2 with WC <80 cm in women; BMI 23–27.4 kg/m^2 with WC <90 cm in men
Obesity	BMI ≥30 kg/m^2 or BMI 25–29.9 kg/m^2 with WHtR ≥0.5 or BMI 25–29.9 kg/m^2 with WC ≥88 cm in women; BMI 25–29.9 kg/m^2 with WC ≥102 cm in men	BMI ≥27.5 kg/m^2 or BMI 23–27.4 kg/m^2 with WHtR ≥0.5 or BMI 23–27.4 kg/m^2 with WC ≥80 cm in women; BMI 23–27.4 kg/m^2 with WC ≥90 cm in men

Elevated WC in women with a non-Asian background is ≥35 inches and in men with a non-Asian background is ≥40 inches. Elevated WC in women with an Asian background is ≥31.5 inches and in men with an Asian background is ≥35.5 inches. WC, waist circumference; WHtR, waist-to-height ratio. [a]The BMI and WC thresholds identified for people with Asian backgrounds represent general targets, and health care professionals should be aware that specific values may exist for certain Asian countries that differ from the values listed above (40, 41, 55). Asian background includes Asia (e.g., China, Japan, Korea) and the South Asian subcontinent (e.g., India, Pakistan, Bangladesh). Clinicians should be aware of the evidence gap regarding individuals who identify as having mixed race or ethnicity. At this time, clinicians should use the background from which the individual identifies.

- ADA Professional Practice Committee. Obesity and Weight Management for the Prevention and Treatment of Diabetes, 2026. *Diabetes Care.* 2026;49(Suppl 1):S166–S182.
- ADA Professional Practice Committee for Obesity. Screening, Diagnosis, Evaluation, and Staging of Obesity in Adults, 2026. *Diabetes, Obesity, and CardioMetabolic CARE.* 2026;1(4):536–571.

ADA Standards: Assessment of Weight

- Take weight, screen BMI annually, assess weight trajectory to inform approach
  - Active in weight mgmt - weigh every 3 months
- To confirm adiposity and risk, use other measures, if available
  - Waist circumference, Wasit-hip ratio, DEXA scan, BIA

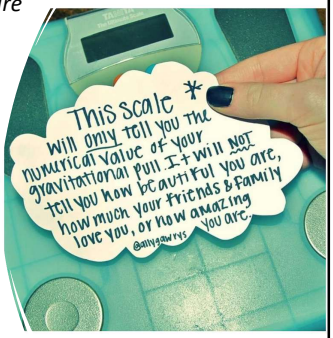


BMI does not measure:
- Adipose tissue distribution/function,
- Wt-related heath/wellbeing consequences

American Diabetes Association Professional Practice Committee for Diabetes*; 8. Obesity and Weight Management for the Prevention and Treatment of Diabetes: Standards of Care in Diabetes–2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S166–S182.

Weight is a Heavy Issue

"Health care professionals are strongly encouraged to increase their awareness of implicit and explicit weight-biased attitudes"



American Diabetes Association Professional Practice Committee for Diabetes*; 8. Obesity and Weight Management for the Prevention and Treatment of Diabetes: Standards of Care in Diabetes–2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S166–S182.

Weight Stigma in Healthcare

Key Recommendations

- Train all health care staff on weight bias
- Create size-inclusive clinical spaces
- Use respectful, person-first language
- Set goals based on patient values, not weight alone
- Use proven strategies to reduce bias

Table 2 Examples of preferred language

Avoid using	Use
Language that places blame or devalues an individual	Language that recognizes the person and shows dignity
Pejorative language: 'You really need to do something about your weight' 'Your weight is killing you' 'Your BMI means you have morbid obesity'	Proactive language: 'Can we talk about your weight today?' 'How do you feel about your weight?' 'What words would you like to use when we talk about weight?'
'obese', 'fat', 'chubby', etc. (*adjectives*)	'A person with obesity'. (*nouns*)
'morbid', 'super', 'ultra', 'extreme', etc. (*superlative adjectives*)	'severe obesity', or the obesity class or stage
'weight recidivism'	'recurrent weight gain' or 'recurrent excess weight'
'non-compliant', 'undisciplined', or 'weak-willed' person	'person with barriers to adherence'
'weight loss failure' or 'failed to lose weight'	'treatment nonresponse'
'inadequate' or 'insufficient' weight loss	'partial treatment response'

Bannuru RR. Weight stigma and bias: standards of care in overweight and obesity—2025. BMJ Open Diabetes Research & Care. 2025;13:e004962. https://doi.org/10.1136/bmjdrc-2025-004962

Weighing with Respect

- Regard weight & BMI as sensitive health information
- Situate scales in a private area/room
- Measure & report weight nonjudgmentally
- If weighing is questioned or refused
  - Be mindful of possible prior stigmatizing experiences
  - Consider/discuss the value of weight monitoring
  - Is it needed to inform treatment decisions?



Puhl RM, Himmelstein MS, Speight J. Weight Stigma and Diabetes Stigma: Implications for Weight-Related Health Behaviors in Adults With Type 2 Diabetes. Clin Diabetes. 2022 Jan;40(1):51-61. doi: 10.2337/cd20-0071.

Nutrition for Weight Management

Interventions to **create an energy-deficit** is recommended, **NOT** one specific macronutrient composition or type of eating pattern

- Aim for 500-750 kcals/day energy deficit
- High frequency of counseling is beneficial
- **Consider SDOH & health disparities**
- **Tailor to cultural needs to increase impact**
- Very low-calorie eating (800-1,000 kcals/day) should only be prescribed to selected individuals by trained practitioners
- Nutrition supplements have no effect; not rec.



Monitor to ensure adequate intake, prevent protein/micronutrient def.

American Diabetes Association Professional Practice Committee for Diabetes*; 8. Obesity and Weight Management for the Prevention and Treatment of Diabetes: Standards of Care in Diabetes–2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S166–S182.

Using a Weight Neutral Approach

- Ask Permission to Discuss Weight
  - Ask whether weight loss is a goal before assuming
- Focus on Actionable Changes
- Remember: there are many indicators of success!



or





ADA Standards: Macronutrients

"People eat food, not nutrients, nutrient recommendations need to be applied to WHAT people eat"





American Diabetes Association Professional Practice Committee for Diabetes*; 5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S89–S131

Healthy Eating Patterns: Pre-DM & DM

Healthy Eating
pattern of eating high quality, nutritionally dense foods in amounts that lead to better health & wellness

Consensus Recommendation: There is no ideal percentage of calories from carb, protein, and fat for people with diabetes.

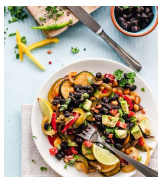
Standard of Care: Keep nutrient quality, total calories, & metabolic goals in mind

- Alison B. Evert, Michelle Dennison, Christopher D. eta al.; Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report. *Diabetes Care* 1 May 2019; 42 (5): 731–754
- American Diabetes Association Professional Practice Committee for Diabetes*; 5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S89–S131

Eating Patterns: Key Nutrition Principles

Until there is more evidence:

- Emphasize non-starchy vegetables in a rainbow of colors



⬆ Whole fruits, legumes, whole grains, nuts & seeds, lean proteins, low-fat dairy/alternatives

⬇ Red meat, added sugars, SSB, refined grains & processed/ultra-processed foods

Any approach should consider:

Individual needs: "health status, personal & cultural preferences, ability to sustain recommendations, food access & nutrition security"

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Carbohydrate: ADA Standard of Care

Inconclusive evidence for ideal amount of carbs per day

- RDA is 130 g/day in people w/o diabetes
- This can be fulfilled via intake or by body's metabolic processes

Monitoring carbohydrate- key strategy for T1DM & T2DM to achieve glucose goals



Amount & **Type** directly impact glucose values

Alison B. Evert, Michelle Dennison, Christopher D. et. Al. Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report. *Diabetes Care* 1 May 2019; 42 (5): 731–754

Carbohydrate Amount

- **Amount** of carb is main dietary influence on postprandial BG
- **Consider reducing carb intake** for <u>some</u> adults to improve glycemia- focus on reduced processed foods.

Systematic reviews and RCT found:
- **Very low carbohydrate diet (<26%)** effectively reduced A1c at 6 months, less difference beyond 1 year.
- **Ketogenic Diet (20-50g)** increased LDL & no sig. difference in A1c compared with low-carb Mediterranean diet.



Most PWD report carb intake (~ 44-46% of total calories)

American Diabetes Association Professional Practice Committee for Diabetes*; 5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S89–S131

Very Low Carb Meal Plan Not Recommended for:



- Women who are pregnant or lactating or children
- People with/at risk for disordered eating
- People who have kidney disease
- **Avoid ketogenic diets if taking SGLT-2 Inhibitor** due to high risk of ketoacidosis
  - Educate: prevention, signs of DKA, how to measure ketones.
  - Avoid excessive alcohol intake, ensure adequate hydration.

Carbohydrates Type

Type- Different carb foods will have different effects

Focus on the "**quality** of carb foods selected"

⬆️ Emphasize minimally processed, nutrient-dense, high-fiber sources



Alison B. Evert, Michelle Dennison, Christopher D. et. Al. Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report. *Diabetes Care* 1 May 2019; 42 (5): 731–754

Carbohydrates: The Basics

SUGAR STARCH FIBER

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Sugar Types

- **Glucose:** If eaten alone, has highest glycemic peak relative to other sugars. Digestion time is minimal.
- **Fructose:** metabolized mostly in the liver; goes to replenish liver glycogen & triglyceride synthesis so it has less acute impact on BG
- **Sucrose:** Broken into 50% glucose and 50% fructose
- **Lactose:** Broken into 50% glucose and 50% Galactose
  - Galactose- Milk sugar, primarily converted into glucose in the liver. Modest glucose increase.



ADA Recommendations: Caloric Sweeteners

Nutritive sweeteners: *Sweet-tasting substances that provide energy*

Typically 4 calories per gram.

No specific ADA limit for added sugars

Strongly discourages added sugars - can displace healthier, more nutrient-dense foods & increase inflammation



American Diabetes Association Professional Practice Committee for Diabetes*; 5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S89–

Fructose in Fruit

No evidence to avoid naturally occurring fructose in fruits and vegetables

- "Free fructose" in fruit may
  - improve glycemia compared with isocaloric intake of sucrose or starch
  - not likely to impact triglycerides - unless consumed in excess



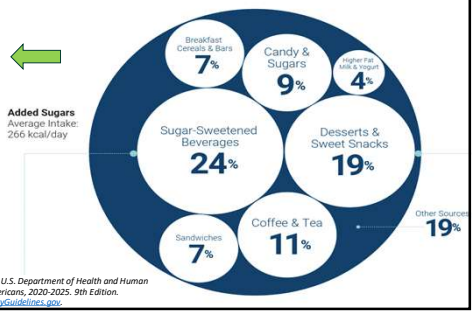
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Added Sugars in the US Diet

Average intake = ~ **17 tsp** added sugar per day or **67 grams** of added sugar

Figure 1-10

Top Sources and Average Intakes of Added Sugars: U.S. Population Ages 1 and Older



U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2020-2025. 9th Edition. December 2020. Available at DietaryGuidelines.gov.

Sugar Sweetened Beverages (SSBs)

- General population: SSBs should be avoided to ↓risk of T2DM, heart disease, weight gain, MASLD & tooth decay
- In people at risk and with diabetes: ADA Standard of Care
  - Replace SSBs (including juice) with water or low-calorie/no-calorie beverages, as often as possible
    - To manage glycemia & ↓ risk of CVD.

How!

- Encourage water as first choice
- Add lemon, lime, cucumber slices or berries to water
- Choose no calorie flavored/sparkling waters



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Good Time for Sugar: Hypoglycemia Treatment

Standard of Care:

- All individuals taking insulin, sulfonylurea or at risk of hypo should receive education for prevention, treatment

Rule of 15: Treat hypoglycemia with 15g fast-acting carbs if glucose level reaches <70 mg/dl

- Best option: pure glucose
- Other options: glucose-containing carbs
- Do NOT select foods with fat or protein

- Recheck 15 minutes later; retreat if still low
- If on AID system, consider less treatment (5-10g)



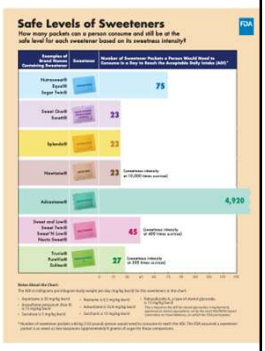
American Diabetes Association Professional Practice Committee for Diabetes*; 6. Glycemic Goals, Hypoglycemia, and Hyperglycemic Crises: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S132–S149.

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Non-Nutritive Sweeteners Safety & Regulation

Food additive with intense sweet taste without calories or nutrients of sugar

- FDA approved for public & PWD
- US FDA regulates food additives under the Food, Drug and Cosmetic Act
- Companies wanting to use a new food additive or use an approved one in a different way, must seek FDA approval OR can use if falls under GRAS
- FDA determines safety for intended use & sets ADI



Downloaded March 26rd, 2026 from https://www.fda.gov/food/food-additives-petitions/aspartame-and-other-sweeteners-food

ADA Recommendations: NNS

- Use in moderation & short term to reduce overall kcals /carb
- NNS may be acceptable for those transitioning from SSB
  - Do not have significant affect on glycemic management
  - Do not raise liver enzymes
  - Overall reduce calorie & carb intake
- Emphasize water intake



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A Unique Sugar: Allulose

Labeling for allulose:

- Not included in "Total Sugars" or "Added Sugars"
- Included in Total Carbohydrates
- Calories calculated with 0.4 kcals/gram
- Must be in ingredient list

Carbohydrate Count:

- Subtract allulose carbs from total carbs



Nutrition Facts

About 12 servings per container

Serving size 2 tbsp (30 mL)

Amount per serving

Calories 20

	% Daily Value*
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 0mg	0%
Total Carbohydrate 28g	10%
Dietary Fiber 0g	0%
Total Sugars 0g	
Includes 0g Added Sugars	0%
Allulose 26g	
Protein 0g	

* Percent Daily Values (DV) are based on a 2,000 calorie diet.

2G NET CARBS = 28G TOTAL CARBS - 26G ALLULOSE

INGREDIENTS: Besti Monk Fruit Allulose Blend (Liquid Allulose, Monk Fruit Extract), Vegetable Glycerin, Natural Flavors

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Sugar Substitute: Sugar Alcohols

- Another category of sweeteners approved for consumption for general public and PWD
  - Calorie contribution is slightly lower than sugar
  - 25% to 100% as sweet
  - Does not promote tooth decay
  - Associated with bloating, flatulence, and diarrhea

Examples: Sorbitol, maltitol, **erythritol**, isomalt, xylitol, lactitol



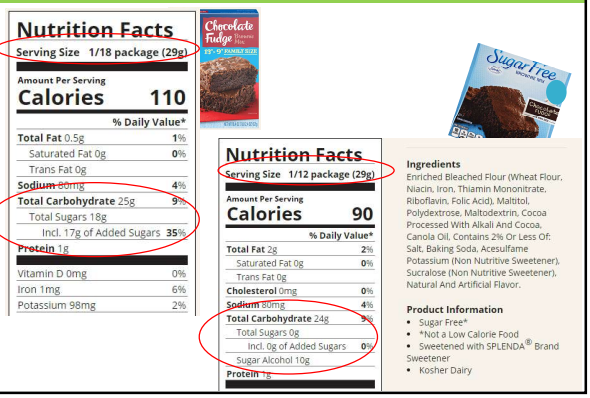
Sugar Alcohols

- Benefit lacks significant evidence for people w/diabetes
- Consumption may lead to small rise in blood glucose
  - Postprandial response is lower than sugars like fructose, glucose, or sucrose
  - Contributes ~2* Calorie per Gram on Average:

*erythritol 0.2 kcal/gm, mannitol ~ 2 kcal/gm, others > 2 kcal/gm



Sugar Alcohols



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Starch: Amount & Type Matters

- Digestion is efficient at breaking starches to glucose
- **Glycemic effect** of a particular starch is determined by:
  - Type/structure of starch
  - Types of processing & cooking used
- Starch–lipid and starch–protein complexes reduce rapidly digestible starch → can delay or extend glucose response
- **Choose high fiber** instead of refined/processed grains



"low glycemic index or "low glycemic load" is synonymous with higher fiber eating patterns*

- Zhang J, Du J, Xie L, Ashraf J, Liu S, Qi Y, Xu B. Evaluation, influencing mechanisms, regulatory strategies, and industrial standardization of glycemic index in starchy foods: An integrative framework based on starch digestion. Food Chem. 2026 Oct 1;525(Pt 2):150445.
- American Diabetes Association Professional Practice Committee for Diabetes*; S. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S89–S131

Starch: Impact of Type and Structure

- Higher **amylose** (vs. amylopectin) → slower digestion, lower glucose/insulin rise
- Intact granular/crystalline structure resists enzymatic breakdown



AMYLOSE
More "resistant starch"
Lesser impact on glucose levels
Example: Long grain rice (basmati), beans, lentils



AMYLOPECTIN
Greater impact on glucose levels
Example: Short grain rice, potatoes

Starch: Impact of Cooking Time

- Cooking/**gelatinization** (heat + water) **increases** digestibility and glucose response
- Cooling/**retrogradation** and less-gelatinized starch **lowers** it
- Fine milling disrupts food structure → higher glucose and greater glycemic variability than intact grains

Example: The longer pasta cooks, the more water-logged its molecules become, making it easier for the body to break it down to glucose.
Al dente pasta have less gelatinization.



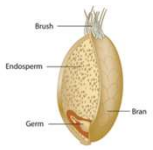
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Fiber

Type of carbohydrate that passes through the body largely undigested, contributes minimally to postprandial rise

Associated with:

- Lower all cause mortality
- Inverse association with risk of T2DM
- Increased microbiome diversity
- Reduced cholesterol





Fiber

- Goal: 14 grams of fiber/1000 kcal
  - Typical American gets ~15 grams/day
  - Improved glycemia with > 50 grams/day; may be difficult due to palatability and GI side effects
- Choose whole intact grains
- Encourage foods form due to co-existing micronutrients and phytochemicals



Tips to Increase Fiber

- Avoid/limit highly processed foods
- Choose > 3 gm fiber per serving
- Choose High Fiber Foods: Whole intact grains, legumes, fruits, veggies, nuts/seeds, avocados

How!

- Choose whole grain- **when culturally appropriate**
- Eat **whole fruit** instead of drinking juice
- Include **plant-based proteins-** Substitute beans/lentils for meat in a salad, chili, or soup
- **Add** onions, celery, carrots, other veggies when cooking
- **Replace** white flour/rice with brown rice/whole grains
- **Snack on** nuts, seeds, fruit, or veggies more often



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100 Trillion Friends to Call Your Own

From way back when, to current time
man and bacteria have been intertwined.

Start with your head, it's a happening place,
there's staphylococcus all over your face.

Next up is gums, teeth and mouth,
You'll find streptococcus inside and out!

Now to your stomach, to keep the pH,
H. pylori is on the case!

Inside the intestines, 30 feet of tube,
3 pounds of bacteria digesting your food.

From Bacteroidetes to keep you lean,
to Firmicutes, a junk food digesting machine!

Prevotella another bug on the scene,
breaks down fiber, veggies and beans!

Lactobacillus is a newborn's friend,
lining birth canal from tip to end.



Down to your feet, in-between the toes,
that's where lots of pseudomonas grows!

Short chain fatty acids, you wanna keep them around
Protects gut mucous lining from breakin' down

So here's my message, always nourish your gut
With fresh fruit, grains, veggies, beans and nuts

More kefir, miso, sauerkraut, kimchi
Less sugar and fast foods to keep away disease

Breast feed, get dirty, limit antibiotic use
Let newborns come out through the natural shoot

Be reassured that you're never alone
You've got 100 trillion friends to call your own!

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100 Trillion Friends to Call Your Own by Beverly Thomassian, RN, MPH, CDE, BC-ADM to the tune "Yeah" in the style of Usher.

Knowledge Check: Poll Question #2

Which of the following is true about sucrose digestion?

A. Sucrose is broken down into glucose & fructose, and the fructose is metabolized almost completely in the liver
B. Sucrose is broken down into glucose & maltose, and the glucose is metabolized almost completely in the liver
C. Sucrose is broken down into glucose & fructose, and the glucose is metabolized almost completely in the liver
D. Sucrose is broken down into glucose & maltose, and the maltose is metabolized almost completely in the liver

Knowledge Check: Poll Question #3

Taylor, who has type 1 diabetes, begins experiencing symptoms of hypoglycemia after a long-day of swimming. When she checks, her blood sugar is 63 mg/dl. What should she do?

A. Drink 8 oz of soda and recheck her glucose level in 15 minutes
B. Eat 4 glucose tablets and recheck her glucose level in 15 minutes
C. Drink 15g of liquid glucose and recheck her glucose level in 30 minutes
D. Eat a piece of fruit and recheck her glucose level in 30 minutes



Protein: ADA Standard of Care



- Inconclusive: **No ideal amount of dietary protein to optimize glycemic management or CVD risk**
  - RDA for Americans: 0.8 gm/kg, newest DG: 1.2-1.6 gm/kg
  - Typical consumption: 0.8-1.5 gm/kg
  - Individualize protein goals based on current eating patterns
- Increase plant-based protein for people with or at risk of diabetes to reduce CVD

American Diabetes Association Professional Practice Committee for Diabetes*; 5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S89–S131

Protein & Kidney Disease: ADA Standard of Care

Diabetes & Non-Dialysis CKD

- Individualize based on eating pattern
  - 0.8 gm/kg/day for ≥ stage G3
  - Below this – does not improve BG, CVD or slow kidney disease progression - may increase malnutrition
- Increase plant-based sources
  - Lower risk of all cause mortality



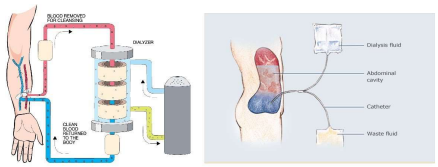
Higher plant protein intake is associated with **lower risk of all-cause and CVD mortality**
Women's Health Initiative cohort study

American Diabetes Association Professional Practice Committee for Diabetes*; 11. Chronic Kidney Disease and Risk Management: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S246–S260. https://doi.org/10.2337/dc26-S011

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Protein & Kidney Disease

- For persons with diabetes on dialysis
  - Malnutrition is common
  - 1-1.2 gm/kg/day should be considered to reduce risk
  - Rec Na+, K+, Phos individualized based on comorbid conditions, medications, BP, labs



Hemodialysis Peritoneal dialysis

American Diabetes Association Professional Practice Committee for Diabetes*; 11. Chronic Kidney Disease and Risk Management: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S246–S260. https://doi.org/10.2337/dc26-S011

Protein Sources

Meat: beef, pork, lamb, veal, etc.	Plant-based meats	Poultry	Fish and seafood
Eggs	Dairy products: milk, yogurt, cheese, cottage cheese	Tofu, tempeh, edamame	Soy milk
Nuts, seeds, nut butters	Beans, lentils, peas, hummus	Grains: quinoa, wheat berry, millet, buckwheat, oatmeal	

Protein & Hypoglycemia

- Treatment of hypoglycemia: avoid **high fat, protein** foods/beverages
  - Food examples: to avoid are whole milk, nuts, peanut butter
- In individuals with T2DM, do not use protein foods to treat/prevent hypoglycemia
  - Protein intake may stimulate the release of insulin



American Diabetes Association Professional Practice Committee for Diabetes*; 6. Glycemic Goals, Hypoglycemia, and Hyperglycemic Crises: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S132–S149. https://doi.org/10.2337/dc26-S006

Protein: Timing Considerations

Individuals with T2DM

consuming non-starchy veggie & protein 5-15 minutes before carb foods was shown to

⬇️ postprandial glucose & insulin excursions



Shukla AP, Andono J, Touhamy SH, Casper A, Iliescu RG, Mauer E, Shan Zhu Y, Ludwig DS, Aronne LJ. Carbohydrate-last meal pattern lowers postprandial glucose and insulin excursions in type 2 diabetes. BMJ Open Diabetes Res Care. 2017 Sep 14;5(1):e000440.



Knowledge Check: Poll Question #4

In counseling an individual with prediabetes on improving fat quality in their diet, which of the following is the most appropriate recommendation?

A. Replace olive oil with butter for cooking to increase flavor & satisfaction.
B. Eliminate all fats from the diet to reduce calorie intake.
C. Replace saturated fats with monounsaturated fats reduce CV risk
D. Choose coconut oil as the primary fat source because it is a natural, plant-based fat.

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Fats: ADA Standard of Care

No optimal amount of fat for people with or at risk of diabetes

Goals should be individualized for eating pattern, preferences & metabolic goals

- Type of fat consumed is more important than total fat
  - **Limit percent of calories from saturated fat**



American Diabetes Association Professional Practice Committee for Diabetes*; 5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S89–S131

Fats: ADA Standard of Care

- Mediterranean "like" Patterns
  - RCT shows improved A1c & Lipids
- Follow guidelines for general population:
  - NAM: 20-35% of Kcals from Total Fat
  - Cholesterol- "as low as possible"
    - without nutrient compromise
  - Saturated fat - < 10% of total kcals
  - Trans fat: Avoid trans fat



How! Cook with vegetable oils (canola, avocado, olive) - instead of butter, coconut oil, lard, shortening.

American Diabetes Association Professional Practice Committee for Diabetes*; 5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S89–S131

Fats: Functions & Types

Function:

- Provides energy, insulation, absorption of fat-soluble vitamins (A, D, E, and K), nerves/brain fxn, healthy skin, body cell structure, cushion vital organs.

Monounsaturated Fat	Polyunsaturated Fat	Saturated Fat
Foods: Avocado, Olives, Nuts **Oils:** Avocado, olive, peanut, canola	**Foods**: Walnuts, sesame, flax, sunflower seeds, fish (salmon, albacore tuna) **Oils:** corn, soybean, safflower, sesame	**Animal**: red meat (beef, lamb, pork), chicken skin, whole fat dairy: milk, cream, cheese, butter, ice cream **Plant:** palm, coconut, palm kernel oil
↓ TC & LDL ↑ HDL	↓ TC & LDL ↓ TG (n-3)	Solid at room temp







Saturated Fat: ADA Standard of Care

Limit foods high in saturated fat to reduce CVD risk

- Quality more important than quantity
- Replace saturated with unsaturated; not refined carb

Why: ⬇️ total cholesterol, LDL & CVD risk
Refined carbs may increase triglycerides & reduce HDL
Higher saturated fat → increased liver fat deposition

- American Diabetes Association Professional Practice Committee for Diabetes*; 5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S89–S131
- Alison B. Evert, Michelle Dennison, Christopher D. Gardner, W. Timothy Garvey, Ka Hei Karen Lau, Janice MacLeod, Joanna Mitri, Raquel F. Pereira, Kelly Rawlings, Shamera Robinson, Laura Saslow, Sacha Uelmen, Patricia B. Urbanski, William S. Yancy; Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report. *Diabetes Care* 1 May 2019; 42 (5): 731–754



Polyunsaturated Fats

- Consumption associated with lower risk of T2DM.
- Increasing foods with the long-chain omega-3 fatty acids (EPA and DHA) is recommended for prevention of CVD

Have two servings of fatty fish per week

- Wild salmon, mackerel, herring, anchovies, tuna

NOT commercially fried fish filets

Plant sources for vegetarian/vegan eating patterns (ALA)

- Ground flaxseed/flax meal, chia seeds, walnuts, soybeans, mung beans, green leafy vegetables, whole grains, beans



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Polyunsaturated Fats

- Evidence **<u>does not</u>** conclusively support omega-3 (EPA and DHA) supplements for all people with DM for the prevention/treatment of CV events.
- May benefit individuals needing TG reduction.



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Knowledge Check: Poll Question #5

Olive oil and canola oil are good sources of:

A. Monounsaturated fats
B. Polyunsaturated fats
C. Saturated fats
D. Trans fats



Sodium

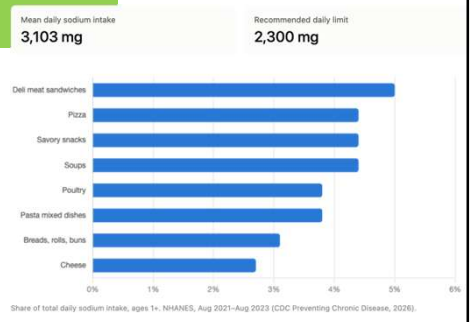
- Limit sodium intake to less than 2300 mg/day
- Consider palatability, availability, affordability, & difficulty of achieving low-sodium recommendations in a nutritionally adequate diet.



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Sodium



How!

- Focus on whole, fresh foods.
- Reduce consumption of processed/ultra processed foods.
- Avoid adding salt
- Use herbs and spices

Koyama AK, Woodruff RC, Jackson SL, Gunn JP, Self JL. Top Food Contributors of Sodium Intake in US Children and Adults Aged 1 Year or Older, National Health and Nutrition Examination Survey, August 2021–August 2023. Prev Chronic Dis 2026;23:260054.

Micronutrients & Supplements

Nutrition therapy should educate on how to acquire adequate amounts of vitamins & minerals from food



Unless specific deficiency noted, scientific evidence does not support use of vit/min supplements for all people with diabetes or prediabetes.

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Micronutrients & Supplements: At Risk Groups

Select groups with may need a multivitamin supplement

- Elderly
- Women planning pregnancy, currently pregnant, lactating
- Strict vegetarians/vegans
- People with celiac disease
- Increased risk of malabsorption
- People on calorie or carb-restricted diets



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Calcium & Vitamin D

- Fracture risk is 34% higher in people with diabetes
- Advise those with **diabetes on dietary or supplemental intake of intake of Calcium and Vitamin D**
  - Calcium – meet age specific recommendations for intake (1000-1300 mg)
  - Vitamin D – RDA (600-800 IU)
    - Aim for serum levels ≥20 or >30 ng/mL

American Diabetes Association Professional Practice Committee for Diabetes*; 4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S61–S88. https://doi.org/10.2337/dc26-S004

Vitamin B12

- Long-term metformin use may be associated with vitamin B12 deficiency
  - Check B-12 if taking metformin > 5 years.
  - Consider periodic testing if taking Metformin chronically, especially for those with anemia or peripheral neuropathy
- T1DM: measure in individuals with peripheral neuropathy or unexplained anemia



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Supplements: ADA Standards of Care

- Ask about supplement use, counsel as needed.
- Routine antioxidant supplements (Vit E, C, *B*-carotene) not recommended.
  - *B*-carotene may increase harm.
- Limited evidence for BG benefit unless deficiency is present.

NIH National Center for Complementary and Integrative Health

Diabetes and Dietary Supplements: What You Need To Know

https://www.nccih.nih.gov/health/diabetes-and-dietary-supplements-what-you-need-to-know



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Alcohol: ADA Standards of Care

- No benefit for those who do not drink
  - Risks: hypoglycemia, delayed hypoglycemia, hyperglycemia, wt gain
- To reduce risk of harm: consume in moderation & with food
  - Women: < 1 drink per day
  - Men: < 2 drinks a day
- 1 gram of alcohol = 7 calories
  - Consider when discussing wt. management

1 drink equals: *12 oz beer, 5 oz glass of wine, or 1.5 oz distilled spirits (vodka, gin, whiskey, etc)*



Alcohol & Glycemia

Risk of hypoglycemia:

- Higher risk with Insulin or secretagogues
  - Evening alcohol → increased risk of overnight/fasting hypoglycemia.
- Pair alcohol with food to reduce risk.
- Monitor glucose frequently



Educate on recognition and management of delayed hypoglycemia is essential!

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Alcohol & Glycemia

Risk of hyperglycemia:

- Consistently having 3+ drinks/day can contribute to hyperglycemia
- Carb containing alcohol (e.g. mixed drink, beer, wine) may **acutely** raise BG







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Knowledge Check: Poll Question #6

Chris has had T1D for 30 years. They use MDI and wear a CGM. Out celebrating they have 4 rum and cokes and appetizers and take insulin for carbs consumed. Now at home before bed, Dexcom shows glucose at 162 mg/dl. Drinking alcohol puts Chris at risk for:

A. Hyperglycemia through the night due to gluconeogenesis
B. Hyperglycemia through the next day
C. DKA due to ketone production associated with excessive alcohol consumption
D. Hypoglycemia due to inhibition of gluconeogenesis in the liver

Special Populations: Nutrition Considerations, Lifting People Up through Person-Centered Care

Youth with Diabetes

Key concepts for youth with all types of diabetes

- Meet energy requirements for growth and activity
- Use *food plan* or *meal plan* not *diet*
  - *Emphasize key nutrition principles*
- Engage youth in planning, shopping, preparing meals for entire family



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Youth with T1D: ADA Standards of Care

- Refer to RD, individualized MNT essential in treatment plan.
- Monitor carb intake and insulin dosing
  - Carb counting/Experienced-based estimation
  - Integrate insulin regimen into lifestyle
- Educate on potential need to adjust for high-fat/protein
  - Meal composition affects post-prandial glucose



American Diabetes Association Professional Practice Committee for Diabetes*; 14. Children and Adolescents: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S297–S320. https://doi.org/10.2337/dc26-S014

Youth with T2D

- Provide family-based culturally & developmentally appropriate programs
- Integrate lifestyle changes with diabetes care
- Goal: > 7-10% wt reduction in youth with overwt/obesity
  - Consider behavior strategies focus.
- Use chronic care approach, ongoing support
- Integrate of early pharmacological interventions
- Include 60 min moderate-vigorous exercise daily

American Diabetes Association Professional Practice Committee for Diabetes*; 14. Children and Adolescents: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S297–S320. https://doi.org/10.2337/dc26-S014

Youth with T2D & Dyslipidemia

Use MNT to support:

- Limit calories from fat: 25-30%
- Limit calories from saturated fat: <7%
- Limit cholesterol: <200 mg/day
- Avoid trans fat
- Aim for ~10% of calories from monounsaturated fat
- For elevated triglycerides
  - ↓ carb intake, ↓ simple sugar, ↑ dietary omega-3s



American Diabetes Association Professional Practice Committee for Diabetes*; 14. Children and Adolescents: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S297–S320. https://doi.org/10.2337/dc26-S014

Diabetes in Pregnancy

- With pre-existing diabetes refer to RDN **before & during** pregnancy
- Prenatal vitamins:
  - Key Nutrients: iron, calcium, vitamin D, choline, omega-3, B vitamins, vitamin C
  - Pre-Conception Pre-natal: 400-800 ug of Folic Acid & 150 mg potassium iodide



Pregnancy: Diabetes in Pregnancy or GDM

Food Plan Focus:

- Refer to RDN for meal plan & wt gain goals
- Modify for glycemic goals & minimize blood glucose excursions
- Focus on carbohydrate quality
- Common gaps: high fat, low fiber, low quality carbs
- Ensure nutrient-dense, safe nutrition
- Meet nutrition needs



American Diabetes Association Professional Practice Committee for Diabetes*; 15. Management of Diabetes in Pregnancy: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S321–S338. https://doi.org/10.2337/dc26-S015

Pre-pregnancy BMI and Weight Gain

Weight-for-Height Category	Recommended Total Weight Gain (Singleton Gestation)
With Underweight (BMI ≤18.5)	28-40 lbs
Healthy Weight (BMI 18.6 – 24.9)	25-35 lbs
With Overweight (BMI 25.0 – 29.9)	15-25 lbs
With Obesity (BMI ≥ 30)	11-20 lbs

- American College of Obstetricians and Gynecologists. Weight gain during pregnancy. *Obstet Gynecol.* 2013;121(1):210-212.
- Moore Simas TA, Waring ME, Sullivan GM, Liao X, Rosal MC, Hardy JR, Berry RE Jr. Institute of Medicine 2009 gestational weight gain guideline knowledge: survey of obstetrics/gynecology and family medicine residents of the United States. *Birth.* 2013;40(4):237-246.

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DRIs & Pregnancy

- **Dietary Reference Intake** - a minimum of:
  - 175 grams/day of carbohydrates
  - 71 grams/day of protein
  - 28 grams/day of fiber
- **Amount/Type of Carb** impacts glucose values
  - emphasize nutrient-dense to promote –
    fasting + post-meal glucose goals, ↓ FFA, ↑ insulin action, vascular benefits
- **Consider ketone testing**, esp in individuals with lower carb consumption
  - Higher fat diets may –
    ↑ lipolysis, ↑ FFA, promote insulin resistance, fetal overgrowth
- Emphasize **key nutrition principles**



American Diabetes Association Professional Practice Committee for Diabetes*; 15. Management of Diabetes in Pregnancy: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S321–S338. https://doi.org/10.2337/dc26-S015

Diabetes in Older Adults

Tailor to frailty status, not just age:

- **Frail older adults** → focus on optimal nutrition + structured exercise (aerobic/resistance/flexibility/balance) to reduce sedentary time, prevent mobility disability, and improve function - *not* weight loss
- **Non-frail older adults with overweight/obesity** → consider intensive lifestyle intervention (diet + activity + modest 5–7% weight loss) for benefits in quality of life, mobility, and cardiometabolic risk

Recommend healthful eating patterns, adequate protein to counter sarcopenia/dynapenia risk

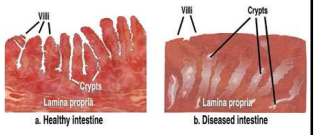
Screen for Malnutrition

American Diabetes Association Professional Practice Committee; 13. Older Adults: Standards of Care in Diabetes—2025. *Diabetes Care* 1 January 2025; 48 (Supplement_1): S266–S282. https://doi.org/10.2337/dc25-S013

Celiac Disease

- Immune-mediated disorder where destruction of the small intestine villi occurs following exposure to gluten
- Occurs more often in people with T1D
  - 1%-16% of individuals compared to 0.3%-1% in general population

Signs/Symptoms:
Diarrhea, malabsorption/ fatty stools, abd bloating or pain, wt loss, muscle tenderness, failure to thrive, signs of deficiencies



Celiac Disease

When to Screen for Celiac Disease	
Pediatrics with T1D	**Adults with T1D**
• Measure soon after diagnosis • Repeat within 2 years of diagnosis • Again 5 years after diagnosis, or sooner if symptoms present • Consider increased screening if relative with celiac relative	With suggestive • GI symptoms (diarrhea, malabsorption, abdominal pain) • Signs (Osteoporosis, vitamin deficiency, iron deficiency anemia)

Celiac Disease- Diagnosis

Diagnosis via blood tests and a small intestine biopsy

- Screen for celiac by testing IgA:
  - If normal serum IgA, measure IgA-tTG antibodies
  - If IgA deficient, measure IgG tTg and IgG DGA
- Small bowel biopsy confirms diagnosis if antibody positive
- Child Gastroenterology guidelines: biopsy may not be needed if symptomatic + high titers.

IgA: immunoglobulin A
IgG: immunoglobulin G
tTG: tissue transglutaminase
DGA: deaminated gliadin antibodies

American Diabetes Association Professional Practice Committee for Diabetes*; 14. Children and Adolescents: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S297–S320. https://doi.org/10.2337/dc26-S014

Celiac Disease- Treatment

- Treatment: **lifetime gluten-free diet**
  - Eliminate all **wheat** (including durum, semolina, spelt, and farro) and the related grains of **rye, barley, and triticale**.
- Refer to a RDN for nutrition assessment & education
  - food selection, label reading, understanding cross contamination, other suspects

GLUTEN FREE

Products may be labeled gluten-free if they contain less than 20 parts per million (ppm) of gluten

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Nutrition Interventions: Celiac Disease

Gluten Free Whole Grains & Starches include:

- **Quinoa**
- **Potatoes**
- **Beans & Peas**
- **Cassava**
- **Corn**
- **Oats***
- **Flax**
- **Amaranth**
- **Millet**
- **Rice**
- **Wild rice**
- **Buckwheat**
- **Job's Tears (Hato Mugi)**
- **Montina (Indian rice grass)**
- **Sorghum**
- **Teff**

**Oats are inherently gluten-free but may be contaminated with wheat during growing or processing.*

Disordered Eating Behaviors

- Estimated prevalence varies in people with diabetes
- Most reported disordered eating behaviors:

T1DM
- Insulin omission causing loss of glucose/calories via the urine
- Higher rates of body concerns, diabetes distress, fear of hypoglycemia

T2DM
- Binge episodes with an accompanying sense of loss of control most reported. If on insulin, omission also reported.

American Diabetes Association Professional Practice Committee for Diabetes*; 5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S89–S131

Disordered Eating Patterns

- **Screen** for disordered/disrupted eating using validated tools
- **Re-evaluate treatment plan** - with disordered eating behaviors, an eating disorder, or disrupted patterns
- **Consult** with qualified professional -
  - Multidisciplinary team approach to treatment is the standard of care

Example Screening Tools:
T1D: Diabetes Eating Problem Survey-revised (DEPS-R), mSCOFF- 5
T2 D: Questionnaire on Eating and Weight Patterns, the binge eating scale, Night eating Questionaries



American Diabetes Association Professional Practice Committee for Diabetes*; 5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S89–S131

Disordered Eating Patterns

Anorexia nervosa restricted energy intake relative to need Marked by low body weight, fear of weight gain, and disturbance in the way in which one's body weight or shape is experienced	**Bulimia nervosa** recurring binge eating and compensatory behavior Binging characterized by a sense of a lack in control. Compensatory behaviors vary
Binge Eating Disorder overeating in a short period 30-40% of those seeking weight loss treatment.	**Diabulimia** unofficial diagnostic term, DSM-V Falls under purging behavior: reduction/omission of insulin doses This causes hyperglycemia and loss of glucose calories through the urine.

Monitor Nutrition Intake

At Risks Groups:

- Individuals on GLP-1 or GIP RA or s/p metabolic surgery
- Individuals with multiple chronic conditions
- Older age groups
- Food insecurity and poverty

Screen:

- Monitor individuals pursing intentional wt loss-
  - adequate intake- protein, fluid, and micronutrients.

Goals:

- Ensure adequacy of nutrient intake
- Prevent deficiencies
- Individualize dose titration in GLP-1 or GIP RA



Incretin Therapy: Nutrition Strategies

Adverse Effect	Nutrition Intervention
Malnutrition & Sarcopenia	Sufficient protein (min. 60 gm, up to 1.2-1.5 gm/kg) Nutrient-dense foods eating pattern to support needs Encourage resistance training
Nausea	Small frequent meals Limit high fat foods Stay hydrated, limit carbonation
Constipation	Fiber, Fluids, & Movement Consider stool softener as needed.
Diarrhea	Fiber & Fluids Limit sugar alcohols, coffee, dairy, alcohol and carbonation

- Gigliotti, Linda et al. Incretin-Based Therapies and Lifestyle Interventions: The Evolving Role of Registered Dietitian Nutritionists in Obesity Care. Journal of the Academy of Nutrition and Dietetics
- Pamela Kushner, Carlos Campos, Aaron King, Davida F. Kruger, Javier Morales; Clinician Guidance on the Benefits of Healthy Nutrition and Increased Physical Activity for People With Type 2 Diabetes Following Glucagon-Like Peptide 1 Receptor Agonist Initiation. *Clin Diabetes* 15 December 2025; 43 (5): 681–695. https://doi.org/10.2337/cd25-0037

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Knowledge Check: Poll Question #7

Sara has just been diagnosed with gestational diabetes. Her current weight is 176 lbs. and her pre-pregnancy BMI was 28. What is the total recommended weight gain for Sara's pregnancy?

A. 15 pounds
B. 15-25 pounds
C. 25-35 pounds
D. 28-40 pounds

Knowledge Check: Poll Question #8

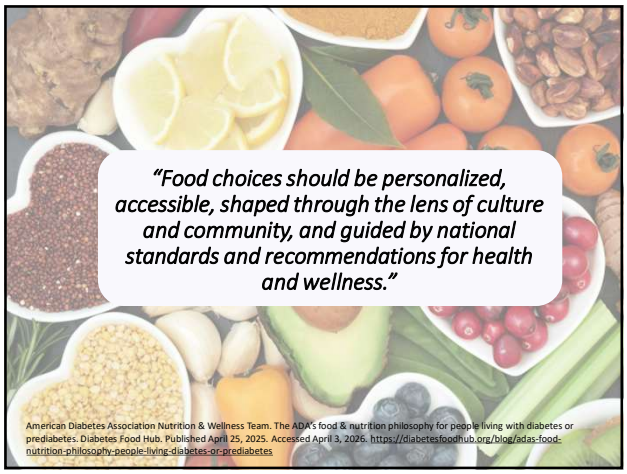
What are the nutrient goals for pregnant women?

A. 130 grams of carbohydrate/day, 71 grams of protein/day, 14 grams of fiber/day
B. 130 grams of carbohydrate/day, 90 grams of protein/day, 28 grams of fiber/day
C. 175 grams of carbohydrate/day, 90 grams of protein/day, 14 grams of fiber/day
D. 175 grams of carbohydrate/day, 71 grams of protein/day, 28 grams of fiber/day

DiaBingo - N

N DPP demonstrated that exercise and diet reduced risk of DM by__%
N Average A1c of 7% = Avg BG of ____
N The goal is to eat 14 gms per 1000 cals of this nutrient a day
N 1 serving of alcohol has ____ kcals
N Individuals taking Metformin can be a risk for _____ deficiency
N Get LDL less than ____for most people with diabetes 40 years+
N This diet pattern is associated with reduced CVD risk.
N 2/3 cups of rice equals _____ serving carbohydrate
N Couscous is safe to consume on a gluten-free diet. Yes/No
N 1 gm of fat equal _____kilo/calories
N This can impact the glycemic effect of food
N Average American consumes 15 teaspoons of sugar a day.
N SGLT2s and very low carbohydrate diets increase the risk of?

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American Diabetes Association Nutrition & Wellness Team. The ADA's food & nutrition philosophy for people living with diabetes or prediabetes. Diabetes Food Hub. Published April 25, 2025. Accessed April 3, 2026. https://diabetesfoodhub.org/blog/adas-food-nutrition-philosophy-people-living-diabetes-or-prediabetes



"Eating Pattern is the **totality of all foods** and beverages consumed over a period". It classifies nutrition patterns.

American Diabetes Association Professional Practice Committee for Diabetes*; 5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S89–S131

Mediterranean Eating Pattern

Description & Notes	• Encourages plant-based foods, fish and shellfish, some dairy. Olive oil is primary fat source. • Limitations: • Moderate number of eggs, minimal red meat, wine in low to moderate amount, rare use of concentrated sugars or honey.
Current Literature	• ↓ risk of CVD • ↓ 30% relative risk of diabetes , ↓ A1c, ↓ TG • Energy restricted version of these meal plans can improve weight and glycemia

Alison B. Evert, Michelle Dennison, Christopher D. Gardner, W. Timothy Garvey, Ka Hei Karen Lau, Janice MacLeod, Joanna Mitri, Raquel F. Pereira, Kelly Rawlings, Shamera Robinson, Laura Saslow, Sacha Uelmen, Patricia B. Urbanski, William S. Yancy; Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report. *Diabetes Care* 1 May 2019; 42 (5): 731–754

DASH Eating Pattern

Description & Notes	*Dietary Approaches to Stop Hypertension* Encouraged foods: • Fruits & Veg (8-10 servings/day), whole grains (6-8 servings/day), low-fat dairy (2-3 servings/day), poultry & fish (6 servings/week), nuts & seeds (4-5 servings/week) • Limitations: • Red meat, sweets, sugar-containing, processed food, excessive alcohol consumption
Current Literature	• ↓ risk of diabetes by 20% • ↓ cardiometabolic risk factors • ↓ BP in general population & people with diabetes

Plant-Based Eating Pattern

Description & Notes	• **Vegan**: eats only plant-based foods • **Vegetarian:** vegan + dairy and/or eggs • **Plant-based:** undefined • All associated with lower intake of saturated fat and cholesterol
Current Literature	• Energy restricted version of these meal plans improved CVD risk factors, ↓ weight, and ↓ A1c • Low-fat Vegan Diet-↓ A1c, ↓Wt, ↓ LDL

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Low Carbohydrate Eating Pattern

Description & Notes	• No consistent definition • Very Low Carb: < 50 grams or 26% of kcals • Low Carb: often 26-45% of kcals • Emphasizes veggies/fruits low in carb, protein & fat from animal foods, oils. • Limits/avoids starchy and sugary foods.
Current Literature	• ↓ A1c, ↓weight, ↓ BP, ↓ TG & ↑ HDL-C • 2022 RCT-no difference 45-65% and LCD patterns in people with/without diabetes.

- American Diabetes Association Professional Practice Committee for Diabetes*; 8. Obesity and Weight Management for the Prevention and Treatment of Diabetes: Standards of Care in Diabetes–2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S166–S182.
--Alison B. Evert, Michelle Dennison, Christopher D. Gardner, W. Timothy Garvey, Ka Hei Karen Lau, Janice MacLeod, Joanna Mitri, Raquel F. Pereira, Kelly Rawlings, Shamera Robinson, Laura Saslow, Sacha Uelmen, Patricia B. Urbanski, William S. Yancy; Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report. *Diabetes Care* 1 May 2019; 42 (5): 731–754

Nutrition for Lipid Management

- Weight and Glycemic Management - if indicated
- Follow Mediterranean-style or DASH eating pattern
- Reduce saturated and trans fat
- Increase
  - Omega-3 fatty acids
  - Viscous fiber
  - Plant stanols/sterols
- Add/increase physical activity

Helps improve lipid profile & reduce ASCVD risk



American Diabetes Association Professional Practice Committee for Diabetes*; 10. Cardiovascular Disease and Risk Management: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S216–S245. https://doi.org/10.2337/dc26-S010

Nutrition for Hypertension

Managing HTN reduces ASCVD events, HF & microvascular complications

Elevated BP: 120-129/<80
Hypertension: > 130/80

Key Recommendations:

- For individuals with BP >120/80 mmHg, focus on:
  - Weight loss
  - Aim for > 150 minutes aerobic activity/week
  - Try DASH-style approach
    - ↓ sodium (~2300 mg/day), ↑ potassium
    - ↑ fruit /vegetables (8-10 servings/day)
    - ↑ low-fat dairy (2-3 servings per day)
  - Limit/avoid excessive alcohol consumption



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Nutrition for MASLD & MASH

Metabolic dysfunction-associated steatotic liver disease (MASLD)

Steatoic liver disease + ≥1 cardiometabolic risk factor

- Affects >70% of people with T2DM, type 1 diabetes is ~20%

Metabolic-dysfunction-associated steatohepatitis (MASH)

> 5% hepatic steatosis + inflammation & liver cell injury without fibrosis

- Affects >50% of people with T2DM

If indicated:

Wt Loss	Outcome
> % 5	↓ steatosis
> 10%	Improved histology
greater	↓ fibrosis

Nutrition-Related Management

- Structured nutrition & activity plan to promote wt loss
- ↓ ultra-processed foods, sat. fat, added sugar/fructose
- ↑ high-fiber foods, unsaturated fats
- Mediterranean diet = strongest evidence

Kenneth Cusi, Manal F. Abdelmalek, Caroline M. Apovian, et al. Metabolic Dysfunction–Associated Steatotic Liver Disease (MASLD) in People With Diabetes: The Need for Screening and Early Intervention. A Consensus Report of the American Diabetes Association. *Diabetes Care* 20 June 2025; 48 (7): 1057–1082. https://doi.org/10.2337/dci24-

Gastroparesis

Gastroparesis: a form of autonomic neuropathy that delays emptying of the stomach

- **Symptoms**: nausea, vomiting, fullness with little food, bloating, & low appetite
- Unpredictable movement of food thru GI can cause erratic BGs
- Timing of insulin delivery is important;
  - hypo can result if insulin is given & gastric emptying is delayed
  - Delayed hyperglycemia as food absorbs



Alison B. Evert, Michelle Dennison, Christopher D. Gardner, W. Timothy Garvey, Ka Hei Karen Lau, Janice MacLeod, Joanna Mitri, Raquel F. Pereira, Kelly Rawlings, Shamera Robinson, Laura Saslow, Sacha Uelmen, Patricia B. Urbanski, William S. Yancy; Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report. *Diabetes Care* 1 May 2019; 42 (5): 731–754

Nutrition for Gastroparesis

- Eat smaller, more frequent meals
  - Meal timing matters: symptoms often worse later in the day
- Focus on small food particle size
  - Chew well, liquids (mash and grind foods)
  - Choose softer/liquid foods
- Adjust Nutrients
  - ↓ fiber
  - Modify Fat: calorie-dense is helpful for intake, liquid fats may be tolerated better
- Prevent Deficiencies:
  - Monitor nutrition and hydration
  - Oral Nutrition Supplements/Tube feeding, if needed



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Knowledge Check: Poll Question #9

Blake has type 1 diabetes and was recently diagnosed with gastroparesis. Blake is runner and has not been able to exercise recently due to nausea, vomiting, bloating, and intestinal pain and the occurrence of lows, about 3 times a week. What hypoglycemia treatment would you recommend?

A. Apple Juice
B. Fruit
C. Glucose tablets or gels
D. Peanut butter crackers



Dietary Approaches

Eating Approach:

A way to provide practical tools for for developing an eating pattern/plan

- Frequency of Meal Timing
- Diabetes Plate Method
- Carbohydrate Choice
- Carbohydrate Counting
- Individualized behavioral approaches



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Intermittent Fasting & Time Restricted Eating

Description & Notes	**TYPES:** • Alternate-day fasting- 500–600 calories on alternating days • 6:1 or 5:2 diet- 500–600 calories on 1-2 days with usual intake the other 5-6 days • Time-restricted eating - Daily calorie restriction based on 8-16 hour window of time
Current Literature	• No difference in wt loss vs. calorie restriction • Time restricted eating: easy to follow, no need to count calories, sustainability • Monitor safety: medications (glucose, BP), hydration, etc.

Meal Approaches

Partial/Total Meal Replacements	• Bars, shakes, soups with set macros/micros • Shown to improve nutrient quality & glycemic management by reduced portions & energy intake • Effective short-term strategy for weight loss, A1c & fasting glucose reduction
Chrononutrition	• New subspeciality - aims to understand how timing of nutrition impacts metabolic health • Early studies - ? CVD benefit of eating earlier vs. increased DM risk in shift workers

American Diabetes Association Professional Practice Committee for Diabetes*; 5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S89–S131

Dietary Approaches: Carbohydrate Mgmt

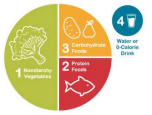
Therapy	Dietary Approach
Nutrition therapy only or on meds excluding insulin or insulin secretagogues	Consider reducing overall carb intake, **portion sizes, simplified meal plan, plate method, or carb counting**
Fixed insulin doses or insulin secretagogues	Educate on **carbohydrate consistency** with respect to **time, amount & insulin action**. Consider tools like **carbohydrate counting or choices, plate method, simplified meal plan, or food lists**
Flexible insulin therapy	Educate on carbohydrate counting & using an insulin-to-carb ratio

Franz, M. J., MacLeod, J., Evert, A., Brown, C., Gradwell, E., Handu, D., Reppert, A., & Robinson, M. (2017). Academy of Nutrition and Dietetics Nutrition practice guideline for type 1 and type 2 diabetes in adults: Systematic review of evidence for medical nutrition therapy effectiveness and recommendations for integration into the Nutrition Care Process. *Journal of the Academy of Nutrition and Dietetics*, *117*(10), 1659–1679. https://doi.org/10.1016/j.jand.2017.03.022

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Plate Method

- Simplified Visual Approach
  - Emphasizes portion control and healthy food choices
  - Using a 9” plate and filling ½ plate non-starchy vegetables, ¼ protein and ¼ starch
  - Consider using with:
    - Basic meal planning in T1DM and T2DM
    - Individuals with T2DM not on insulin
    - Those with limited health literacy or numeracy
    - Older adults prone to hypoglycemia







Basic Carbohydrate Counting

Focus on awareness of foods that **contain carbohydrate** and impact glucose levels.

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Carbohydrate Counting: Fixed-Carb Meal Plans OR Sm, Med, L

1. Learn about typical meal patterns/goals
   - types of foods & schedule
2. Learn about medications
   - Types, doses & schedule
3. Consider carb needs, current intake & glucose patterns
   - Divide total CHO by meal & snacks.
   - Modify based on eating patterns.
4. Consider servings/grams per meal.

Now:
Plan is developed based on individual goals & glucose CGM can provide personalized feedback.

Historical Example ONLY: 2000 kcals

PWD eat ~ 45% kcals from carbs

	Grams	Servings
Each Meal	45-60 gm	3 - 4
Snacks	15-30 gm	1 - 2

Calories	20%	30%	40%	50%
1500	75 g	113 g	150 g	188 g
2000	100 g	150 g	200 g	250 g

Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report. *Diabetes Care* 1 May 2019; 42 (5): 731–754

Exchanges- AKA- Food Lists

- The exchange system groups like foods that have similar nutritional value (specifically macronutrient and caloric value) into exchanges that can be swapped for another
  - Example: the "starch" predetermined servings are ~80 kcals, ~15g of carb, and ~3g protein
- An individual may count the number of food exchanges in each category at each meal/thru the day



Exchanges – AKA – Food Lists

Advantages

- Allows for flexibility and personalization
- Can encourage consistency in the timing and amounts at meals and snacks

Disadvantages

- Requires Literacy/Numeracy
- Requires learning how to fit unlisted foods into the plan (especially today with so many food choices)
- Less attention given to micronutrient content

Count Your Carbs - Food Groups

- Categories within the exchange food list
  - Starch
  - Fruit
  - Dairy / Milk
  - Sweets/ Dessert
  - Non-Starchy Vegetable
  - Meat / Protein
  - Fats
  - "Free"
  - Combination Foods

•American Diabetes Association. *Complete Guide to Carb Counting.* 5th ed. American Diabetes Association; 2025.
•American Diabetes Association. *The Official Pocket Guide to Diabetes Food Choices.* 6th ed. American Diabetes Association; 2025.

Food List: 1 Carb Choice

Exchange	Carb	Prot	Fat	Cals	Examples
Starch	15	3	0-1	80	⅓ rice, pasta, ½ cup beans, peas, ½ cup cooked cereal, corn, potato, 1 oz. bread (1 slice) or ¼ bagel, ½ English muffin
Fruit	15	0	0	60	1 small apple , ½ large banana, 1¼ cup whole strawberries, 1 cup raspberries, 1 cup blackberries, Juice: ½ (most) to ⅓ (grape, cran) cup
Dairy / Milk	12	8	0-8	100-160	1 cup milk, 6 oz. non-fat plain yogurt (any fat content)
Sweets/ Desserts	15	Varies	Varies	Varies	1 oz trail mix, ½ cup frozen yogurt, ½ cup regular ice cream (any flavor)

Food List: 1 Choice

Exchange	Carb	Prot	Fat	Cals	Examples
Veggies	5	2	0	25	1 cup raw vegetables, ½ cup cooked vegetables of vegetable juice
Meat / Protein	0	7	2-8	45-100	1 oz. fish, chicken, beef, pork or cheese, ½ cup tofu, 1 egg
Fat	0	0	5	45	1 tsp. oil, butter, or mayo, 6 almonds, 2 whole walnuts
Free	0-5	0	0	0-20	Sugar free gelatin, 1 tbsp catsup, 2 tsp sugar free jam, 2 tbsp sugar free syrup, coffee, tea, spices

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Carbohydrate Food Groups

General Rules for Serving Sizes

	Exchange	Category	Measure
	**Starch**	Quinoa/Rice/Pasta	⅓ cup
		Beans/Lentils/Peas/Potato/ Cooked Cereal	½ cup
		Bread Products	1 ounce
	**Fruit**	Fresh	1 small piece
		Dried	2 Tbsp
		Juice/Canned/Applesauce	½ cup
		Cubed Melon	1 cup

Carbohydrate Food Groups

General Rules for Serving Sizes

	Exchange	Category	Measure
	**Dairy / Milk**	Skim, 1%, 2%, Whole	1 cup
		Ice Cream	½ cup
		Yogurt, nonfat	$^3/_4$ cup (6 oz)
	**Sweets / Desserts**	Cookies	2 small (2¼")
		Sugar-free pudding	½ cup
		Cake, unfrosted	2" square

Low-Carbohydrate Food Groups

General Rules for Serving Sizes

	Exchange	Category	Measure
	**Vegetables**	Raw	1 cup
		Cooked	½ cup
		Salad or Leafy Greens	3 cups
	**Protein**	Meats/Chicken/Fish	1 ounce
		Cheese	1 ounce
		Egg	1 each

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Low-Carbohydrate Food Groups

General Rules for Serving Sizes

	Exchange	Category	Measure
	Fat	Avocado	2 Tbsp
		Butter/Margarine/Oil/Mayo	1 tsp
		Seeds	1 Tbsp
	Free	Coffee, tea	Unlimited
		SF Syrup	2 Tbsp
		SF Jam/Jelly	2 tsp

Carbohydrate Counting: Reading the Label

1. Look at the serving size
2. Look at "Total Carbohydrates"
   - Consider subtracting ½ of sugar alcohols.
   - Don't need to adjust fiber
3. Adjust the count depending on the number of servings that will be eaten
4. Total the carbs for all items in the snack/meal

NOTE: The 1 cup measure as the serving size is for convenience only!

All information provided by the Nutrition Facts label is based on the weight (the information in parentheses) of the food serving.

Nutrition Facts

8 servings per container

Serving size **2/3 cup (55g)**

Amount per serving

Calories **230**

	% Daily Value*
Total Fat 8g	**10%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 38g	**13%**
Dietary Fiber 4g	**14%**
Total Sugars 12g	
Includes 10g Added Sugars	**20%**
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Carbohydrate Counting

Things to consider:

- Portion consumed vs. listed?
- Does the PWD have measuring tools?
- Does the PWD feel comfortable doing the math?
- Is the PWD motivated/able to learn carb counting?

Nutrition Facts

8 servings per container

Serving size **2/3 cup (55g)**

Amount per serving

Calories **230**

	% Daily Value*
Total Fat 8g	**10%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 38g	**13%**
Dietary Fiber 4g	**14%**
Total Sugars 12g	
Includes 10g Added Sugars	**20%**
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

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Tips for Teaching Carb Counting

- Use **measuring cups/spoons**, available dollar store
- Review **basic portions & fractions** (videos can help)
- Encourage use of a **calculator** for math
- Practice with **food logs**
  - Review logs before advancing, like using an ICR
- Encourage **tools for support**:
  - phone apps, books, & carb counting guides/sheets



Top Diabetes Apps CHEAT Sheet

Top Recommended Diabetes Apps

Name of App	Compatibility	Cost	Category	Description
BD Bright: Diabetes Assistant	Apple/Android	Free	Management and Monitoring	• Nutrition advice, healthy recipes, and activities • Digital diabetes assistant available 24/7 • Voice recognition for logging insulin doses/blood glucose, asking question
CalorieKing	Apple	Free, with in-app purchases	Nutrition and fitness	• Curated food database of nutrition information • Includes many fast-food chains and restaurants
Fitwee	Apple	Free with in-app purchases	Nutrition and fitness	• Visualization tool for learning different portion sizes of food items with nutrition data • Paid upgrade tracks what you eat, allows custom food entry, records progress
Fooducate	Apple/Android	Free, with in-app purchases	Nutrition and fitness	• Nutrition tracking tool • Individualized nutrition grade for each food • Personalization for age, sex, weight loss goal • Community support
Glucagon	Apple/Android	Free	Management and Monitoring	• Step-by-step instructions (text and video) for using glucagon for injection: 1 mg (1 unit) • Tracker for glucagon kit locations and expiration dates • Reminder notifications
MyFitnessPal	Apple/Android	Free, with in-app purchases	Management and Monitoring	• Tracking tool for exercise, nutrition • Connects with fitness trackers and other health apps • Large food database with nutrition information • Individualized based on sex, age, weight loss goal
MySugr	Apple/Android	Free, with in-app purchases	Management and Monitoring	• Tracking tool for blood glucose, mood, carbohydrates, medications • Reports for HCPs • Paid upgrade adds reminders
One Drop	Apple/Android	Free	Management and Monitoring	• Tracking tool for blood glucose, mood, carbohydrates, medications • Integrated nutrition database • Reminders • Reports for HCPs
Relax Lite	Apple/Android	Free, with in-app purchases	Stress Management	• Guided breathing and meditation exercises
Tidepool	Apple/Android	Free	Management and Monitoring	• Compatibility with many devices (glucose meters, CGM devices, insulin pumps) • Tracking tool for insulin, CGM, nutrition, and blood glucose data with notes • Reports for HCPs

Tools for Carbohydrate Counting: Smart Scales

- Smart food scales can be purchased to do the math



Kitrics Nutritional Scale



Renpho Nutritional Scale



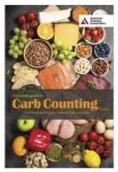
Perfect Portions Scale

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Tips for Carb Counting

Understanding and teaching carb counting:

- Practice carb counting your own meals!
- Keep foods/labels in your office for practice
- Encourage the PWD to bring in familiar foods into the office to practice with you
- Track for 1 week and create a "cheat sheet"/database with counts for regularly consumed foods
- Share portion guides to support experienced estimation
- Try divided plates, bowls with markings to help portion estimation

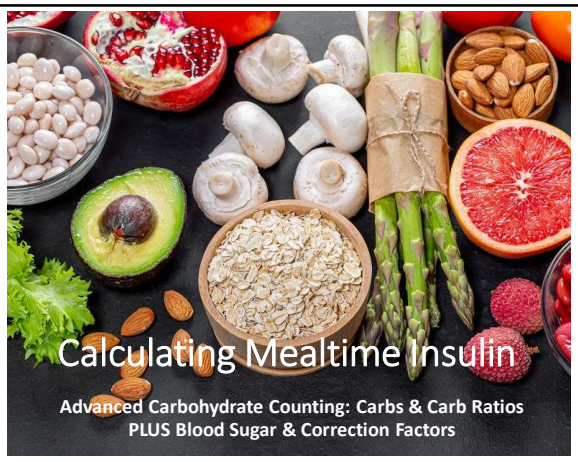




Dietary Approaches: Carbohydrate Mgmt

Therapy	Dietary Approach
Nutrition therapy only or on meds excluding insulin or insulin secretagogues	Consider reducing overall carb intake, portion sizes, simplified meal plan, plate method, or carb counting
Fixed insulin doses or insulin secretagogues	Educate on carbohydrate consistency with respect to time, amount & insulin action. Consider tools like carbohydrate counting or choices, plate method, simplified meal plan, or food lists
Flexible insulin therapy	Educate on **advanced carbohydrate counting & using an insulin-to-carb ratio.**

Franz, M. J., MacLeod, J., Evert, A., Brown, C., Gradwell, E., Handu, D., Reppert, A., & Robinson, M. (2017). Academy of Nutrition and Dietetics Nutrition practice guideline for type 1 and type 2 diabetes in adults: Systematic review of evidence for medical nutrition therapy effectiveness and recommendations for integration into the Nutrition Care Process. *Journal of the Academy of Nutrition and Dietetics*, *117*(10), 1659–1679. https://doi.org/10.1016/j.jand.2017.03.022



Advanced Carb Counting: Calculating Mealtime Insulin

- Carb counting and using an insulin-to-carb ratio (ICR)
  - Can be used with flexible insulin therapy, including MDI and CSII, where bolus insulin is used at mealtimes
  - Insulin dose is based on consumed carbohydrate.

Pros	Cons
• Flexibility for the PWD • Carb consumed/Amt of Insulin matched = improved BGs	• Can lose sight of overall nutritional quality • Requires math skills • Fine tuning needed



Calculating Mealtime Insulin

- To calculate mealtime insulin, you will need the following pieces of information:
  - Total grams of carbohydrate being eaten
  - Carbohydrate ratio (ICR)

  } Food Bolus

  - Current BG
  - Target BG
  - Insulin sensitivity factor (ISF)

  } Correction Bolus

Total Bolus = food bolus + correction bolus

Calculating Mealtime Insulin

- **Insulin to Carb Ratio (ICR):** how many grams of carb are "covered" by 1 unit of insulin.
  - For example, a 1-unit-per-10-grams-of-carb (1:10) ratio = 1 unit of insulin will "cover" 10 grams of carb
  - ICRs are personalized based on insulin sensitivity
- **Use this formula to calculate the amount of insulin needed for carbs:**

$$\frac{\text{Total carbs (g)}}{\text{ICR}} = \text{Food Bolus}$$

of units of insulin required to cover carbs

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Calculating Mealtime Insulin

Example: VW needs to take Novolog, using an insulin pen, for a meal that has 86 grams of carbohydrate. The insulin to carb ratio is 1:8.

How many units of insulin are needed to cover food?

86 grams of carb ÷ 8 = **10.75 units of insulin**

$$\frac{\text{Total carbs (g)}}{\text{ICR}} = \text{Food Bolus}$$

of units of insulin required to cover carbs

Calculating Mealtime Insulin

- **Insulin sensitivity factor (ISF) or Correction Factor (CF):** specifies how far a unit of bolus insulin will lower glucose
  - For example, a 1-unit-per-50 mg/dl (1:50) factor = 1 unit of insulin will lower the glucose by 50 mg/dl.
  - Based on personalized insulin sensitivity.
  - **Use the following formula to calculate amount of insulin to lower BG/SG* to goal:**

$$\frac{\text{(Current BG – Goal BG)}}{\text{ISF}} = \text{Correction Bolus}$$

of units of insulin required to bring glucose to goal

Calculating Mealtime Insulin

Example: VW checks their glucose and it is 280 mg/dl. Target glucose is 120 mg/dl. ISF is 1:40. How many units of insulin are needed to lower for "correction" to lower glucose to target?

$$\frac{(280\ \text{mg/dl} - 120\ \text{mg/dl})}{40} = 4.0\ \text{units of insulin}$$

$$\frac{\text{(Current BG – Goal BG)}}{\text{ISF}} = \text{Correction Bolus}$$

of units of insulin required to bring blood sugar to goal

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Calculating Mealtime Insulin

Food Bolus		Correction Bolus		Total Bolus
VW takes Novolog for a meal that has 86 grams of carbohydrate. The insulin to carb ratio is 1:8		VW glucose is 280 mg/dl before the meal. Target glucose is 120 mg/dl. ISF is 1:40.		Add the food bolus and correction bolus to get the total
10.75 units	+	4.0 units	=	**14.75 units**

Since VW is using an insulin pen… = **15 units**

*Ideally take 15 minutes before eating, with Regular Insulin 30 minutes before eating.

Calculating Mealtime Insulin

- On the exam, round your final answer when using an insulin pen or syringe
  - Round up to nearest whole unit if ≥ 0.5
  - Round down to nearest whole unit if ≤ 0.4
- On the exam, is ok to use decimal places if PWD uses CSII
- In real life, consider:
  - Insulin sensitivity
  - Starting blood sugar/glucose
  - What's happening: exercise, alcohol, stress, illness





Glucose Trends in T1 DM & Mixed Meals

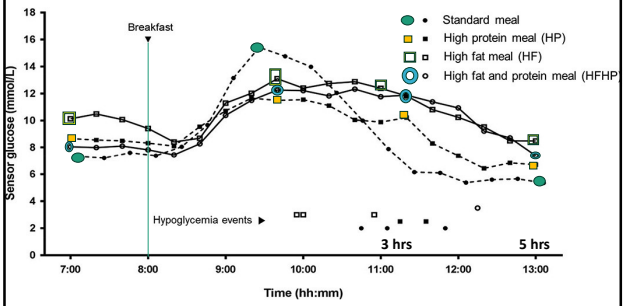


Figure 1. Postprandial glucose profile (median sensor glucose and hypoglycaemic events) in the 5 hours following a standardized meal with either carbohydrate-only (standard) or with added fat (HF), protein (HP) or both (HFHP)

Gingras V, et al. Diabetes Obes Metab. 2018 Nov;20(11):2695-2699.

Flexible Insulin Therapy: T1 DM & Mixed Meals

Insulin in Mixed Meals (Carb + Fat/Protein)

- Insulin needs not just based on carbs - **protein & fat matter**
- **High-fat/protein meals may require**:
  - ↑ total dose
  - Adjustment of timing (dual wave if on CSII)
- Monitor and individualize:
  - Affect of protein/fat differ widely in individuals.
  - Use CSII split-bolus, if available (Start 50/50% - modify)
  - Check glucose 3 hours after
- Research is ongoing: Optimal strategies vary.
  - **No formal ADA recommendation**



American Diabetes Association Professional Practice Committee for Diabetes*; 5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes: Standards of Care in Diabetes—2026. *Diabetes Care* 1 January 2026; 49 (Supplement_1): S89–S131

Knowledge Check: Poll Question #10

Sam is going to eat the following breakfast: A whole english muffin, 2 scrambled eggs with 1 oz cheese, ½ a large banana, and an 8 oz. glass of 1% milk. Using the exchange list, how many grams of carbohydrate are in the breakfast meal?

A. 42g
B. 57g
C. 60g
D. 72g



Knowledge Check: Answered

Food	Amount	Carbs (g)
English muffin	1 whole	15 x 2 = 30
Eggs, scrambled	2	0 x 2 = 0
Cheese	1 oz.	0 x 1 = 0
Banana, large	½	15 x 1 = 15
Milk, 1%	8 oz.	12 x 1 = 12
Total		**57g**

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Knowledge Check – Continued - Poll #11

Before the meal Sam's sensor glucose reads 298 mg/dl. The target is 150 mg/dl. How much Humalog insulin is need to take by syringe if the carb ratio is 1:12 and correction factor is 1:60?

A. 7 units

B. 7.2 units

C. 8 units

D. 9.7 units

E. 10 units

Reminder: Total Carbs consumed is 57 grams

Knowledge Check - Answered

1) Calculate the food dose
   1) Total Carbs: 57g
   2) ICR: 1:12

   57g ÷ 12 = 4.75 units

2) Calculate the correction dose
   1) Current sensor glucose: 298 mg/dl
   2) Target glucose: 150 mg/dl
   3) ISF: 1:60

   $\frac{(298 - 150)}{60}$ = 2.46 units

Total carbs (g) / ICR = Food Bolus	+	(Current BG – Goal BG) / ISF = Correction Bolus

Knowledge Check - Answered

- Sam will need: 4.75 units + 2.46 units = 7.21 units
  = 7 units

*Remember: Since Sam is injecting insulin with a syringe, dosing will be based on whole units of insulin



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Knowledge Check: Poll Question #13

Ari has T2DM managed with lifestyle. A typical weekday breakfast is 2 eggs, 2 slices turkey bacon,1 slice WW toast with margarine, and ½ cup apple juice. During the week, the 2-hour post-prandial BG generally runs < 140. However on weekends, after a breakfast consisting of 1 English muffin with margarine, ½ banana, and 1 cup skim milk, 2-hour post-prandial BG generally runs higher. Why?

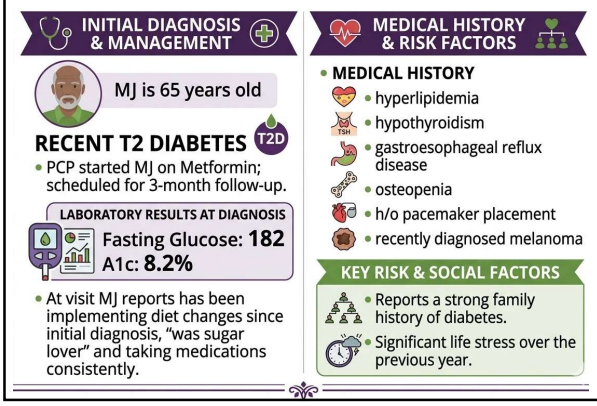
A. Breakfast carbohydrate intake is higher on the weekend
B. Breakfast carbohydrate intake is lower on the weekend
C. Physical activity is likely lower on the weekend
D. Variation in meal timing is contributing to glucose variation



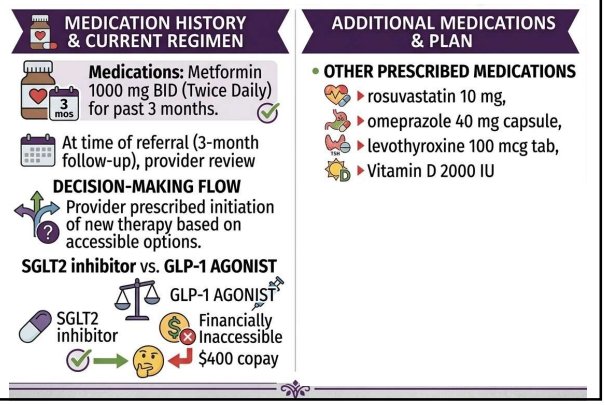


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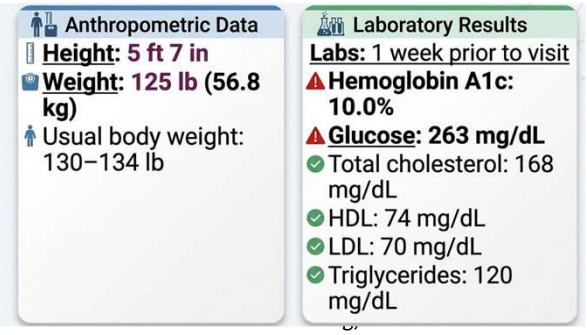
MJ Case Study



MJ Case Study: Medications



Physical and Labs



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Lifestyle and Typical Meals

- **Lifestyle:** Historically active lifestyle, including walking 5–7 miles daily and recent addition of resistance training several times per week.
- Over preceding several months, had unintentional 12 lb weight loss. MJ associates this with food restrictions made following diagnosis. Reports polyuria, polydipsia, and fatigue.
- Diet history notes the recent shift in diet pattern, significantly reducing daily sugar intake and overall intentional carbohydrate reduction.

Current typical meals included:

- Breakfast: two scrambled eggs with half an English muffin, avocado or butter
- Lunch: 1 large low-carbohydrate tortilla with 4 oz lean protein and 1.5 cups vegetables (sauce or cheese added often)
- Dinner: 3-4 oz lean protein with salad and lite dressing. Occasionally would add beans.
- Minimal snacking due to fear of hyperglycemia

Questions

- What labs do you want to draw to determine if right diagnosis?
- What change in therapy?
- If you were starting MJ on insulin, what would be the dose?
- What medical nutrition therapy would you recommend?
- Are there any concerns with the current treatment plan?

Questions & Answers

- What labs do you want to draw to determine if right diagnosis?
  - GADA, IAA, ZnT8A, IA-2A
- What change in therapy?
  - Start on Basal Bolus Therapy
- If you were starting MJ on insulin, what would be the dose?
  - 56kg x 0.5 = 28 units
  - 14 basal & ~4-5 units ac
- What medical nutrition therapy would you recommend?
  - Discuss fears around food, consider incorporating carbs to match with insulin.
- Are there any concerns with the current treatment plan?
  - Stop Metformin, SGLT-2, See Endo, CGM/Ketones & connect with diabetes education team.

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Healing through Connection for Healthcare Professionals

Beverly Thomassian, RN, MPH, CDCES, BC-ADM
Pronouns: she, her and hers
President & Founder – Diabetes Education Services
www.DiabetesEd.net

Diabetes Visit – What do you think?

- JR arrives at the clinic and says they are injecting their basal insulin 5 times a week.
- HCP says "If you don't inject your insulin everyday, you are going to get complications." (Door closed)

How Does JR Feel?



- Defeated
- Embarrassed
- Ashamed
- Angry
- Hurt

How does the HCP feel?

Diabetes Visit – Let's Go *through*

- JR arrives at the clinic and says they are injecting their basal insulin 5 times a week.
- HCP says "If you don't inject your insulin everyday, you are going to get complications." (Door closed)

A small adjustment can make a BIG Difference

- HCP smiles and says, "Hi JR, how are you doing? I heard you are taking your insulin on most days. Great job. What's going on on the other days?"
- Door Open – Connection made

How Does JR Feel?



- Reassured
- Heard & Seen
- Recognized
- Confident
- Connected

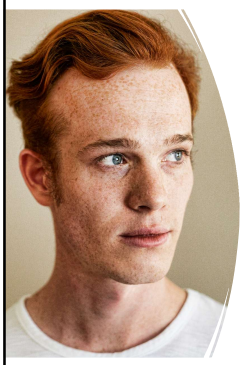
How does the HCP feel?

Healing to HCP

Bidirectional Healing

Healing to Person

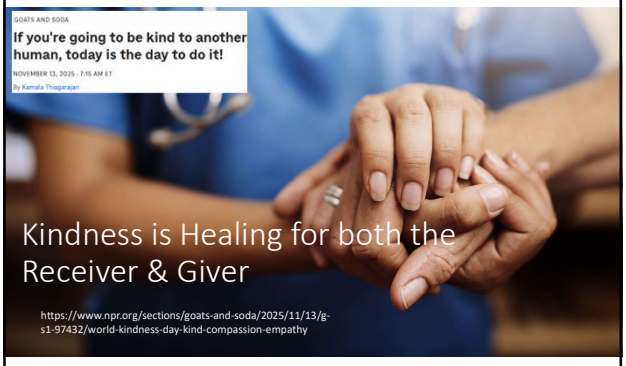
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Missed Appointments due to Stigma and Shame

A recent survey of over 2,600 people with diabetes across eight countries revealed that nearly 40% of missed doctor's appointments are due to stigma or shame.

Abbott. (2025, February 4). Abbott's Above the Bias film reveals misconceptions can impact diabetes care. https://abbott. mediaroom.com/2025-02-04-Abbotts-Above-the-Bias-FilmReveals-Misconceptions-Can-Impact-Diabetes-Care



Kindness is Healing for both the Receiver & Giver

https://www.npr.org/sections/goats-and-soda/2025/11/13/g-s1-97432/world-kindness-day-kind-compassion-empathy



Camille at Nerdabetic
Instagram: / nerdabetic
Twitter: / nerdabetic

"Before you ask me about Time in Range, please ask:
How are you?
What can I help you with?



The ABCs of Creating a Judgement Free Connection



"Out beyond ideas of wrongdoing and right doing, there is a field. I'll meet you there."

-Rumi

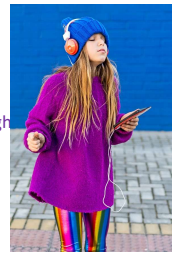
ABC's of Diabetes Care and Education



and Healing Through Connection



- Ask, "How are you doing/feeling?"
- Ask, "What is most difficult about your diabetes right now?
- Ask about their life (SDOH)
- Assess current self-management behaviors
- Assess your feelings
- Accept without judgement
- Acknowledge one thing they are doing right
- Advocate for needed resources



Commit to Listening at least Half of the Time



Fishing Trip Question



What Matters Most to YOU?

What Matters Most – Structured Tool

It is important to make health decisions that line up with your priorities, especially when you have many medical concerns. To do so, it is important to know what matters most to you. For some, this can be hard to put into words. This tool may help.

Circle **up to 3 things in each column** that **MATTER MOST** to you.

FUNCTIONING	ENJOYING LIFE	CONNECTING
• Think clearly • Walk or move around by myself • Choose where I live • Eat foods I enjoy • Work or volunteer • Make decisions about my finances • Dress or bathe myself • Be able to see (or hear, smell, taste, touch) • Drive or be able to get around outside my home • Other:	• Participate in favorite hobbies (like sports, gardening, woodworking, reading, art, etc.) • Attend social events (like movies, concerts, parties, meetings, etc.) • Participate in religious/spiritual services or practices • Spend time outdoors or connecting to nature • Do things to improve myself, learn, or be creative • Have physical touch and / or sexual intimacy • Have quiet time doing nothing in particular • Travel and/or see new places • Exercise • Other:	• Spend time with family and friends • Have good relationships with family or friends • Connect to God or a higher power • Avoid being a burden to others • Take care of my pet(s) • Feel connected to positive aspects of myself • Contribute to my community or neighborhood • Take care of family or friends (like being a caregiver) • Other:

Of all the things you circled, Which 3 Matter Most above all? (Put an X next to them).
In your own words, what do they mean to you?

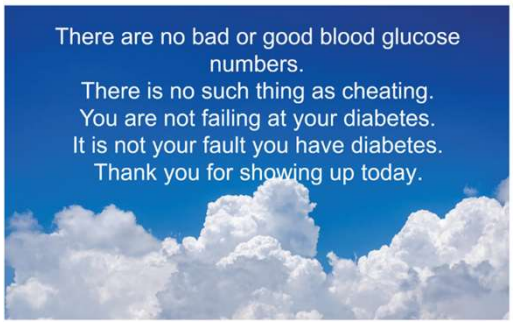
Moye J, Driver JA, Owsiany MT, Chen LQ, Whitley JC, Auguste EJ, Paik JM. Assessing What Matters Most in Older Adults With Multicomplexity. Gerontologist. 2022 Apr 20;62(4):e224-e234. doi: 10.1093/geront/gnab071. PMID: 34043004; PMCID: PMC8982330.

- Beliefs about health and diabetes
- Barriers can be confused with non-compliance
- Burnout lookout. On extended diabetes vacation due to diabetes distress?
- Bouncing back – leaning into resilience



Hessler, D. M., Fisher, L., Guzman, S., Strycker, L., Polonsky, W. H., Ahmann, A., Aleppo, G., Argento, N. B., Henske, J., Kim, S., Stephens, E., Greenberg, K., & Masharani, U. (2024). EMBARK: A randomized, controlled trial comparing three approaches to reducing diabetes distress and improving HbA1c in adults with type 1 diabetes. Diabetes Care, 47(8), 1370–1378. https://doi.org/10.2337/dc23-2432

Create a Judgement Free Zone – Roll out the Carpet of Acceptance



- Having the Conversation - Curiosity
- Coaching that highlights *their* knowledge and resilience.
- Carrots – problem solve together and dig for solutions that are meaningful in everyday life.
- Compassion for the people in our care and ourselves.
- Connection through – opening the door.



Hessler, D. M., Fisher, L., Guzman, S., Strycker, L., Polonsky, W. H., Ahmann, A., Aleppo, G., Argento, N. B., Henske, J., Kim, S., Stephens, E., Greenberg, K., & Masharani, U. (2024). EMBARK: A randomized, controlled trial comparing three approaches to reducing diabetes distress and improving HbA1c in adults with type 1 diabetes. Diabetes Care, 47(8), 1370–1378. https://doi.org/10.2337/dc23-2432

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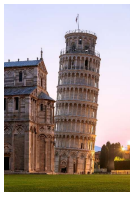
OARS Communication Framework

- Open-ended Questions: 'What concerns you most?'
- Affirmations: 'You've worked hard.'
- Reflective Listening: 'This feels exhausting.'
- Summaries: 'Let me summarize...'



To My Healthcare Professional Colleagues

This is not about Perfection!



It's about Presence



Healing the Healer



"The work of healing requires that we bring our full selves – messy, tired, hopeful, broken and brave – to the table."

- adrienne maree brown

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Our Curiosity Makes a Difference



What is something you would like me to know about you?



Considering the Diabetes Connection as a Sacred "I see you" Space



Thomassian, B. (2025). *Healing through Connection for Healthcare Professionals: Stories and wisdom from the heart of a diabetes nurse.*

- Listening to stories isn't simply an exchange of information; it's an invitation into someone's lived experience.
- When we truly listen, with presence and without judgment, we enter a sacred space within diabetes care.
- In these moments, connection becomes the medicine. The person receiving care feels seen, heard, and valued.
- And something extraordinary happens for us as HCPs, too. We feel reconnected to our humanity.

Healing trough Creativity & Connection

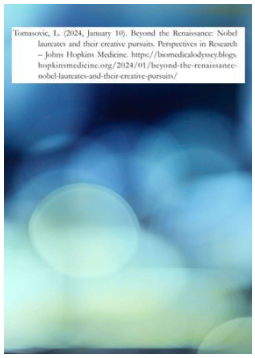
"Each of us is a creative being. Whether or not we recognize it, we all have the potential to bring beauty, meaning, and healing into the world."



-Julia Cameron



Creativity & Nobel Prizes



Scientists who are Nobel laureates are:

- 22 times more likely than typical scientists to perform, sing, or act in their spare time
- 12 times more likely to write fiction, plays, poetry, or short stories
- 5 times more likely to engage in crafting, woodworking, mechanics, or glassblowing
- 7 times more likely to enjoy designing, painting, drawing, or sculpting
- They are more open to novel experiences and often turn to their creative endeavors when working through challenges.

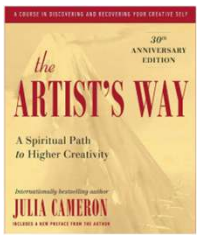
What creative endeavors could you engage in?

20 Creative Endeavors to Consider

Painting	Crafting (e.g., knitting, crocheting, quilting)
Writing poetry or fiction	Interior design or home decoration
Playing a musical instrument	Journaling or bullet journaling
Photography	Filmmaking or video editing
Sculpting or pottery	Gardening or landscaping
Dancing	Calligraphy or hand lettering
Singing or songwriting	Designing jewelry or accessories
Acting, theater performance, and improvisation	Building models or DIY projects
Graphic design or digital art	Woodworking or carpentry
Cooking or baking creatively	Creating comic strips or animations

Homework

- If you had 5 other lives to live, what would you do in each of them?
- The point of these lives is to have fun in them – more *fun* than you might be having in this one.
- Look over your list and select one.
- Then do it this week.



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Notes from Coach Beverly

- Take the risk. Say yes.
- Try that thing you've been putting off.
- Love your body exactly as it is.
- Be bold. Step into your authenticity.
- Make time to ReCreate!
- Think with your heart. Surrender. Show up.
- Move beyond your comfort zone and speak your truth.
- Get enough sleep.
- Ask for help when you need it.
- Stay connected to the people who lift you up.
- Seek out deep conversations, embrace your growth, and get ready for transformation.
- Dive into creativity.



Thank You



Diabetes Education SERVICES 25 YEARS

- Questions?
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Appendix

- Cheat Sheets
- Resources
- Eval & CEs Info.

RECOMMENDATIONS FOR DIAGNOSIS AND CLASSIFICATION OF DIABETES – 2026

CRITERIA FOR SCREENING FOR DIABETES AND PREDIABETES IN ASYMPTOMATIC ADULTS – TABLE 1

DIABETES TYPE	RISK FACTORS and FREQUENCY OF SCREENING and TESTING FOR DIABETES
Type 1	Screen those at risk for presymptomatic type 1 diabetes, by testing autoantibodies to insulin, GAD, islet antigen 2 or ZnT8. Also test antibodies for those with type 1 phenotypic risk (younger age, weight loss, ketoacidosis , etc.)
Type 2	1. Test all adults starting at age **35** for prediabetes and diabetes using Fasting Plasma Glucose, A1C or OGTT. 2. Perform risk-based screening if BMI ≥ 25 or BMI ≥ 23 in Asian Americans 10yrs+ with 1 or more risk factors: • History of cardiovascular disease • First degree relative with diabetes • High risk ethnicity or ancestry • Other conditions associated with insulin resistance (PCOS, Acanthosis Nigricans, Steatosis, Obesity) • Physical inactivity • HDL ≤ 35 mg/dl or triglyceride ≥ 250 mg/dl • Hypertension ≥ $^{130}/_{80}$ or on therapy for HTN 3. If results normal, repeat test at a minimum of 3-year intervals or more frequently based on risk status. 4. **Test Yearly** if A1C ≥ 5.7% or Impaired Fasting Glucose or History of GDM (test at least every 1- 3 years) 5. **Closely monitor high-risk groups**- people with HIV, exposure to high-risk medicines, evidence of periodontal disease, history of pancreatitis.

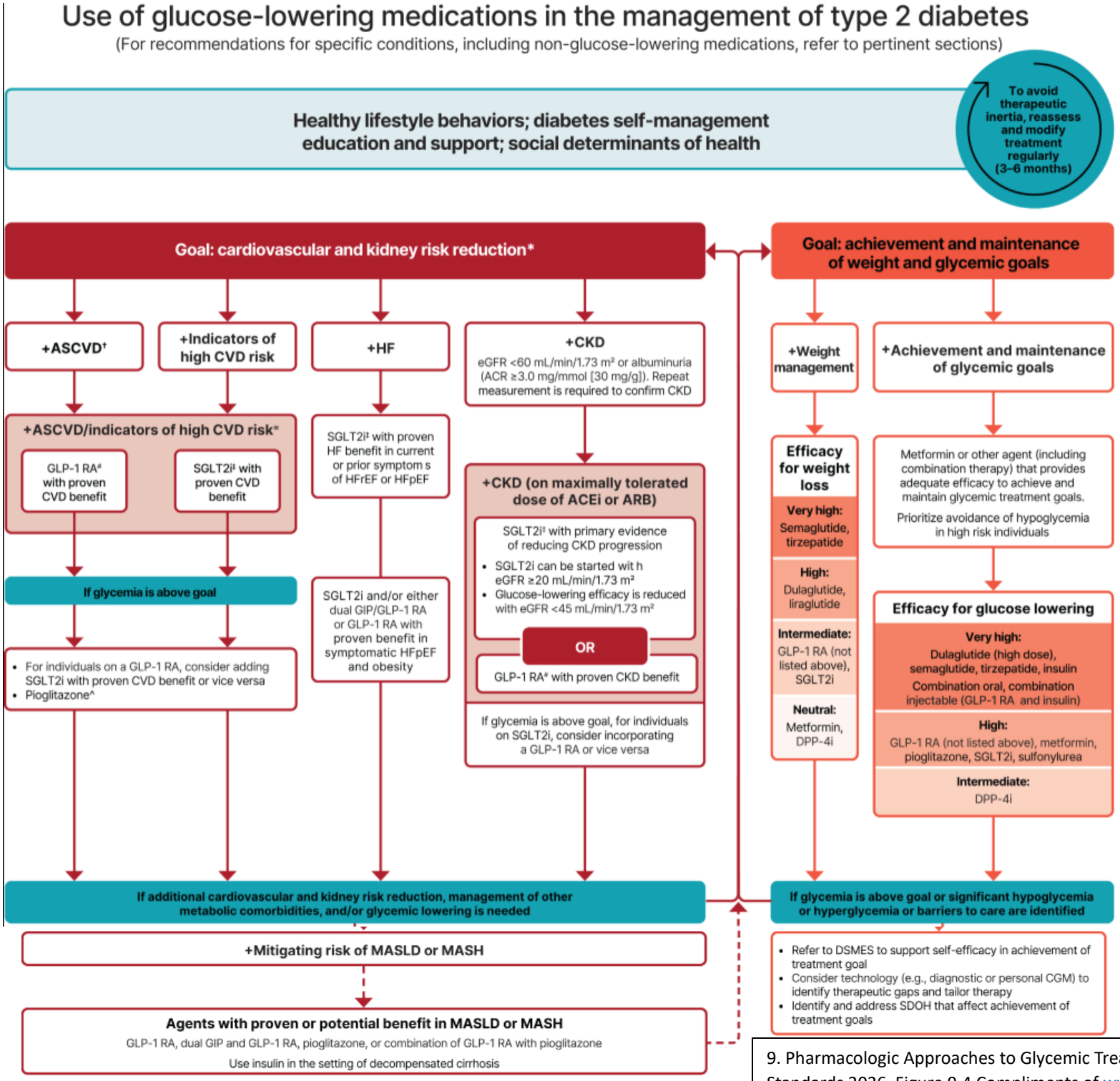
TESTS TO DIAGNOSE DIABETES - TABLE 2

STAGE	For all the below tests, in the absence of unequivocal hyperglycemia, Confirm results by repeat testing.			
	A1C *NGSP certified & standardized assay*	**Fasting* Plasma Glucose (FPG)** **No intake 8 hrs.*	**Random Plasma Glucose**	**Oral Glucose Tolerance Test (OGTT) 75-g** (Carb intake of ≥ 150 g/day for 3 days prior to test.)
Diabetes	A1C ≥ 6.5%	FPG ≥ 126 mg/dl	Random plasma glucose ≥ 200 mg/dl plus symptoms[1] [1]Random = any time-of-day w/out regard to time since last meal; symptoms include usual polyuria, polydipsia, and unexplained wt. loss.	Two-hour plasma glucose (2hPG) ≥ 200 mg/dl
Prediabetes	A1C 5.7 – 6.4%	Impaired Fasting BG (IFG) = FPG 100-125 mg/dl		Impaired Glucose Tolerance (IGT) = 2hPG 140 -199 mg/dl
Normal	A1C < 5.7%	FPG < 100 mg/dl		2hPG < 140 mg/dl

GESTATIONAL DIABETES (GDM)*

PREGNANCY SCREENING	TEST	DIAGNOSTIC CRITERIA
Screen to identify abnormal glucose metabolism before 15 weeks gestation Test those w/ risk factors (table 1) to identify undiagnosed prediabetes or diabetes at first prenatal visit.	Standard Diagnostic Testing and Criteria as listed in Diagnosing Diabetes –Table 2	Standard Diagnostic Testing and Criteria as listed in Diagnosing Diabetes –Table 2 Those with fasting of 110-125 or A1C of 5.9% to 6.4% are at higher risk of adverse outcomes (GDM, need insulin, preeclampisa and other)
Screen for GDM at 24–28 wks gestation for those without known diabetes.	Can use either IADPSG consensus: **"One Step" 75-g OGTT** fasting and at 1 and 2 h (perform after overnight fast of at least 8 h)	**One Step:** GDM diagnosis when ANY of following BG values are exceeded: • Fasting ≥92 mg/dl, • 1 h ≥180 mg/dl • 2 h ≥153 mg/dl
Screen those with GDM for diabetes 4 - 12 wks postpartum with 75-g OGTT. Lifelong screening at least every 3 yrs. **Please see reference below for complete guidelines.*	**"Two step" NIH Consensus – Step 1:** 50gm glucose load (non fasting) w/ plasma BG test at 1 hr. If BG ≥ 130-140*, go to **Step 2 >**	**Two Step -Step 2** - 100g OGTT (fasting) GDM diagnosis if at least 2 of 4 BG measured at fasting, 1h, 2h, 3h after OGTT meet or exceed 95, 180, 155, 140 mg/dL respectively.

***Reference** – Diagnosis & Classification of Diabetes. American Diabetes Association Standards of Medical Care in Diabetes.
Diabetes Care 2026 Jan; 49 (Supplement 1): S27-S49. Compliments of Diabetes Education Services www.DiabetesEd.net



9. Pharmacologic Approaches to Glycemic Treatment: ADA Standards 2026 Figure 9.4 Compliments of www.DiabetesEd.net

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Invite Coach Beverly to Speak at your next event

Beverly Thomassian, RN, MPH, CDCES, BC-ADM, brings decades of clinical expertise, heartfelt storytelling, and a passion for human-centered care to every presentation. Beverly offers keynote talks on her groundbreaking book *Healing Through Connection*, exploring how presence, empathy, and authenticity can transform the healthcare experience and support professional well-being.

She also provides a variety of evidence-based presentations on diabetes management, emerging therapies, ADA Standards of Care, and person-centered care approaches. Attendees leave with powerful insights on building meaningful connections with those they serve, their teams, and themselves. To book Coach Beverly for your event, visit www.DiabetesEd.net or email info@diabetesed.net. You can also call us at 530/ 893-8635.

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For Pharmacists: Upon successfully completing the online evaluation, your credit will be submitted to CPE Monitor. Please check your NABP account within thirty (30) days to make sure the credit has posted.

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