

Meds Management for Type2 Diabetes

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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



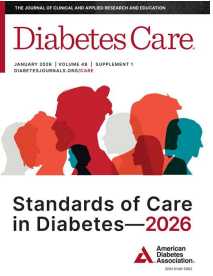
Meds Management for Type 2

Objectives:

1. Describe strategies to improve glucose levels for people with type 2 diabetes (inpatient and outpt).
2. Discuss the application of the new ADA Guidelines to improve glucose and reduce CV and renal risk.
3. List strategies to initiate & adjust oral & injectable therapy using a person-centered approach.
4. Apply new guidelines to individual case studies.



Meds for Type 2 Diabetes - Overview



Standards of Care in Diabetes—2026

THE JOURNAL OF CLINICAL AND ADVANCED RESEARCH AND EDUCATION
JANUARY 2026 | VOLUME 49 | SUPPLEMENT 1
DIABETES JOURNALS ONLINE

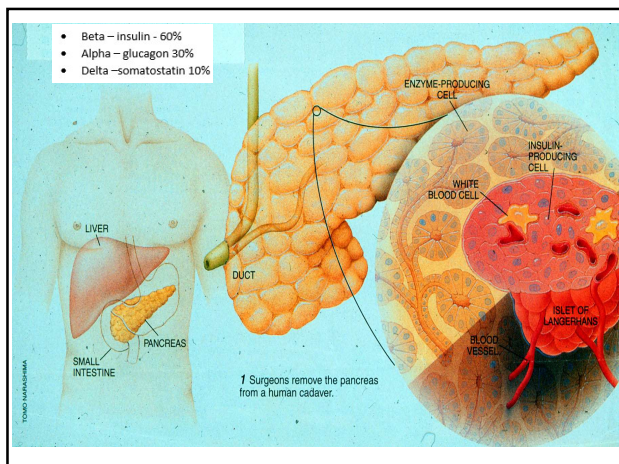
AMERICAN DIABETES ASSOCIATION
ADVANCING CARE

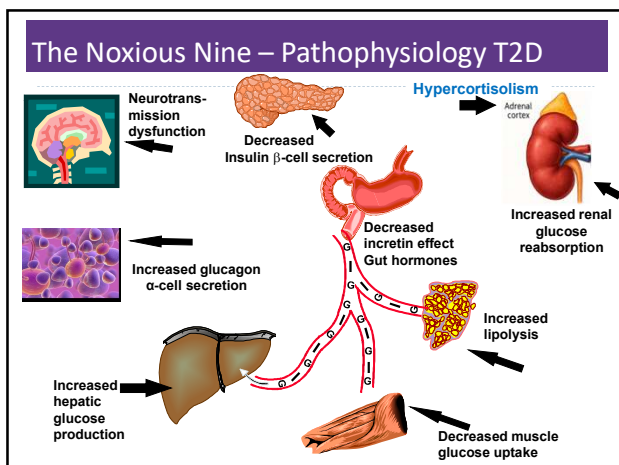
9. Pharmacologic Approaches to Glycemic Treatment: Standards of Care in Diabetes—2026
American Diabetes Association Professional Practice Committee for Diabetes*



Med PocketCards Available 3 ways:

- Home page on website
- CDCES Coach app
- Order your own laminated version





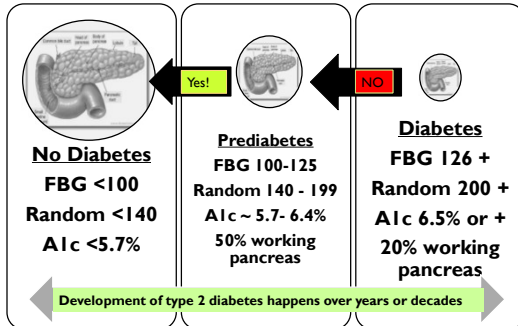
What is Type 2 Diabetes?

►Complex metabolic disorder
(Insulin resistance and deficiency)
with social, behavioral and
environmental risk factors unmasking
the effects of genetic susceptibility.

New Diagnosis?
Call 800 – DIABETES to
request "Getting Started Kit"
www.Diabetes.org



Natural History of Type 2 Diabetes



Matching Meds to the Individual



Medication Taking Behaviors

- ▶ Adequate medication taking is defined as 80%
- ▶ 23% of time, if A1c, B/P, lipids above target - due to med taking behavior
- ▶ Assess for barriers
- ▶ If taking meds 80% of time and goals not met, consider medication intensification



Barriers include:
Forgetting to fill Rx, forgetting to take, fear, depression, health beliefs, med complexity, cost, knowledge gap, system factors, etc.

Work on targeted approach for specific barrier

Wait, What About Emotions?



Diabetes Admit for Hyperglycemia

- ▶ JR is admitted for hyperglycemia because he stopped taking his diabetes meds.
- ▶ HCP says, "Don't you realize you are going to get complications, like kidney disease or amputation if you don't take your medications?"
- ▶ **Door Closed – No Connection made**

How Does JR Feel?

- ▶ Embarrassed
- ▶ Ashamed
- ▶ Defeated
- ▶ Angry
- ▶ Unheard



How does HCP feel?

- ▶ Frustrated
- ▶ Defeated
- ▶ Worried

Diabetes Visit – Let's Go *through*

A small adjustment can make a BIG Difference

- ▶ HCP says, "JR, I am worried about you and your elevated blood glucose. Can you share what is going on in your life?"

- ▶ Door Open – Connection made

How Does JR Feel?

- ▶ Heard & Seen
- ▶ Recognized
- ▶ Connected
- ▶ Engaged

How does the HCP feel?

- ▶ Connected
- ▶ Concerned
- ▶ Collaborative



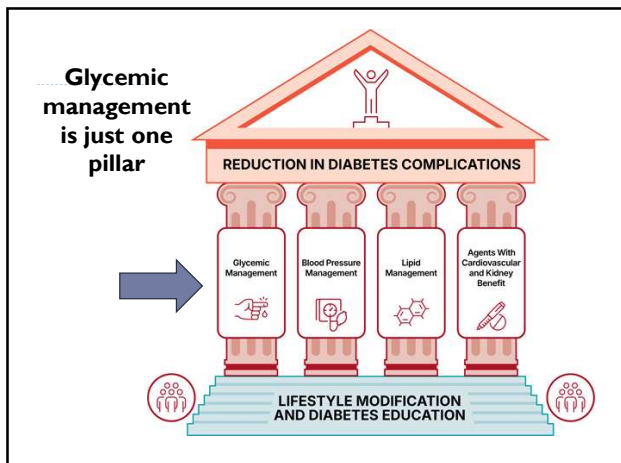
We can make a difference



Step Wise Approach to Hyperglycemia 2026

- ▶ Usually, start one medication at a time
- ▶ However, evidence supports initial combo therapy if A1C 8.5% or more, to quickly reach goals and slow decline of glucose control.
- ▶ Where to start?
 - ▶ Individual values
 - ▶ CVD, Heart failure or Kidney Disease, MASH
 - ▶ Minimize Hypoglycemia
 - ▶ Minimize wt gain or promote wt loss
 - ▶ Consider Cost
 - ▶ Social determinants of health



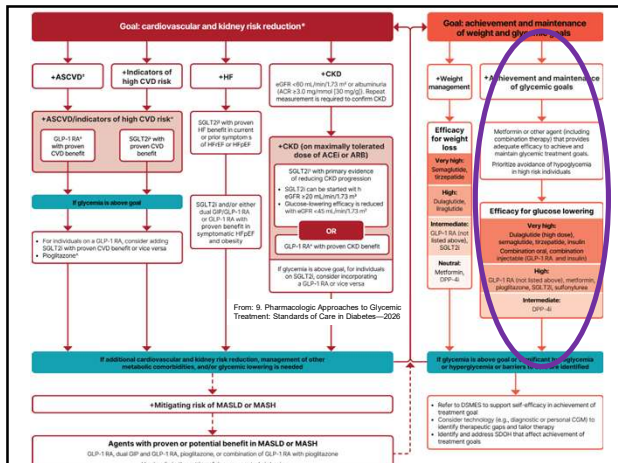


ADA 2026 Goals Summary

A1c less than 7% (individualize)	Blood Pressure <130/80	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

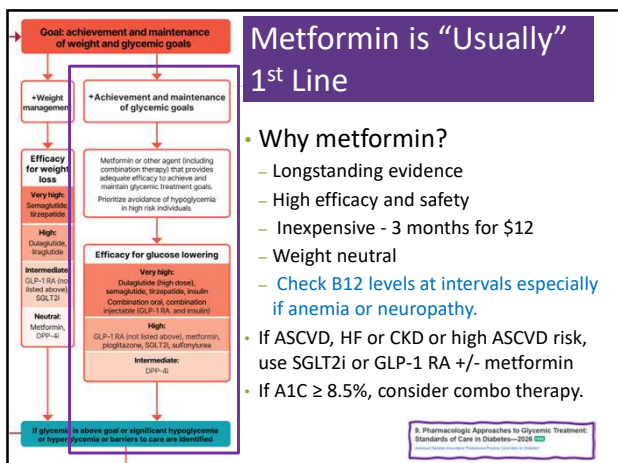
Hospital BG Goal is 100-180

Metformin, Sulfonylureas, DPP-IV Inhibitors & TZD's



Quick Question 1

- ▶ RT, a 61-year-old woman with BMI of 28 and type 2 diabetes 3 months. She wanted to try to manage diabetes with diet and exercise. GFR in 90s, UACR 14mg/gm, A1c 7.4%. Based on this info, which medication would you start?
- ▶ A. Pioglitazone (Actos)
 - ▶ B. Metformin
 - ▶ C. GLP1-RA
 - ▶ D. Sulfonylurea



Common Oral Diabetes Meds

Diabetes Education Services

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Class/Main Action	Name(s)	Daily Dose Range	Considerations
Biguanides - Decreases hepatic glucose output - First line med at diagnosis of type 2	metformin (Glucophage)	500 - 2550 mg (usually BID w/ meal)	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 Metformin - 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%.
	Riomet (liquid metformin)	500 - 2550 mg 500mg/5mL	
	Extended Release-XR (Glucophage XR) (Glumetza) (Fortamet)	(1x daily w/dinner) 500 - 2000 mg 500 - 2000 mg 500 - 2500 mg	

Biguanide derived from: Goat's Rue *Galega officinalis*, French Lilac

Does NOT harm kidneys

\$10 for 3-month supply from Walmart & other pharmacies

Metformin and Kidney Disease – 2026 Update

- Metformin is also a preferred agent in CKD due to well-documented efficacy and safety profile in type 2 diabetes.
- However, there is no documented direct kidney benefit.
- Don't start metformin if eGFR is <45
- Reduce dose of metformin if eGFR is <45 individual is already on metformin.
- Stop metformin once eGFR is <30

Generally, hold metformin during hospital stay.

Sulfonylureas - Squirters

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

Sulfonylureas	Dose	Considerations
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%.

Hold sulfonylureas inpatient to prevent hypoglycemia.

Case Study KR – Poll 2

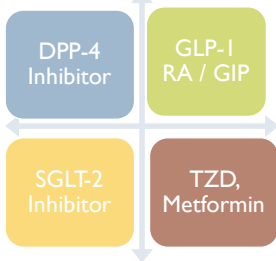
KR is a 47yoM with type 2 diabetes x 5 years. Complains of dizziness/shakiness 3x a week, especially after surfing. Last A1C 6.7%. Which of their medications is most likely causing hypoglycemia?

- A. Metformin
- B. Sitagliptin (Januvia)
- C. Glimepiride (Amaryl)
- D. Pioglitazone (Actos)



Hypoglycemia & Next Steps

Do NOT Cause Hypoglycemia



Can Cause Hypoglycemia

- ▶ Sulfonyleurea
- ▶ Meglitinides
- ▶ Insulin

DPP-4 Inhibitors – “Incretin Enhancers”

- ▶ **Action:**
 - ▶ Increase insulin release w/ meals
 - ▶ Suppress glucagon
- ▶ **Efficacy:** Decreases A1c by 0.6 -0.8%
- ▶ Alogliptin increased risk of heart failure
- ▶ **Average Wholesale Price:** \$650 month

DPP – 4 Inhibitors “Incretin Enhancers” • Prolongs action of gut hormones • Increases insulin secretion	sitagliptin (Januvia, Zimvivo)	25 - 100 mg daily*	*If creat elevated, see med insert for dosing. Side effects: headache and flu-like symptoms. Can cause severe, disabling joint pain. Contact MD, stop med. Report signs of pancreatitis. Alogliptin & saxagliptin can cause heart failure. Report signs of HF; shortness of breath, edema, etc. No wt gain or hypoglycemia. Lowers A1c 0.6%-0.8%.
	linagliptin (Tradjenta)	5 mg daily – eliminated via feces	
	alogliptin (Nesina)	6.25 - 25 mg daily*	
	saxagliptin	2.5 - 5 mg daily*	

Basal insulin plus sitagliptin can be considered during hospital stay.

Case Study Question 3

MZ is complaining of nausea, and increased eructation?

What class of medication may be causing these side effects?

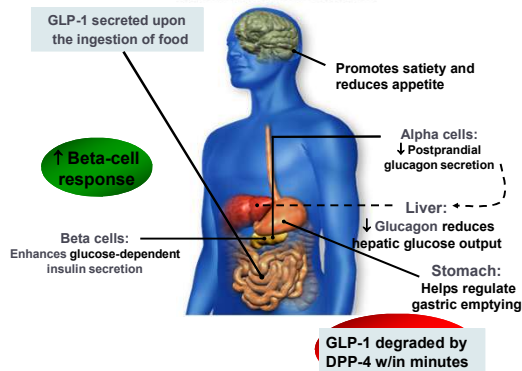
- a. GLP-1/GIP Receptor Agonists
- b. Metformin
- c. SGLT-2 Inhibitor
- d. DPP-IV Inhibitor



GLP & GIP Receptor Agonists



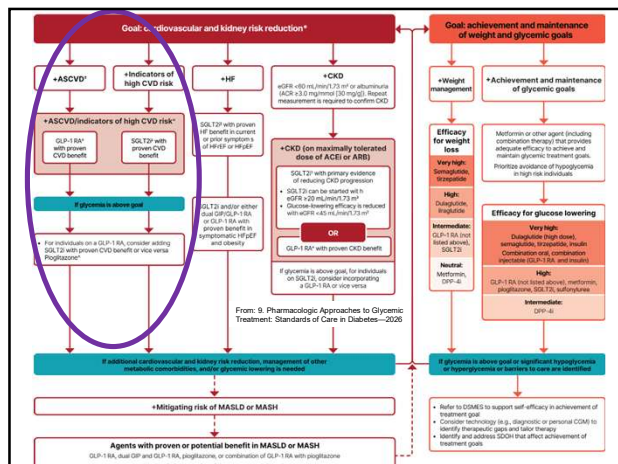
GLP-1 Effects in Humans Understanding the Natural Role of Incretins



Pocket Card: 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. All FDA approved to reduce risk of CV disease, death, MI, stroke (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/ H2O	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 via prefilled pen or vial.	Mounjaro [†] 2.5, 5.0, 7.5, 10, 12.5, 15 mg Gradually adjust dose based on shared decision, individual goals.	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)



Choosing glucose-lowering medication in people with CVD

USE OF GLUCOSE-LOWERING MEDICATIONS IN THE MANAGEMENT OF TYPE 2 DIABETES

HEALTHY LIFESTYLE BEHAVIORS, DIABETES SELF-MANAGEMENT EDUCATION AND SUPPORT (DSMES), SOCIAL DETERMINANTS OF HEALTH (SDOH)

Goal Cardiovascular and kidney risk reduction in High-Risk Individuals with Type 2 Diabetes*

*ASCVD = atherosclerotic cardiovascular disease

†Current or prior symptoms of HF with documented WEF or HF[†]

†Current or prior symptoms of HF with documented WEF or HF[†]

†Current or prior symptoms of HF with documented WEF or HF[†]

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Most effective meds based on Cardiovascular Outcomes Trial (CVOT)

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

~ Or ~

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

Next Step for KR – Question 4

KR is a 47yoM with type 2 diabetes x 5 years. Had recent stroke. A1C was 6.7% now increased to 8.2% after stopping glimepiride. Not able to surf as much and gaining some weight. GFR 90+ and UACR less than 30mg/gm. What class of med would be best to start?

- A. SGLT-2i
- B. Biguanide - Metformin
- C. DPP-IV
- D. GLP-1 RA



Benefits of GLP-1 RA & GIP/GLP-1 Receptor Agonists

A1C lowering

Substantial Weight loss

Cardiovascular benefits*

Decreased appetited

Lowers post meal glucose

Ease of use

*semaglutide, liraglutide, dulaglutide

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

- ▶ Avoid if personal or family history of medullary thyroid cancer or personal history of Multiple Endocrine Neoplasia type 2 (MEN-2)
- ▶ Avoid in combo with DPP-4 inhibitors
- ▶ 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



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

- ▶ Potential risk of pancreatitis
- ▶ If on tirzepatide and oral contraceptives, use back up contraception for first 4 weeks
- ▶ Warning about aspiration during surgery
- ▶ Ask about recent eye exam
 - ▶ Potential increase in diabetes retinopathy
 - ▶ Nonarteritic anterior ischemic optic neuropathy (NAION) reported (rare incidence)



Sudden discontinuation of semaglutide and tirzepatide results in regain of one-half to two-thirds of the weight loss within 1 year. Consider trying lowest effective dose, using intermittent therapy, or stopping medication followed by close weight monitoring.

Poll Question 5

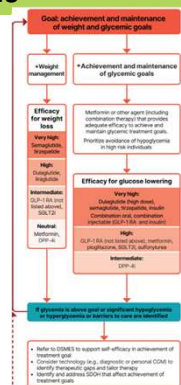
WR has diabetes is on max dose Metformin and Sulfonylurea. A1C is 8.4. Has been trying to lose weight with limited success. Which of the following medications would be indicated?

- Basal insulin
- GLP-1 Receptor Agonists
- Meglitinides
- Bolus insulin



Assess Weight Loss Goals

- ▶ These meds associated with weight loss
- ▶ GLP-1 RA and GLP/GIP agonists
- ▶ SGLT-2 Inhibitors
- ▶ These meds are weight neutral
- ▶ Metformin
- ▶ DPP-4 Inhibitors



Pocket Card: 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. All FDA approved to reduce risk of CV disease, death, MI, stroke (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/ H2O	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 via prefilled pen or vial.	Mounjaro† 2.5, 5, 0, 7.5, 10, 12.5, 15 mg Gradually adjust dose based on shared decision, individual goals.	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)

GLP-1 /GIPs Approved for Weight Loss

- ▶ Liraglutide (Daily)
 - ▶ Victoza 1.8 mg (diabetes)
 - ▶ Saxenda 3 mg (wt loss)
 - ▶ 6% wt loss, \$1349 a mo
- ▶ Semaglutide:
 - ▶ Ozempic 2mg (diabetes)
 - ▶ Wegovy 2.4mg (wt loss)
 - ▶ Wegovy 7.2mg (high dose)
 - ▶ Oral Wegovy 25mg (oral)
 - ▶ 6% wt loss, \$1349 a mo
- ▶ Tirzepatide
 - ▶ Mounjaro 15mg (diabetes)
 - ▶ Zepbound 15mg(wt loss)
 - ▶ 13% wt loss - \$1056 a mo

All 3 Approved for use in adults with a:

- ▶ BMI of ≥ 30 or
- ▶ BMI of ≥ 27 or greater who have hypertension, type 2 diabetes, or dyslipidemia.

***Foundayo (Orforglipron):** small-molecule, oral GLP-1 receptor agonist - a once-daily pill with no water or food restrictions – up to 17.2 mg daily

Diabetes Bingo

"DiaBingo" Shout out Right Answer



- B** Frequent skin and yeast infections can indicate?
- B** A BMI of ____ or more increases risk of diabetes
- 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** 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

Mitigating Risk of MASLD or MASH

If additional cardiovascular and kidney risk reduction, management of other metabolic comorbidities, and/or glycemic lowering is needed

+Mitigating risk of MASLD or MASH

Agents with proven or potential benefit in MASLD or MASH

GLP-1 RA, dual GIP and GLP-1 RA, pioglitazone, or combination of GLP-1 RA with pioglitazone
Use insulin in the setting of decompensated cirrhosis

► MASLD: metabolic-dysfunction associated steatotic liver disease

► MASH: Metabolic-dysfunction associated steatohepatitis

Liver Disease: MASLD or MASH

- In adults with T2D, MASLD and overweight/obesity, consider using a GLP-1 RA with demonstrated benefits in MASH or a GLP-1/GIP RA with potential benefits for MASH
- In adults with biopsy proven MASH, GLP-1 RA is preferred.
- Pioglitazone or a dual GIP/GLP-1 RA can be considered for glycemic management due to potential beneficial effects on MASH.
- Insulin preferred for decompensated cirrhosis

Semaglutide
Tirzepatide
Pioglitazone

Indications for Insulin Sensitizers Pioglitazone (Actos)

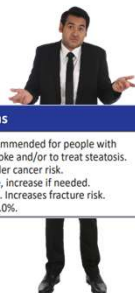
- **Action:** decrease insulin resistance by making muscle and adipose cells more sensitive to insulin. Decrease free fatty acids

► **Names:**

Class/Main Action	Name(s)	Daily Dose Range	Considerations
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%.

► **Efficacy/ Considerations**

- Reduce A1C ~0.5-1.0%
- 6 weeks for maximum effect
- Pioglitazone \$5 a month
- Can cause fluid retention, not indicated w/ CHF



Poll Question 6

ADA recommends pharmacologic agents along with lifestyle interventions to treat people with diabetes and MASH. Which of the following diabetes medications are recommended to treat MASH?



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



SGLT2 Inhibitors- "Glucoretics"

- ▶ **Action:** decreases renal reabsorption of glucose proximal tubule of kidneys (reset renal threshold)
- ▶ **Preferred** diabetes treatment for people with heart and kidney failure. Decreases BG & CV Risk.
- ▶ AWP: ~\$650 a month



Class/Main Action	Name(s)	Daily Dose Range	Considerations
SGLT2 Inhibitors "Glucoretic" • Decreases glucose reabsorption in kidneys	Canagliflozin**† (Invokana)	100 - 300 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%.
	Dapagliflozin**† (Farxiga)	5 - 10 mg 1x daily	
	Empagliflozin**† (Jardiance)	10 - 25 mg 1x daily	
	Ertugliflozin (Steglatro)	5 - 15 mg 1x daily	
	Bexagliflozin (Brenzavvy)	20 mg 1x daily	

Case Study LS

LS is 69 with type 2 diabetes for over a decade. Takes metformin 1000mg twice daily. Admitted to hospital with heart failure.

A1C=7.3%.

UACR 212mg/gm

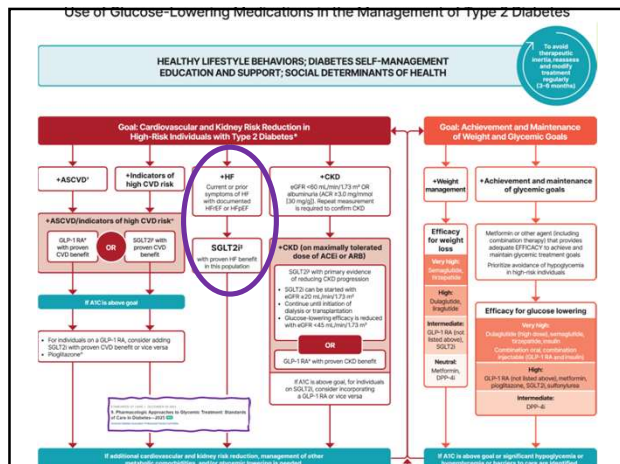
eGFR=56

B/P 146/82

What class of diabetes med do we need to start ASAP?

Albuminuria Categories	Urinary Albumin Creatinine Ratio (UACR)
Normal to mildly increased – A1	< 30 mg/g
Moderately increased – A2	30 – 299 mg/g
Severely increased – A3	300 mg/g +
Kidney Disease Stage	GFR
Stage 1 – Normal	90+
Stage 2 – Mild loss	89 - 60
Stage 3a – Mild to Mod	59 - 45
Stage 3b – Mod to Severe	44 - 30
Stage 4 – Severe loss	29 - 15
Stage 5 – Kidney failure	14 - 0

Use of Glucose-Lowering Medications in the Management of Type 2 Diabetes



Heart Failure

In heart failure, use SGLT2i because they improve heart failure and kidney outcomes.
Empagliflozin - Canagliflozin - Dapagliflozin - Ertugliflozin

New for 2026 –

9.9 In adults with T2D, obesity, and symptomatic HF with preserved ejection fraction, include a GIP/GLP-1 agonist or GLP-1 agonist with demonstrated benefits for BG reduction in HF events (irrespective of A1C).

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

HFpEF Heart failure with preserved ejection fraction $\geq 40\%$)

(HFrEF) Heart failure with reduced ejection fraction $\leq 40\%$)

Side Effects of SGLT-2 Inhibitors

Genitourinary infections

Volume depletion

Increased urination

Hypotension

Monitor Lytes

Diabetes ketoacidosis (DKA)

Case Study LS

LS is 69 with type 2 diabetes for over a decade. Takes metformin 1000mg twice daily. Admitted to hospital with heart failure.

A1C=7.3%.

UACR 212mg/gm

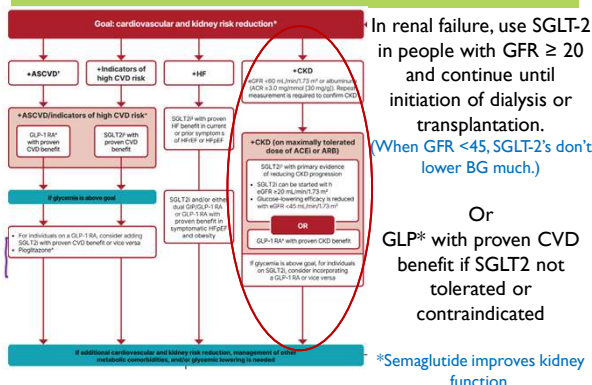
eGFR=46

B/P 146/82

What class of diabetes med do we need to start?

Albuminuria Categories	Urinary Albumin Creatine Ratio (UACR)
Normal to mildly increased – A1	< 30 mg/g
Moderately increased – A2	30 – 299 mg/g
Severely increased – A3	300 mg/g +
Kidney Disease Stage	GFR
Stage 1 – Normal	90+
Stage 2 – Mild loss	89 - 60
Stage 3a – Mild to Mod	59 - 45
Stage 3b – Mod to Severe	44 - 30
Stage 4 – Severe loss	29 - 15
Stage 5 – Kidney failure	14 - 0

Chronic Kidney Disease - Choosing glucose-lowering medication



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



From: 8. Pharmacologic Approaches to Glycemic Treatment: Standards of Care in Diabetes—2026

SGLT-2i Indications Summary

Drug	Lower BG	Reduce CV Risk?	Use to treat Heart Failure?	Slow renal disease?
Dapagliflozin (Farxiga)	Yes	Yes	Yes +/- Diabetes	Yes
Empagliflozin (Jardiance)	Yes	Yes	Yes +/- Diabetes	Yes
Canagliflozin (Invokana)	Yes	Yes	Yes w/ Diabetes	Yes
Ertugliflozin (Steglatro)	Yes	No	Yes w/ Diabetes	Yes
Bexagliflozin (Brenzavvy)	Yes	NA	NA	NA

Poll Question 7

► JR, a 67-year-old with type 2 diabetes for 7 years, with an A1C of 9.7% was started on empagliflozin 10mg two weeks ago. Other labs include a GFR of 49 and a UACR of 34 mg/g. Also takes glargine 12 units and pioglitazone. JR drinks a few beers at night. Partner calls you in a panic and says JR is admitted to the hospital in DKA. What is the most likely explanation?

- A. Excess alcohol intake leading to starvation ketosis
- B. Potential side effect of SGLT-2 Inhibitors
- C. Low GFR and elevated UACR increase hyperglycemic risk
- D. JR is misdiagnosed and likely has type 1 diabetes



SGLT-2 Inhibitors – DKA Warning

Common Oral Diabetes Meds

Class/Main Action	Name(s)	Daily Dose Range	Considerations
SGLT2 Inhibitors "Glucoretic" • Decreases glucose reabsorption in kidneys	Canagliflozin* (Invokana)	100 - 300 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 $\geq$ 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%.
	Dapagliflozin*† (Farigla)	5 - 10 mg 1x daily	
	Empagliflozin*† (Jardiance)	10 - 25 mg 1x daily	
	Ertugliflozin (Steglatro)	5 - 15 mg 1x daily	
	Bexagliflozin (Brenzavvy)	20 mg 1x daily	

FDA Warning of DKA – Not approved for Type 1 (but used off-label)
 ~ increases risk of EDKA by 4-6%

Increased risk for those with type 2 on insulin + SGLT-2 Inhibitor
 Decreased insulin dose due to lower BG on SGLT-2 Inhibitors
 Can lead to insulin deprivation and ketoacidosis

Signs and Symptoms Euglycemic DKA

- ▶ Similar in presentation to hyperglycemic DKA.
- ▶ **Don't usually have polydipsia or polyuria since serum glucose is normal.**
- ▶ S/S include nausea, vomiting, shortness of breath, generalized malaise, lethargy, loss of appetite, fatigue, or abdominal pain.
- ▶ **Ill feeling individuals with diabetes plus malaise, dyspnea, nausea, or vomiting need to eval serum pH and get blood or urine ketone testing.**



Euglycemic Diabetic Ketoacidosis

Michael C. Plewa; Michael Bryant; Robin King-Thiele.

FDA NEWS RELEASE

FDA Authorizes First Wearable Device That Continuously Monitors Both Ketone Levels and Blood Sugar

New device can help people with diabetes detect warning signs of a dangerous complication before it becomes a medical emergency

For Immediate Release: August 25, 2026

The U.S. Food and Drug Administration today authorized the Libre Duo 10 Day Continuous Dual Glucose Ketone Monitoring System for people aged 2 years and older living with diabetes. The Libre Duo 10 Day is the first wearable device in the U.S. that continuously monitors ketone levels, and the first in the world to continuously monitor both ketones and blood sugar (glucose) together in a single device.

"Today's authorization is a breakthrough for the safety of children and adults living with diabetes," said **Michelle Tarver, M.D., Ph.D., Director of the FDA's Center for Devices and Radiological Health**. "Knowing that ketone levels are rising, and having that information in real time, around the clock, can be the difference between early intervention and a life-threatening emergency."

EDKA in Type 1 or Type 2

- ▶ Characterized by
 - ▶ euglycemia in presence of severe metabolic acidosis
 - ▶ pH less than 7.3
 - ▶ serum bicarbonate less than 18
 - ▶ Beta-hydroxybutyrate levels (3 mmol/L +) or 2+ ketones in urine
 - ▶ Can diagnosis someone with Euglycemic DKA with
 - ▶ BG less than 200 mg/dL
 - ▶ Or history of diabetes



Often insulin-using ind's do not recognize their symptoms as DKA because BG is not elevated. They may maintain or decrease their insulin dose.

Euglycemic Diabetic Ketoacidosis

Michael C. Plewa; Michael Bryant; Robin King-Thiele.

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

	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

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

LS needs surgery – Poll 8

LS is 69 with type 2 diabetes and HF. On empagliflozin (Jardiance) 10mg daily in hospital. A1C 7.1% Needs surgery for infected foot ulceration. What action is needed?

- A. Give empagliflozin night before surgery.
- B. Start basal bolus insulin therapy.
- C. Hold empagliflozin 3 days before surgery.
- D. Start low dose insulin infusion to get glucose to goal pre surgery.



Diabetes and Surgery

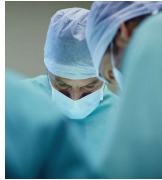
- ▶ 20% of individuals undergoing major general surgery have diabetes,
- ▶ 23–60% have prediabetes or undiagnosed diabetes
- ▶ A1C target <8% for elective surgeries or Time in Range >50%.
- ▶ Perioperative glucose target of 100-180
- ▶ Postponing surgery based on A1C or TIR not recommended, as it may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



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

Preparation for Surgery

- ▶ Preoperative risk assess (heart, renal disease, neuropathy).
- ▶ Hold SGLT-2 for 3-4 days before surgery
- ▶ Evaluate GLP-1 Therapy



ADA 2026

The American Society of Anesthesiologists recommends holding GLP-1 RAs on the day of the procedure or surgery for daily dose agents and for at least 7 days prior to the procedures or surgery for once-weekly dose agents. Individualize.

Is Inpatient Diabetes Education Realistic?

- ▶ Unique opportunity to address urgent learning needs
- ▶ Brief and targeted education effective
- ▶ Strategies
 - ▶ Empathic listening and open ended questions
 - ▶ “What are you most worried about when it comes to taking care of your diabetes.
- ▶ Assist with needed supplies and referrals



Look for
“teaching moment”
opportunities

Stigma associated with diabetes

Have you heard others using these words or phrases?

- ▶ Cheats
- ▶ No will power
- ▶ Diabetic
- ▶ Non-compliant
- ▶ Train wreck
- ▶ Frequent Flyer
- ▶ Non-adherent
- ▶ Doesn't really care
- ▶ If they would only lose some weight
- ▶ Doesn't monitor blood sugar
- ▶ Forgot logbook/reader again
- ▶ Doesn't take their meds as directed
- ▶ Eats junk food
- ▶ Eats too much fruit
- ▶ Loves sugar
- ▶ They brought it on themselves

Self Reflective Question

- ▶ A person shows up to the Emergency Room in a hyperglycemic crisis and tells you they are only taking their daily insulin injection about 4 times a week.
- ▶ What feelings would that evoke?
 - ▶ Doesn't care
 - ▶ Non-compliant
 - ▶ Lazy
 - ▶ Better scare them
 - ▶ Exasperation

curiosity

Our Curiosity
Makes a
Difference

What is
something you
would like me to
know about you?



Create a Judgement Free Zone – Roll out the Carpet of Acceptance

There are no bad or good blood glucose numbers.

There is no such thing as cheating.
You are not failing at your diabetes.
It is not your fault you have diabetes.
Thank you for showing up today.



Life Study – Mrs. Jones

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

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

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



Language of Diabetes Education

Old Way

- ▶ Control diabetes
- ▶ Test BG
- ▶ Patient
- ▶ Normal BG
- ▶ Non-adherent, compliant
- ▶ Refuse

New Way

- ▶ Manage
- ▶ Check
- ▶ Participant, Individual
- ▶ BG in target range
- ▶ Focus on what they are accomplishing
- ▶ Decided, chose

American Diabetes Association, Diabetes Care
The Use of Language in Diabetes Care and Education, 2017

Mrs. Jones asks you What Do You Say?

- ▶ What is diabetes?
- ▶ They say I am a diabetic because I am obese?
- ▶ How am I going to control this?
- ▶ What is a normal blood sugar?
- ▶ Do I have to test my blood sugars?
- ▶ My doctor told me to stay away from white foods. Is that true?



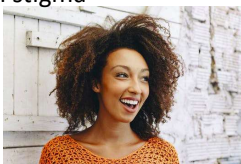
Mrs. Jones asks you What Do You Say?

- ▶ You are wondering if your weight caused your diabetes?
- ▶ You can manage your diabetes and improve your health at the same time.
- ▶ For people without diabetes, fasting blood sugar is less than 100 and A1c is less than 5.7%
- ▶ Checking blood sugars can help you figure out if the plan is working.



Let's use language that (is)

- | | |
|-------------------------------------|---|
| ▶ Imparts hope | ▶ Respectful, inclusive |
| ▶ Neutral, nonjudgmental | ▶ Fosters collaboration between person and provider |
| ▶ Based on fact, actions or biology | ▶ Avoids shame and blame |
| ▶ Free from stigma | |



Quick Question 9

Which phrase represents the principles for communicating with people living with diabetes.



- A. You are walking 3 times a week.
- B. Let's focus this appt on weight loss.
- C. Do you know possible complications associated with elevated A1C levels?
- D. You should try to eat 3 servings of fruits and veggies daily.

Guiding Language Principles

Strength Based

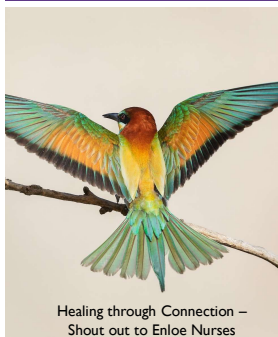
- ▶ Emphasize what people know, what they *can* do.
- ▶ Focus on strengths that empower people



Person-first

- ▶ Words that indicate awareness
- ▶ Sense of dignity
- ▶ Positive attitude toward person with diabetes

Chapter 7 – The Body Tells the Story



Healing through Connection –
Shout out to Enloe Nurses

- ▶ I was admitted to the neuro floor with the diagnosis of epileptic seizures and started on anti-seizure medications. The seizures continued despite the medications.
- ▶ The nurses would sit with me during these episodes, hold my hand, and give me tissues. They reassured me that I was not a loser. They were angels who loved and protected this broken little soul, trying to find her way.
- ▶ When I woke up scared one night, they moved me right next to the nurse's station so I would feel safe. They intuitively knew what I needed, and I felt blanketed in their nurturing.

Diabetes Bingo

"DiaBingo" Shout out Right Answer



DiaBingo- G

- G ADA goal for A1c is less than ____%
- G Blood pressure goal is less than
- G People with DM should see eye doctor (ophthalmologist) at least
- G The goal for blood sugars 1-2 hours after a meal is less than:
- G People with DM should get this shot every year
- G People with DM need to get these kidney tests yearly
- 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
- G Name 3 healthy foods to include in daily meal plan

Thank You



- Thank you for inviting me to be a part of this program!
- Please let me know if you have any questions.
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