Updates in Diabetes Care: A focus on pharmacologic treatment options

Wendy L. Wright,
DNP, ANP-BC, FNP-BC, FAANP, FAAN, FNAP

1

Wendy L. Wright
DNP, ANP-BC, FNP-BC, FAANP, FAAN, FNAP

Adult/Family Nurse Practitioner
Owner – Wright & Associates Family Healthcare, Amherst, NH
Owner – Partners in Healthcare Education, LLC

Faculty, Fitzgerald Health Education Associates, Lawrence, MA

2

2

Disclosures

- Speaker Bureau
  - Sanofi-Pasteur, Merck, Pfizer, Moderna, and Seqirus: Vaccines
  - Exact Sciences: Colorectal cancer
  - AstraZeneca: Asthma and COPD
- Consultant
  - Sanofi-Pasteur, Merck, Pfizer, Moderna, and Seqirus: Vaccines
  - GlaxoSmithKline: OA and pain
  - AstraZeneca: Asthma and COPD

All relevant financial disclosures have been mitigated.

3

3

Objectives

- At the end of this presentation, the participant will be able to:

1. Discuss the impact of diabetes mellitus in the United States.
2. Discuss the nonpharmacologic and pharmacologic treatments for the patient with type 2 diabetes.
3. Compare/contrast pharmacologic options.

4

4

Tips

- References
  - Listed throughout and at the end of the presentation
- To facilitate your learning
  - Specific tables/images can be viewed full page at the end of your handout.

5

5

Diabetes[1]

- Group of metabolic diseases characterized by hyperglycemia

- Results from eight defects
  - Decreased insulin secretion
  - Inefficient glucose uptake (skeletal muscle)
  - Increased hepatic glucose production
  - Decreased incretin effect
  - Increased glucagon secretion
  - Increased free fatty acids
  - Neurotransmitter dysfunction
  - Increased glucose resorption

6

6

Statistics Regarding Prediabetes[2]

- 96 million American adults—approximately 1 in 3—have prediabetes (2022).
- Approximately, 11% of individuals with prediabetes develop type 2 diabetes each year over a 3-year study.
- Majority of individuals with prediabetes develop type 2 diabetes within 10 years.

7

7

Statistics Regarding Diabetes[2]

In 2022, 37.3 million Americans, or 11.3% of the population, had diabetes (>1 in 10 people)

Increasing by 1 million people per year

Cost: 1 in every 5 dollars spent in the United States is spent on diabetes care/costs

In 2020, diabetes was the eighth leading cause of death in the U.S.

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CDC: Map of Diagnosed Diabetes vs. Obesity by County Among U.S. Adults, 2009

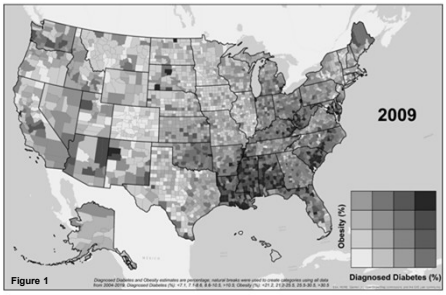

Figure 1

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CDC: Map of Diagnosed Diabetes vs. Obesity by County Among U.S. Adults, 2014

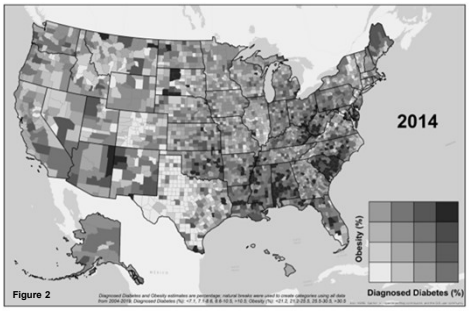

Figure 2

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CDC: Map of Diagnosed Diabetes vs. Obesity by County Among U.S. Adults, 2019

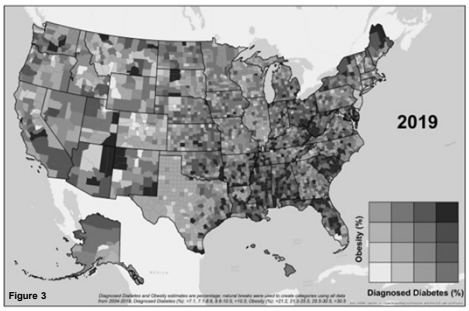

Figure 3

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Race/Ethnicity[3]

Race and ethnic differences in prevalence of diagnosed diabetes

- Non-Hispanic whites: 7.4%
- Asian Americans: 8.0%
- Hispanics: 12.1%
- Non-Hispanic blacks: 12.7%
- American Indians and Alaska Natives: 15.1%

12

12

Diabetes and Cardiovascular Disease[4]

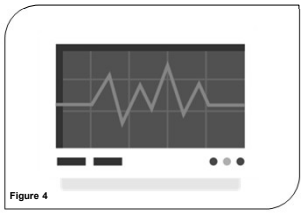

Figure 4

- 7th leading cause of death in the United States
- Majority of cardiovascular or cerebrovascular

13

13

WW1

14

14

Prediabetes

Impaired Fasting Glucose or
Impaired Glucose Tolerance

15

15

Slide 14

WW1 New standards; this needs to replace 2024 guidelines references please

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Classification and Diagnosis of Diabetes[5]

Criteria for screening for diabetes or prediabetes in asymptomatic adults

1. Testing should be considered in adults with overweight or obesity (BMI ≥25 kg/m^2 or ≥23 kg/m^2 in Asian Americans) who have **one or more** of the following risk factors:
   - First-degree relative with diabetes
   - High-risk race/ethnicity (e.g., African American, Latino, Native American, Asian American, Pacific Islander)
   - History of CVD
   - Hypertension (≥140/90 mm Hg or on therapy for hypertension)

16

16

Classification and Diagnosis of Diabetes[5] (continued)

Criteria for screening for diabetes or prediabetes in asymptomatic adults (cont.)

1. Testing should be considered in adults with overweight or obesity who have **one or more** of the following risk factors: (cont.)
   - HDL cholesterol level <35 mg/dL (0.90 mmol/L) ***and/or*** a triglyceride level >250 mg/dL (2.82 mmol/L)
   - Women with polycystic ovary syndrome
   - Physical inactivity
   - Other clinical conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans)

17

17

Classification and Diagnosis of Diabetes[5] (continued)

Criteria for screening for diabetes or prediabetes in asymptomatic adults (cont.)

2. Patients with prediabetes (A1C ≥5.7% [0.057 proportion], IGT, or IFG) should be tested yearly.
3. Women who were diagnosed with GDM should have lifelong testing at least every 3 years.
4. People with HIV should be evaluated annually.

18

18

Recommendations – Prediabetes[5]

- Screening for prediabetes with an informal assessment of risk factors or validated tools should be considered in asymptomatic adults.
  - For those without risk factors, testing should begin at **age 35 years.**
    - If tests are normal, repeat at a minimum of 3-year intervals.

19

19

2015

The BMI cut point for screening overweight or obese Asian Americans for prediabetes and type 2 diabetes was changed to 23 kg/m^2 (vs. 25 kg/m^2) to reflect the evidence that this population is at an increased risk for diabetes at lower BMI.[5]

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20

Children and Screening[6]

Begin at 10 years of age in children at risk or at the onset of puberty, if earlier than 10 years.

- Repeat every 3 years, if normal.

21

21

What constitutes a risk factor in children?

- Overweight (BMI >85th percentile for age and sex, weight for height >85th percentile, or weight >120% of ideal for height)
  - **Plus ≥ONE risk factor**
    - Family history of type 2 diabetes in first- or second-degree relative
    - Race/ethnicity (Native American, African American, Latino, Asian American, Pacific Islander)
    - Signs of, or conditions associated with, insulin resistance including acanthosis nigricans, hypertension, dyslipidemia, polycystic ovary syndrome, small for gestational age at birth history in the child
    - Maternal history of DM or gestational DM

22

22

Criteria for the Diagnosis of Diabetes[5]

FPG ≥126 mg/dL (7.0 mmol/L).
Fasting is defined as no caloric intake for at least 8 h.*

or

2-h PG ≥200 mg/dL (11.1 mmol/L) during OGTT. The test should be performed as described by WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.*

or

A1C ≥6.5% (0.065 proportion).
The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay.*

or

In a patient with classic symptoms of hyperglycemia ***or*** hyperglycemic crisis, a random plasma glucose ≥200 mg/dL (11.1 mmol/L).

*In the absence of unequivocal hyperglycemia, diagnosis requires two abnormal test results from the same sample or in two separate test samples.

Diabetes Control and Complications Trial (DCCT)

23

23

Criteria for Prediabetes[5]

- Fasting glucose: 100–125 mg/dL (5.6–6.9 mmol/L)
- A1C: 5.7%–6.4% (0.057–0.064 proportion)
- 2-hour glucose tolerance test: 140–199 mg/dL (7.8–11.0 mmol/L)

24

24

Important to Remember[7]

- Postprandial hyperglycemia is a significant contributor to A1C levels, particularly at the lower end of A1Cs.
  - For instance
    - A1C of 7.3% to 9.2% (0.073 to 0.092 proportion)
      - Postprandial glucose accounts for 50% of this number.
    - A1C <7.3% (0.073 proportion)
      - Postprandial glucose accounts for 70% of this number.
- Take away message – Someone with an A1C of 6.8% (0.068 proportion), **look** very closely at reducing postprandial glucose.

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25

Multimodal Treatment

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DPP – Benefit of Diet/Exercise or Metformin on Diabetes Prevention in At-risk Patients

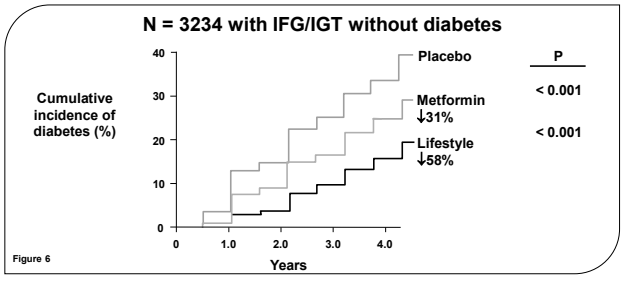

Figure 6

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DPP – Benefit of Diet/Exercise or Metformin on Diabetes by Race/Ethnicity[8]

- DPP results – Metformin and lifestyle intervention reduced diabetes across all racial and ethnic subgroups: White, Black, Hispanic, Native American, Asian
- Lifestyle intervention highly effective in reducing the risk of developing diabetes
  - Interventions – Appropriate and beneficial for the ethnically and culturally diverse U.S. population.
- **Diet/exercise was more effective than metformin in reducing new-onset diabetes** in every racial and ethnic group.

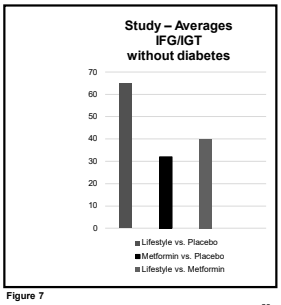

Figure 7

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28

Recommendations – Prevention or Delay of T2DM

- Patients with prediabetes should be referred to an intensive diet and physical activity behavioral counseling program adhering to the tenets of the DPP targeting a loss of 7% of body weight and should increase their moderate physical activity to at least 150 min/week.[5]

29

29

Recommendations – Prevention or Delay of T2DM (continued)

- Metformin therapy for prevention of type 2 diabetes should be considered in adults with prediabetes, especially those aged 25–59 years with BMI 35 kg/m^2, higher fasting plasma glucose (e.g., 110 mg/dL [6.1 mmol/L]), and higher A1C (e.g., 6.0% [0.06 proportion]), and in women with prior GDM.[5]

30

30

Medical and Surgical Interventions Shown to Delay or Prevent T2D

How is prediabetes managed?

Intervention	Follow-up Period	Reduction in Risk of T2D (P Value vs. Placebo)
Antihyperglycemic agents		
Metformin[9,a]	2.8 years	31% (P <0.001)
Acarbose[9,b]	3.3 years	25% (P=0.0015)
Pioglitazone[9,c]	2.4 years	72% (P <0.001)
Rosiglitazone[9, d]	3.0 years	60% (P <0.0001)
Weight loss interventions		
Orlistat[9,e]	4 years	37% (P=0.0032)
Phentermine/topiramate[9,f]	2 years	79% (P <0.05)
Bariatric surgery[9,g]	10 years	75% (P <0.001)

Lifestyle modification should be used with all pharmacologic or surgical interventions.

Type 2 diabetes (T2D)

31

31

Pharmacologic Approaches to Glycemic Treatment

Use of glucose-lowering medications in Type 2 Diabetes: 2024 ADA Professional Practice Committee (PPC)

Slide 66

https://www.slideshare.net/slideshow/summary-of-revisions-standards-of-care-in-diabetes-2024/269971668#66

Pharmacologic Approaches to Glycemic Management:
Standards of Care in Diabetes - 2024. Diabetes Care 2024

32

32

ADA Guidelines

33

33

Biguanides

- Biguanides decrease hepatic glucose production and increase insulin-mediated peripheral glucose uptake.

- Efficacy
  - Decrease fasting plasma glucose 60–70 mg/dL (3.3–3.9 mmol/L)

- Other effects
  - Diarrhea and abdominal discomfort
  - Lactic acidosis
  - Cause small decrease in LDL cholesterol level and triglycerides
  - No specific effect on blood pressure
  - No weight gain, with possible modest weight loss
  - B_{12} deficiency

Medications in this class
- Metformin, metformin hydrochloride extended release

34

34

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Biguanides

- Used to be considered first line for all
- Now, a first line option for those without ASCVD, CHF, CKD

35

35

Metformin Updates[10]

- Metformin is contraindicated in patients with an eGFR below 30 mL/minute/1.73 m^2.
- Starting metformin in patients with an eGFR between 30 to 45 mL/minute/1.73 m^2 is not recommended.
- In patients taking metformin whose eGFR later falls below 45 mL/minute/1.73 m^2, assess the benefits and risks of continuing treatment.

36

36

Slide 35

WW1 ADA guidelines 2025
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Metformin Updates[10] (continued)

- Discontinue metformin at the time of or before an iodinated contrast imaging procedure in patients with an eGFR between 30–60 mL/minute/1.73 m^2; in patients with a history of liver disease, alcoholism, or heart failure; or in patients who will be administered intra-arterial iodinated contrast.
- GFR: 30–35 mL/min/1.73 m^2
  - Maximum dosage 1000 mg daily

37

37

Sulfonylureas

- Sulfonylureas increase endogenous insulin secretion.
- Efficacy
  - Decrease fasting plasma glucose 60–70 mg/dL (3.3–3.9 mmol/L)
  - Reduce A1C by 1.0–2.0%
- Other effects
  - Hypoglycemia
  - Weight gain
  - No specific effect on plasma lipids or blood pressure
  - Cost is minimal; one of the least expensive classes of medication

Medications in this class
- Second-generation sulfonylureas – Glyburide, glimepiride, glipizide

38

38

Thiazolidinediones

- Thiazolidinediones decrease insulin resistance by making muscle and adipose cells more sensitive to insulin. They also suppress hepatic glucose production.
- Efficacy
  - Decrease fasting plasma glucose ~35–40 mg/dL (1.9–2.2 mmol/L)
  - Reduce A1C ~0.5–1.0%
  - 6–12 weeks for maximum effect

39

39

Thiazolidinediones

- Other effects
  - Weight gain, edema
  - Hypoglycemia (if taken with insulin or agents that stimulate insulin release)
  - Contraindicated in patients with abnormal liver function or CHF
  - Improves HDL cholesterol and plasma triglycerides; usually LDL neutral

Medications in this class
- Pioglitazone, rosiglitazone, troglitazone – Taken off market due to liver toxicity

40

40

GLP-1R Agonists

Mechanism of action

- Lowers blood glucose by increasing insulin secretion, suppresses glucagon secretion and slows gastric emptying

- Because it only has this effect in the presence of elevated blood glucose levels, it does not tend to increase the risk of hypoglycemia on its own.

41

41

GLP-1R Agonists (continued)

- Average efficacy
  - 0.8%–1.1% decrease in A1C from baseline
  - Weight loss (1–3 kg)

- Precautions
  - Pancreatitis
  - Thyroid C-cell carcinomas (medullary thyroid carcinoma)
  - Hypoglycemia
  - Category C
  - Gastroparesis

- 6 options
  - Dulaglutide (once weekly) *CVD
  - Exenatide (twice daily)
  - Exenatide ER (once weekly)
  - Liraglutide (once daily) *CVD
  - Lixisenatide (once daily)
  - Semaglutide (once weekly) *CVD
  - Semaglutide (oral daily)

**Lixisenatide removed from U.S. market 2/8/2023 – No safety issues

42

42

Tirzepatide (Mounjaro®)

- Once weekly GIP/GLP-1 agonist
- Indicated for type 2 diabetes but performed very well in phase 3 trial for those with obesity
- 3 doses available (5 mg, 10 mg, and 15 mg)
  - Patients on maximum dose lost 12 pounds (5.4 kg) more than those on semaglutide, 29 pounds (13 kg) more than those on insulin degludec, and 27 pounds (12 kg) more than those on insulin glargine
- Injected once weekly

43

43

DPP-4 Inhibitors

- Mechanism of action
  - Blocks enzyme which breaks down GLP-1 and GIP, allowing these two incretins to…
    - Increase insulin production in response to increased glucose.
    - Reduce glucagon production.
    - Reduce hepatic glucose production.

- Four options
  - Sitagliptin
  - Saxagliptin*
  - Linagliptin
  - Alogliptin*

44

44

Mechanism of Action of all DPP-4 Inhibitors

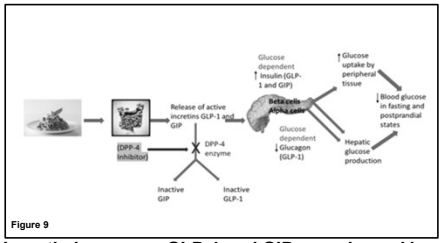

Figure 9

Incretin hormones GLP-1 and GIP are released by the intestine throughout the day, and their levels ↑ in response to a meal.

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The Incretin Effect in Subjects Without and With Type 2 Diabetes

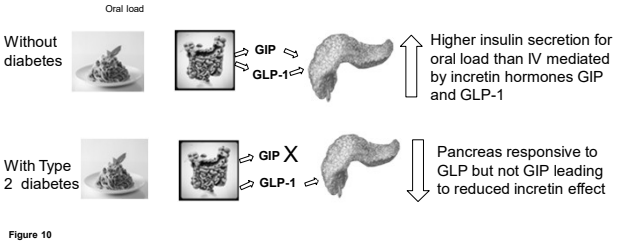

Figure 10

46

46

DPP-4 Inhibitors

- A1C reduction
  - 0.5%–0.8%
  - Best with postprandial blood sugar reduction
- Precautions
  - Reduce dosage in setting of CKD (except linagliptin).
  - Drug/drug interactions (saxagliptin)

47

47

Sodium Glucose Cotransporter 2 Inhibitors[11]

- Mechanism of action
  - Sodium glucose cotransporter 2 (SGLT2) inhibitor for the treatment of patients with type 2 diabetes
  - The kidneys of people with type 2 diabetes reabsorb greater amounts of glucose back into the body compared to nondiabetic people, which may contribute to elevated glucose levels.
  - Blocks the reabsorption of glucose by the kidney, increasing glucose excretion and lowering blood glucose levels
- Five options
  - Canagliflozin *CVD, **CKD
    - c/i: GFR <30 mL/min/1.73 m^2
  - Dapagliflozin *CHF, **CKD
    - c/i: GFR <25 mL/min/1.73 m^2
  - Empagliflozin *CVD, **CHF
    - c/i: GFR <20 mL/min/1.73 m^2 (heart failure indication)
  - Ertugliflozin
    - c/i: GFR <45 mL/min/1.73 m^2
  - Bexagliflozin
    - c/i: GFR < 30 mL/min/1.73m2

48

48

Warnings SGLT2[12]

- Hundreds of cases of DKA reported to FDA
  - Per FDA: "Ketoacidosis is not typically observed in patients with type 2 diabetes, the FDA notes, and the DKA case presentations were 'atypical in that glucose levels were only mildly elevated at less than 200 mg/dL (11 mmol/L) in some reports' "
- Urosepsis and pyelonephritis
- Lower extremity amputations
- Fournier's gangrene

49

49

Risk of Chronic Kidney Disease Progression: KDIGO

CKD Risk Map Prognosis of CKD by GFR and Albuminuria Category				Albuminuria categories Description and range		
				A1 Normal to mildly increased	A2 Moderately increased	A3 Severely increased
				<30 mg/g <3 mg/mmol	30-299 mg/g 3-29 mg/mmol	≥300 mg/g ≥30 mg/mmol
GFR categories (ml/min/1.73 m²) Description and range	G1	Normal or high	≥90	Monitor 1	Monitor 1	Refer* 2
	G2	Mildly decreased	60-89	Monitor 1	Monitor 1	Refer* 2
	G3a	Mildly to moderately decreased	45-59	Monitor 1	Monitor 2	Refer 3
	G3b	Moderately to severely decreased	30-44	Monitor 2	Monitor 3	Refer 3
	G4	Severely decreased	15-29	Refer* 3	Refer* 3	Refer 4+
	G5	Kidney failure	<15	Refer 4+	Refer 4+	Refer 4+

Risk of chronic kidney disease (CKD) progression, frequency of visits, and referral to nephrology according to glomerular filtration rate (GFR) and albuminuria

Figure 11

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Finerenone (Kerendia®)[13]

- Class
  - Non-steroidal mineralocorticoid receptor antagonist (MRA)
  - Finerenone blocks MR mediated sodium reabsorption and MR overactivation in both epithelial (e.g., kidney) and nonepithelial (e.g., heart, and blood vessels) tissues.
  - It has no relevant affinity for androgen, progesterone, estrogen, and glucocorticoid receptors.

- Indication
  - Reduce the risk of sustained eGFR decline, end stage kidney disease, cardiovascular death, nonfatal myocardial infarction, and hospitalization for heart failure in adult patients with chronic kidney disease (CKD) associated with type 2 diabetes (T2D)

51

51

Finerenone (Kerendia®)[13] (continued)

- Dosage
  - 10–20 mg starting dose based upon eGFR and potassium dosed once daily
    - eGFR: ≥60 mL/min/1.73 m^2: 20 mg once daily
    - eGFR: ≥25 to <60 mL/min/1.73 m^2: 10 mg once daily
    - eGFR: <25 mL/min/1.73 m^2: Not recommended
  - Increase dose to 20 mg once daily at 4 weeks based upon eGFR and serum potassium.
  - May be dosed with or without food; may be crushed and mixed with water or soft foods

52

52

Finerenone (Kerendia®)[13] (continued)

	10 mg Once Daily	20 mg Once Daily
Potassium ≤4.8 mEq/L	Increase dose to 20 mg daily.	Maintain dose of 20 mg daily.
Potassium >4.8–5.5 mEq/L	Maintain dose of 10 mg daily.	Maintain dose of 20 mg daily.
Potassium >5.5 mEq/L	Withhold finerenone Consider restarting at 10 mg daily when potassium ≤5.0 mEq/L.	Withhold finerenone Restart at 10 mg daily when potassium ≤5.0 mEq/L.

53

53

Combination Medications

- DPP4 inhibitors with biguanide
- DPP4 inhibitor with TZD
- Glinide with biguanide
- SGLT2 with biguanide
- SGLT2 with DPP4 inhibitor
- Sulfonylurea with biguanide
- TZD with biguanide
- TZD with sulfonylurea

54

54

Insulins

55

55

Case Study #1 – John

- Age – 55 years
- A1C – 8.5% (0.085 proportion)
- Weight – 220 pounds (100 kg)
- Medications
  - Glimepiride 4 mg daily
  - Sitagliptin/metformin 50/1000 mg 1-pill two times daily
  - Atorvastatin 40 mg 1-tablet daily
  - Aspirin 81 mg daily
  - Lisinopril/HCTZ 20/25 mg 1-pill daily

56

56

What's new?[5]

Before adding insulin, important to use GLP-1, if able.
If A1C remains above goal, proceed to insulin.

57

57

Rough Calculation

- How much insulin does someone need?
- Weight in kg/2=Total dose of insulin
  - Of total dose
    - 50%–60% basal
    - 40%–50% rapid-acting

58

58

Introduction of Insulin

Insulin Type	Onset	Peak	Duration
Rapid-acting (Humalog®, NovoLog®, Apidra®, Fiasp®, Admelog®)	10–15 minutes	1–2 hours	3–5 hours
Short-acting (Regular [Humulin R® and Novolin R®])	½–1 hour	2–4 hours	4–8 hours
Intermediate-acting (Humulin N® or Novolin N®)	1–3 hours	4–12 hours	10–18 hours
Long-acting analogues Glargine (Lantus®, Basaglar®, Toujeo®) Detemir (Levemir®) Degludec (Tresiba®)	 2–3 hours 1 hour	 None None	 24 hours+ Up to 24 hours

59

59

Pharmacologic Approaches to Glycemic Treatment: Intensifying to Injectable Therapies

Slide 165
https://professional.diabetes.org/content-page/slide-deck

Pharmacologic Approaches to Glycemic Management:
Standards of Care in Diabetes - 2023. Diabetes Care 2023;46(Suppl. 1):S140-S157

60

60

How to Initiate Insulin on John

- Start with long-acting insulin at bedtime.
  - 0.2 units/kg at bedtime
  - 100 kg patient= 220 pounds
  - 0.2 units= 20 units at bedtime
- Once above 50 units per day, may find two times daily dosing works best
- Rapid-acting insulin can be added immediately or later.

61

61

How to Use Neutral Protamine Hagedorn (NPH)/Regular Insulin

- Calculate total dosage.
- If you must use NPH and regular insulin due to cost (60/40 AM to PM ratio)
  - Morning dosage
    - Total daily dose of insulin (TDD) × 0.4 = AM NPH dosage
    - TDD × 0.2 = AM regular dosage
  - PM dosage
    - TDD × 0.2 = PM NPH dosage
    - TDD × 0.2 = PM regular dosage

62

62

Insulin:Carb Ratio[14]

- 1 unit of rapid-acting insulin covers 10–20 units of carbohydrates.
- 1 unit of insulin lowers glucose about 50 mg/dL (2.8 mmol/L).
- **How do you figure what ratio to use?**

- One method

Weight		Approx. I:C Ratio
Lbs	Kg	
<60	<27	1:30
60–80	27–36	1:25
81–100	37–45	1:20
101–120	46–54	1:18
121–140	55–64	1:15
141–170	64–77	1:12
171–200	78–91	1:10
201–230	91–104	1:8
231–270	105–123	1:6
>270	>123	1:5

63

63

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Self-Monitoring Advice[15]

- 2013 guidelines have modified these recommendations.
  - Individualize recommendations
  - Those on intensive insulin therapy should…
    - Test at least before meals, occasionally after eating, at bedtime, before exercise or critical tasks such as driving, when low blood glucose is suspected, and after treating low blood glucose to ensure normoglycemia has been reached.

64

64

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Glucose Monitoring – Recommendations[16]

- Most patients using intensive insulin regimens (multiple-dose insulin or insulin pump therapy) should perform self-monitoring of blood glucose (SMBG):
  - Prior to meals and snacks
  - At bedtime
  - Occasionally postprandially
  - Prior to exercise
  - When they suspect low blood glucose
  - After treating low blood glucose until they are normoglycemic
  - Prior to critical tasks such as driving

65

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Glucose Monitoring

- People who are taking insulin and using BGM should be encouraged to check their blood glucose levels when appropriate based on their insulin therapy.
- Examples: fasting, prior to meals and snacks, after meals, at bedtime, in the middle of the night, prior to, during, and after exercise, when hypoglycemia is suspected, after treating low blood glucose levels until they are normoglycemic, when hyperglycemia is suspected, and prior to and while performing critical tasks such as driving.

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Slide 64

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CGM

- **ADA recommends**: real-time CGM (rtCGM) or intermittently scanned CGM (isCGM) for diabetes management to adults with diabetes on any type of insulin therapy.
  - The choice of CGM device should be made based on the individual's circumstances, preferences, and needs.
- **Additional consideration:** using rtCGM and isCGM in adults with type 2 diabetes treated with glucose-lowering medications other than insulin to achieve and maintain individualized glycemic goals.
  - The choice of device should be made based on the individual's circumstances, preferences, and needs.

67

67

A1C Testing – Recommendations[16]

- Perform the A1C test **at least** two times a year in patients who are meeting treatment goals (and who have stable glycemic control). **E**
- Perform the A1C test quarterly in patients whose therapy has changed or who are not meeting glycemic goals. **E**
- Point-of-care testing for A1C provides the opportunity for more timely treatment changes. **E**

68

68

ADA-EASD Position Statement – Management of Hyperglycemia in T2DM[17]

- Anti-hyperglycemic therapy
  - Glycemic targets
    - HbA1C <7.0% (0.07 proportion) (mean PG ~150–160 mg/dL [8.3–8.9 mmol/L])
    - Preprandial plasma glucose (PG) <130 mg/dL (7.2 mmol/L)
    - Postprandial PG <180 mg/dL (10.0 mmol/L)
    - Individualization is key.
      - Tighter targets (A1C of 6.0%–6.5% [0.06–0.065 proportion]) – Younger, healthier
      - Looser targets (A1C of 7.5%–8.0%+ [0.075–0.08+ proportion]) – Older, comorbidities, hypoglycemia prone, etc.
      - Newest addition: NO A1C goal for those with very limited life expectancy or WW1 older adults with poor health/very complex care
    - Avoidance of hypoglycemia

PG = Plasma glucose

69

69

Slide 67

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Wendy Wright, 2025-01-05T14:08:44.352

Goals for A1C[18]

- More stringent HbA1c targets (e.g., 6.0%– 6.5% [0.06–0.065 proportion]) might be considered in select patients.
  - Short disease duration, long life expectancy, no significant CVD, if this can be achieved without significant hypoglycemia
- Conversely, less stringent HbA1c goals (e.g., 7.5%–8.0% [0.075–0.08 proportion] or even slightly higher) are appropriate for patients with a history of severe hypoglycemia, limited life expectancy, advanced complications, extensive comorbid conditions and those in whom the target is difficult to attain.

70

70

Glycemic Recommendations for Nonpregnant Adults with Diabetes[16]

A1C	**<7.0%*** **(0.07 proportion)**
Preprandial capillary plasma glucose	**80–130 mg/dL*** **(4.4–7.2 mmol/L)**
Peak postprandial capillary plasma glucose†	**<180 mg/dL*** **(10.0 mmol/L)**

* Goals should be individualized.
† Postprandial glucose measurements should be made 1–2 hours after the beginning of the meal.

71

71

Cardiovascular Disease and Risk Management

Recommendations for the Treatment of Confirmed Hypertension in People with Diabetes

Source:
Diabetes Care
Standards of Care in Diabetes—2023
American Diabetes Association Professional Practice Committee
2023;46(Supplement_1):S1-S292
https://diabetesjournals.org/care/issue/46/Supplement_1

72

72

BP Thresholds for and Goals of Pharmacological Therapy in Patients With Hypertension According to Clinical Conditions

Clinical Condition(s)	BP Threshold, mm Hg	BP Goal, mm Hg
General		
Clinical CVD or 10-year ASCVD risk ≥10%	≥130/80	<130/80
No clinical CVD and 10-year ASCVD risk <10%	≥140/90	<130/80
Older persons (≥65 years of age; noninstitutionalized, ambulatory, community-living adults)	≥130 (SBP)	<130 (SBP)
Specific comorbidities		
Diabetes mellitus	≥130/80	<130/80
Chronic kidney disease	≥130/80	<130/80
Chronic kidney disease after renal transplantation	≥130/80	<130/80
Heart failure	≥130/80	<130/80
Stable ischemic heart disease	≥130/80	<130/80
Secondary stroke prevention	≥140/90	<130/80
Secondary stroke prevention (lacunar)	≥130/80	<130/80
Peripheral arterial disease	≥130/80	<130/80

Atherosclerotic cardiovascular disease (ASCVD); blood pressure (BP); cardiovascular disease (CVD); and systolic blood pressure (SBP).

73

Cardiovascular Disease and Risk Management: Statin Treatment – Primary Prevention[5]

10.19: For patients with diabetes aged 40–75 years without atherosclerotic cardiovascular disease, use moderate-intensity statin therapy in addition to lifestyle therapy. **A**

10.20: For patients with diabetes aged 20–39 years with additional atherosclerotic cardiovascular disease risk factors, it maybe reasonable to initiate statin therapy in addition to lifestyle therapy. **C**

10.21: In patients with diabetes at higher risk, especially those with multiple atherosclerotic cardiovascular disease risk factors or aged 50–70 years, it is reasonable to use high-intensity statin therapy. **B**

10.22: In adults with diabetes and 10-year ASCVD risk of 20% or higher, it may be reasonable to add ezetimibe to maximally tolerated statin therapy to reduce LDL cholesterol levels by 50% or more. **C**

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74

Additional Guidance: ADA 2023[19]

- ADA recommends
  - High-intensity statin therapy in individuals with diabetes aged 40–75 years at higher risk, including **one or more** ASCVD risk factors to lower LDL by ≥50% and to target an LDL goal of <70 mg/dL (1.8 mmol/L).
  - For those with diabetes and known ASCVD, a high intensity statin to target an LDL cholesterol reduction of ≥50% from baseline and an LDL cholesterol goal of <55 mg/dL (1.4 mmol/L).
  - Combination therapy may be required to achieve these goals.

75

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Cardiovascular Disease and Risk Management – Antiplatelet Agents[5]

10.34: Use aspirin therapy (75–162 mg/day) as a secondary prevention strategy in those with diabetes and a history of atherosclerotic cardiovascular disease. **B**

10.35: For patients with atherosclerotic cardiovascular disease and documented aspirin allergy, clopidogrel (75 mg/day) should be used. **A**

10.36: Dual antiplatelet therapy (with low-dose aspirin and a P2Y12 inhibitor) is reasonable for a year after an acute coronary syndrome and may have benefits beyond this period. **A**

10.37: Long-term treatment with dual antiplatelet therapy should be considered for patients with prior coronary intervention, high ischemic risk, and low bleeding risk to prevent major adverse cardiovascular events. **A**

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76

76

Cardiovascular Disease and Risk Management – Antiplatelet Agents[5] (continued)

10.38: Combination therapy with aspirin plus low-dose rivaroxaban should be considered for patients with stable coronary and/or peripheral artery disease and low bleeding risk to prevent major adverse limb and cardiovascular events. **A**

10.39: Aspirin therapy (75–162 mg/day) may be considered as a primary prevention strategy in those with diabetes who are at increased cardiovascular risk, after a comprehensive discussion with the patient on the benefits versus the comparable increased risk of bleeding. A

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77

77

Immunizations

- Influenza vaccine annually
- PCV 20 or PCV 15 + PPSV 23 or PCV 21
- COVID vaccine
- Shingles vaccine
- Tdap vaccine
- Hepatitis B series
- RSV: 60 and older

78

78

Foot Care – Recommendations[20] (5)

- To perform the 10 g monofilament test, place the device perpendicular to the skin; apply pressure until monofilament buckles.
- Hold in place for 1-second and release.
- The monofilament test should be performed at the highlighted sites while the patient's eyes are closed.

79

79

MASLD

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- Use MD Calc
- Calculate FIB 4 score: is it ≥ 1.3?
  - If yes, higher risk for cirrhosis
  - Needs liver elasticity/stiffness measurement (LSM)
  - Pharmacologic agents with known benefit for MASLD
    - Pioglitazone
    - GLP-1 RA or GLP-1/GIP RA
  - Refer to algorithm in 2025 SOC – ADA guidelines

80

80

Let's Summarize

A: A1C, aspirin (if appropriate)
B: Blood pressure control
C: Cholesterol management, lipid annually, creatinine, GFR, urine albumin/creatinine ratio
D: Diet
E: Dilated eye examination yearly
F: Feet – Monofilament and vibratory/position sense, ankle reflex (or similar) annually
G: Goals reviewed at every visit
I: Immunizations

81

81

Slide 80

WW1 SOC 2025 guidelines
Wendy Wright, 2025-01-05T13:59:44.305

I would be happy to entertain any questions you have!

82

82

End of Presentation!
Thank you for your time, attention.

Wendy L. Wright,
DNP, ANP-BC, FNP-BC, FAANP, FAAN, FNAP

WendyARNP@aol.com

83

83

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88

Credits

Figures 1 & 2. 2009 & 2014 Diabetes and Obesity Maps
From the CDC. (Updated 2022). Age-Adjusted Prevalence of Diagnosed Diabetes and Obesity Among Adults, by County, United States (2004, 2009, 2014, 2019). (https://www.cdc.gov/diabetes/statistics/slides/maps_diabetesobesity_county-508.pdf) In the public domain

Figure 3. Diabetes and Obesity Map
From the CDC. (Updated 2022). Diabetes and Obesity Maps. (https://www.cdc.gov/diabetes/data/center/slides.html). In the public domain

Figure 4. Monitor
From VideoPlasty. (2018). Heart rate monitor. (https://commons.wikimedia.org/wiki/File:Heart_Rate_Monitor_Flat_Icon_Vector.svg). CC BY-SA 4.0.

Figure 5. Standards of Medical Care in Diabetes—2022
American Diabetes Association; Introduction: Standards of Medical Care in Diabetes—2022. Diabetes Care 1 January 2022; 45 (Supplement_1): S1–S2. https://doi.org/10.2337/dc22-Sint (https://professional.diabetes.org/content-page/practice-guidelines-resources)

Figures 6 & 7. Benefit of Diet/Exercise or Metformin on Diabetes
Adapted for FHEA from Knowler, W. C., et al., & Diabetes Prevention Program Research Group (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. The New England Journal of Medicine, 346(6), 393–403. https://doi.org/10.1056/NEJMoa012512

Figure 8. Pharmacologic Approaches to Glycemic Treatment
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89

89

Credits (continued)

Figure 9. Mechanism of Action of all DPP-4 Inhibitors
Fitzgerald Health Education Associates. All rights reserved.

Figure 10. The Incretin Effect in Subjects Without and With Type 2 Diabetes
Derived from Nauck, M.A. & Meier, J.J. (2016). The incretin effect in healthy individuals and those with type 2 diabetes: Physiology, pathophysiology, and response to therapeutic interventions. *The Lancet, Diabetes & Endocrinology*. 4(6), 525-536. doi:10.1016/S2213-8587(15)00482-9

Figure 11. CKD Risk Assessment Tool
National Kidney Foundation. (2015). CKD Risk Assessment Tool. https://www.kidney.org/sites/default/files/01-10-7027_ABG_HeatMap_Card_3_0.pdf

Figures 12 & 13. Pharmacologic Approaches to Glycemic Treatment: Intensifying to Injectable Therapies
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90

90