Objectives

1. Define diabetes and differentiate diabetes types.

2. Discuss complications related to diabetes.

3. Review medications used for patients with diabetes.

4. Review care considerations for medical assistants treating patients with diabetes.

What is diabetes?

- Diabetes is the inability of the body to produce or properly use insulin.

- 11.3% of U.S. population have diabetes

- 30% of the U.S. population have pre-diabetes

- Cost: $327 billion annually

- 38.2 million office visits per year

- More common in Alaskan Natives, Native Americans, non-Hispanic Blacks, Asians, and Hispanics than non-Hispanic Whites

Pre-Diabetes

- Fasting glucose between 100-126 or HbA1c between 5.7-6.4%

- Impairment in ability to use insulin properly

- Genetic factors

- Obesity

Type 1 Diabetes

- Inability of body to produce insulin

- Typically diagnosed in childhood

    - Most common chronic disease in childhood

- About 10% of diabetes cases in the U.S.

- Longer exposure to diabetes and more likely to experience disease complications

Type 2 Diabetes

- Most common type of diabetes

- More common with aging

- More common in the Southern U.S.

- Caused by genetic factors, obesity

Gestational Diabetes

- Diabetes during pregnancy

- Diagnosed with oral glucose tolerance test

- Goes away after pregnancy

- Increased risk for type 2 diabetes later in life

Complications of Diabetes- Blood Vessels

- High glucose over time damages blood vessels →

- Increased fatty deposits →

- Stroke

- Heart attack
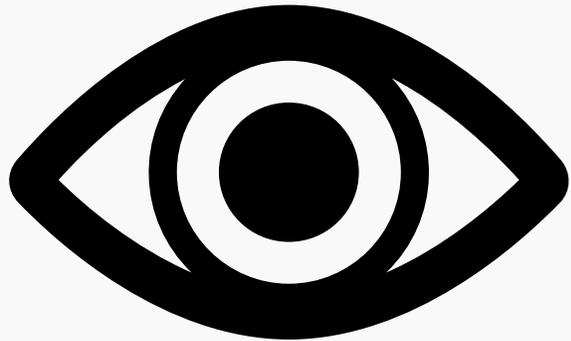
- Peripheral vascular disease

Complications of Diabetes- Kidneys

- High blood sugar attacks small vessels in the kidneys similarly to large vessels in heart

- One in three adults with diabetes have chronic kidney disease

- Kidney function checked regularly in labs

- Leading cause of kidney failure
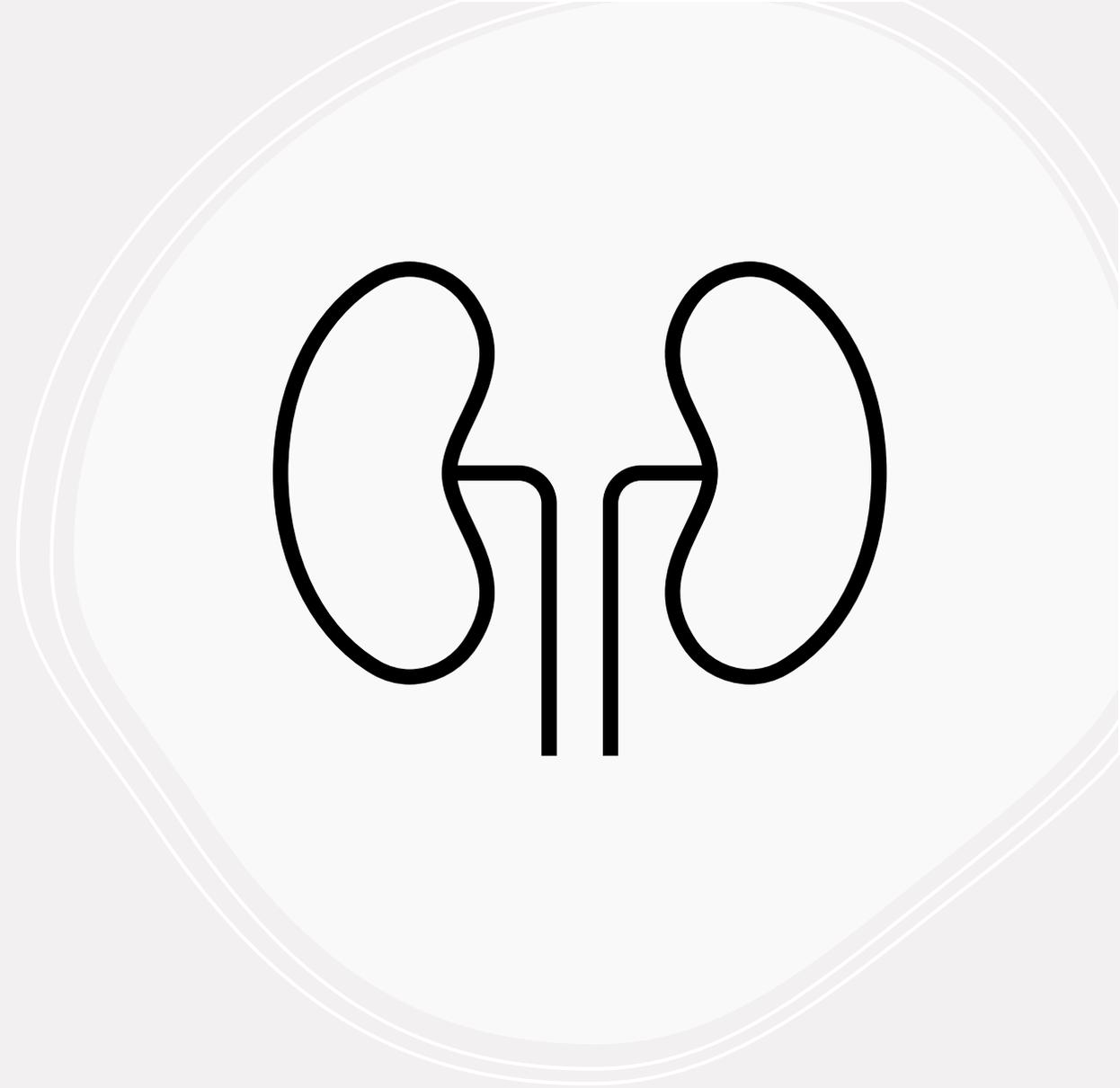
Complications of Diabetes- Eyes

- High blood sugar causes damage to small vessels in the eyes

- Increased risk for retinopathy (leading cause of preventable blindness

    - *damage to vessels in back of the eye*

- Increased risk for cataracts

    - *damage to the lens causing cloudiness*

- Increases risk for glaucoma

    - *damage to the drainage system*

    causing increased pressure and damage to the optic nerve

Complications of Diabetes- Nerves

- High glucose damages nerves so they stop sending signals

- Can cause nerve pain

    - sharp, stabbing, sensation changes "like walking on bubble wrap"

- Can cause numbness

    - increased risk of injury

- Important to do full foot exam

Other complications

- Fatty liver disease

- Depression

- Foot ulcers- blood flow

- Hearing loss

- Arthritis and fractures

Diabetes Medications

Medication Class	Names	Mechanism of Action	Side Effects	Cost	Weight
Insulin	*Long acting*: glargine, detemir, degludec *Intermediate acting*: NPH *Short acting*: Aspart, lispro, glulisine, regular Mixed insulin: 70/30, 50/50	Acts as a key to move blood sugar from blood to cells (muscles, tissues) which use it for energy	Low blood sugar, weight gain	Cheap or expensive	gain

Diabetes Medications

Medication Class	Names	Mechanism of Action	Side Effects	Cost	Weight
Biguanide	Metformin	Helps body use insulin better, decreases liver production of glucose	Diarrhea	Cheap	Slight weight loss, neutral

Diabetes Medications

Medication Class	Names (-ide)	Mechanism of Action	Side Effects	Cost	Weight
Sulfonylureas	Glipizide, glyburide	Stimulate pancreas to produce more insulin	Low blood sugar	cheap	Slight gain

Diabetes Medications

Medication Class	Names (-zone)	Mechanism of Action	Side Effects	Cost	Weight
Thiazoladinediones (TZDs)	Pioglitazone, rosiglitazone	Improve insulin sensitivity, move fat out of blood stream	Fluid retention	cheap	Slight gain

Diabetes Medications

Medication Class	Names (-glutides)	Mechanism of Action	Side Effects	Cost	Weight
GLP1-RA	Semaglutide, dulaglutide, exenatide, liraglutide, lixisenatide Tirzepetide (GLP1-GIP)	Stimulates insulin release, slows food from emptying stomach, reduces food intake	Nausea	expensive	loss

Diabetes Medications

Medication Class	Names (-flozin)	Mechanism of Action	Side Effects	Cost	Weight
SGLT2i	Canaglaflozin, dapaglaflozin, empaglaflozin	Wastes sugar in urine	Yeast infections, Urinary tract infections	Expensive	Slight loss

Medication Tips

- Only meds that will cause low blood sugar: insulin and sulfonylureas

- Usually, insurance will cover one of the medications in the class if branded

- Sometimes patients must "fail" metformin before branded med is covered.

- Ozempic "cheat" due to supply issues (18 clicks)

- Donut hole will always be a problem

- GLP-1 RA are one dose per week so 28- or 84-day supplies should be on prescriptions

Calculating Insulin

- All insulin pens have 3ml of insulin in them

    - 100 units/ml is standard for most **pens** so **300 units** are in each pen

-       - each **vial** has **1000 units** in it

- If a patient uses 28 units of insulin glargine in pen form daily, how many pens will they need for a 30-day supply?

    - 300/28=10.7 (10 days for each pen)

    - 30/10= 3 (3 pens for 30 day supply)

- If a patient uses 10 units of regular insulin before meals three times a day, how many vials will they need for a 90-day supply?

    - 10 x 3= 30 units per day. 1000 units/30 units per day is 33 days.

    90/33 days= 2.7- rounds up to 3 vials

Care Considerations for MAs

Diabetes Supplies

- Glucometer

  - For patients on medications that cause low blood sugar or those not meeting goals

- Continuous Glucose Monitoring

  - For patients on insulin

- Diabetic Shoes

  - For patients with neuropathy or those with vascular disease and history of ulcers

Care of Feet

- Check feet daily

- No pedicures from salons

- Wear supportive shoes (close-toed sneakers) or prescription diabetic shoes

- Do not walk around barefoot (even in the house) if you have neuropathy

Diabetes Stigma

The idea that patients have diabetes because of the choices they made.

Shame and guilt can cause depression and avoidance of healthcare facilities

Stigma can cause people not to perform important tasks (like checking blood sugar in public)

Do not say "Diabetic"

Do not say patient's weight after weighing

Diabetes Prevention

- Exercise- 150 min of moderate intensity exercise per week

- Healthy food choices

    - avoiding processed meats, sugary beverages, white carbs

    - rich in fruits, vegetables, whole grains, nuts, beans

- Weight loss

    - 5-10% weight loss reduces risk for diabetes

References

American Diabetes Association. Economic costs of diabetes in the US in 2017. Diabetes Care. 2018 May;41(5):917–928.

American Diabetes Association Professional Practice Committee (2022). 9. Pharmacologic Approaches to Glycemic Treatment: Standards of Medical Care in Diabetes-2022. Diabetes care, 45(Suppl 1), S125–S143. https://doi.org/10.2337/dc22-S009

Centers for Disease Control and Prevention. (2022, November 23). *Diabetes Stigma: Learn About It, Recognize It, Reduce It.* https://www.cdc.gov/diabetes/library/features/diabetes_stigma.html#print

Cowie, C. C., Casagrande, S. S., Menke, A., Cissell, M. A., Eberhardt, M. S., Meigs, J. B., Gregg, E. W., Knowler, W. C., Barrett-Connor, E., Becker, D. J., Brancati, F. L., Boyko, E. J., Herman, W. H., Howard, B. V., Narayan, K. M. V., Rewers, M., & Fradkin, J. E. (Eds.). (2018). Diabetes in America. (3rd ed.). National Institute of Diabetes and Digestive and Kidney Diseases (US).