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Introduction to VA/DoD Clinical Practice Guideline for the Management of Type 2 Diabetes Mellitus

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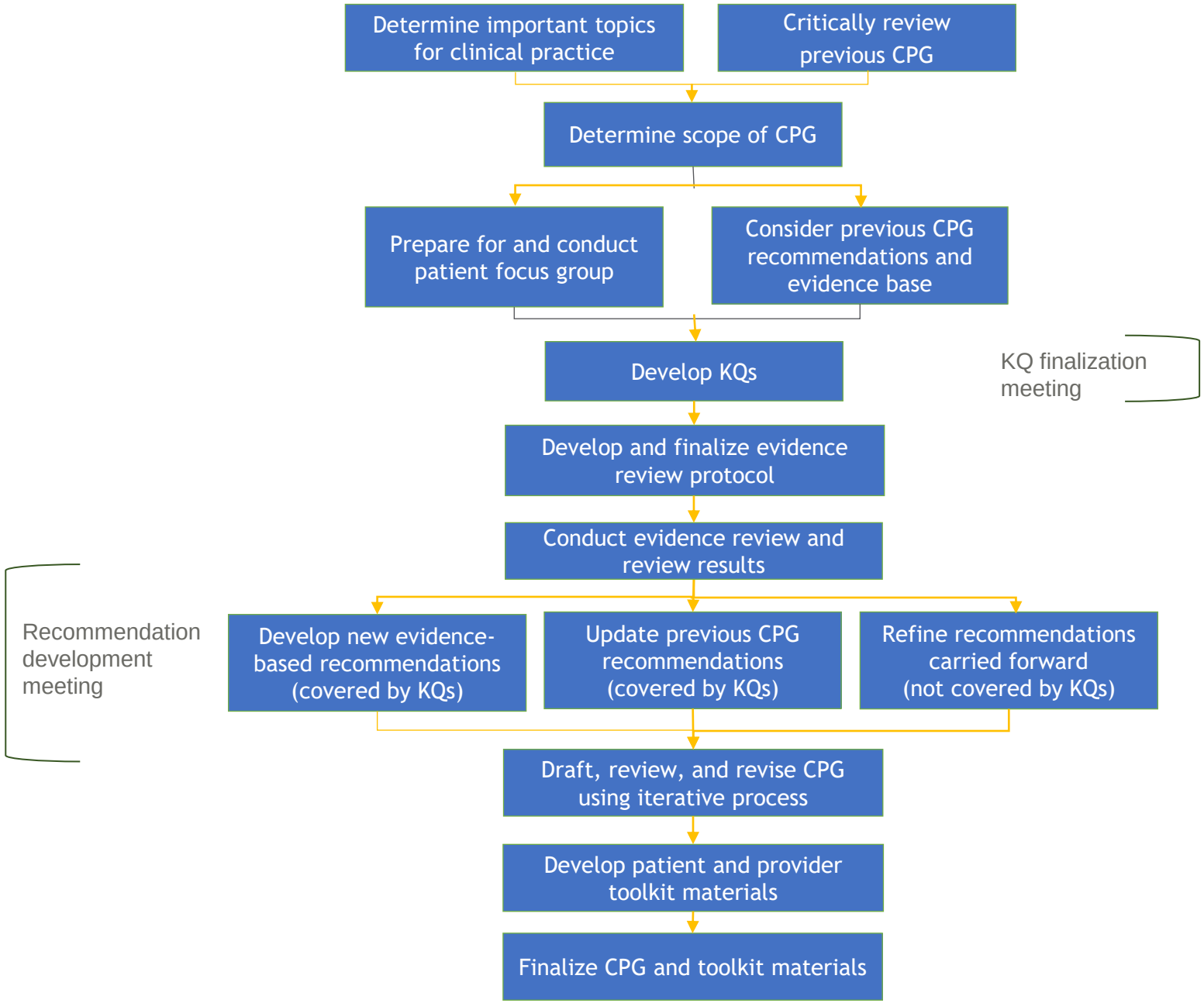
Overview of CPG Development Process



Grading Recommendations - GRADE

- Evidence-based clinical practice recommendations were developed based on the:
  - Evidence review, which was informed by 12 key questions
  - GRADE (Grading of Recommendations Assessment, Development and Evaluation) methodology and use of four decision domains to determine strength (*Strong* or *Weak*) and direction (*For* or *Against)* of each recommendation:
    - Confidence in the quality of evidence
    - Balance of desirable and undesirable outcomes
    - Values and preferences
    - Other implications, as appropriate (e.g., resource use)

Strength of a Recommendation

- Strength of a recommendation on a continuum:
  - ***Strong for*** (or "*We recommend*…")
  - ***Weak for*** (or "*We suggest*…")
  - ***Neither for nor against*** (or "*There is insufficient evidence*…")
  - ***Weak against*** (or "*We suggest against*…")
  - ***Strong against*** (or "*We recommend against*…")

Polling Question

1. VA/DoD CPG evidence based guideline recommendations with are developed based on all of the following except:
   a. Evidence review
   b. GRADE (Grading of Recommendations Assessment, Development and Evaluation)
   c. Expert opinion
   d. Confidence in the quality of evidence

Definitions

- Type 2 Diabetes Mellitus (T2DM)
  - T2DM is due to progressive insulin deficiency on a background of insulin resistance.
  - This is thought to be because of genetic factors and obesity, especially increased visceral adiposity.
- Prediabetes
  - Describes hyperglycemia insufficient to meet the diagnostic criteria for DM.
  - It has been historically been categorized as either impaired fasting glucose (IFG) or impaired glucose tolerance (IGT).
  - Prediabetes is usually seen on the continuum in the progression from normoglycemia to eventual T2DM.

Epidemiology

- T2DM is a growing health concern in global, United States, VA, and DOD populations.
- World-wide T2DM prevalence increased from approximately 151 million in 2000 to 537 million individuals in 2021.
- The US had approximately 29 million diagnosed and approximately 8.5 million undiagnosed individuals with T2DM in 2022, or about 1 in 8 adults.
- Nearly one in four Veterans (1.6 million individuals) currently receiving VA care has DM.
- MHS beneficiaries vary depending on age.

Implications

- Often, T2DM is preceded by prolonged asymptomatic hyperglycemic period where microvascular and macrovascular damage occurs.
- T2DM occurs with other comorbid conditions (e.g.- metabolic syndrome) that influence the disease's pathogenesis, course, complications, and treatment.
- T2DM is closely associated with the increased prevalence of obesity in the U.S. Currently, ~42% of Americans are considered obese; diabetes is present in 6.6% of normal weight, 10.3% of overweight, and 23.3% of obese individuals

Polling Question

2. Type 2 Diabetes Mellitus (T2DM) is defined by progressive insulin deficiency on a background of insulin resistance.

a. True
b. False

Prediabetes & Diabetes Diagnosis

Status	Fasting Plasma Glucose [a,b] or HbA1c [c, d]
Diabetes Mellitus	FPG ≥126 mg/dL (7.0 mmol/L) on two occasions
	OR
	HbA1c ≥6.5% with a confirmatory FPG ≥126 mg/dL (7.0 mmol/L)
	OR
	HbA1c ≥7.0% OR Two-hour plasma glucose on 75g OGTT of >200 mg/dl
Prediabetes	FPG ≥100 mg/dL and <126 mg/dL on two occasions
	OR
	HbA1c ≥5.7–6.4% and FPG ≥100 mg/dL (5.5 mmol/L) and <126 mg/dL (7.0 mmol/L)
	OR
	Two-hour plasma glucose on 75g OGTT of 140–199 mg/dL (7.8–11.0 mmol/L) (IGT)
Normal	FPG <100 mg/dL (<5.5 mmol/L) HbA1c <5.7%

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Individualized targets for A1C

Major Comorbidity[g] or Physiologic Age	Microvascular Complications		
	Absent or Mild [h]	Moderate [i]	Advanced [j]
Absent [k] **>10–15 years of life expectancy**	6.0–7.0% [l]	7.0–8.0%	7.5–8.5% [m]
Present [n] **5–10 years of life expectancy**	7.0–8.0% [l]	7.5–8.5%	7.5–8.5% [m]
Marked [o] **<5 years of life expectancy**	8.0–9.0% [m]	8.0–9.0% [m]	8.0–9.0% [m]

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Polling Question

3. Diagnosis of Type 2 Diabetes Mellitus (T2DM) includes all of the following **except:**

a. Fasting plasma glucose ≥126 mg/dL (7.0 mmol/L) on two occasions or
b. HbA1c ≥6.5% with a confirmatory FPG ≥126 mg/dL (7.0 mmol/L) or
c. HbA1c ≥7.0% OR Two-hour plasma glucose on 75g OGTT of >200 mg/dl
d. Symptoms of polyuria and polyphagia

Pharmacotherapy for Adults With Prediabetes

- Population: Patients who remain at **high risk for progression to T2M <u>after lifestyle modification</u>**

- Recommendation:
  1. Evaluate Patient characteristics prior to offering pharmacotherapy
     - (e.g., age, life expectancy, co-occurring conditions, BMI)

  2a. Metformin

  2b. If poor candidates for metformin use
     - Pioglitazone, Acarbose, Liraglutide

  3. Future Potential
     - SGLT-2s and other GLP-1 RAs

- Benefit: Decrease the risk of major cardiovascular adverse event

Pharmacotherapy for Adults With T2DM

- Population: <u>High risk of</u> OR <u>with</u> **ASCVD**

- Recommendation: GLP-1 RA or SGLT-2 inhibitor (with proven CVD benefit)

<u>*GLP-1 RAs*</u>	<u>*SGLT-2 Inhibitors*</u>
Liraglutide	Canagliflozin
Dulaglutide	Empagliflozin
Semaglutide (Inj)	

- Benefit: Decrease the risk of major cardiovascular adverse event

Pharmacotherapy for Adults With T2DM

- Population: **Heart Failure**

- Recommendation: SGLT-2 inhibitor

- Benefit: Prevention of hospital admissions for heart failure

Pharmacotherapy for Adults With T2DM

- Population: **Chronic Kidney Disease**

- Recommendation: SGLT-2 inhibitor (with proven renal protection)

SGLT-2 Inhibitors

Canagliflozin

Empagliflozin

Dapagliflozin

- Benefit: Improvement in renal outcomes

Pharmacotherapy for Adults With T2DM

- Population: **Chronic Kidney Disease** who are <u>not</u> good candidates for SGLT-2 inhibitors

- Recommendation: GLP-1 RA (with proven renal protection)

  <u>GLA-1 RA</u>

  Liraglutide

  Dulaglutide

  Semaglutide

- Benefit: to improve macroalbumineria

Pharmacotherapy for Adults With T2DM

Important Considerations in Treatment

- Consider utilizing SGLT-2 inhibitors and GLP-1 RAs in those with CVD or renal disease regardless of if the patient has reached glycemic targets

- Prioritize drug classes other than insulin, sulfonylureas, or meglitinides to minimize the risk of hypoglycemia, if glycemic control can be achieved with other treatments.

Polling Question

4. The VA/DoD T2DM CPG give a “Strong For” recommendation for the use of glucagon like peptide-1 receptor agonists or sodium glucose cotransporter-2 inhibitors with proven cardiovascular benefits to decrease the risk of major adverse cardiovascular events in patients with T2DM with atherosclerotic cardiovascular disease.

a. True

b. False

Key Recommendation Medical Nutrition Therapy

#	Recommendation	Strength	Category
Non-Pharmacologic Medical Nutrition Therapy			
12.	For adults with type 2 diabetes, we suggest a Mediterranean style nutrition intervention strategy to improve glycemic control, body weight, and hypertension.	Weak for	Reviewed, New Replaced

Mediterranean/DASH-style nutrition intervention pattern has been shown to be:

- Effective in improving glycemic control
- Improving A1c
- Delaying time to first Pharmacological intervention
- Improve blood pressure
- Reduce Cardiovascular Risk
- Reduce Weight

Esposito K. Ann Int Med. 2009; 151:306-312. Jin. J Diab Investig 2021;12(3):357-64. Rock CL. Diabetes Care. 2014;37(6)573-80. Schwingshackl L. Eur J Epidemiol 2018;33(2): 157-70.

INTERNET https://vaww.nutrition.va.gov/DiabetesToolkit.asp

Fish	Oils	Nuts, Beans, Seeds, and Legumes	Vegetables	Fruits	Grains	Herbs and Spices
Make fish a choice at least twice a week.	Choose unsaturated fat sources.	Try to eat 3-6 servings per week.	Choose 4+ servings per day. Make 1 serving raw.	Choose 3 or more servings per day.	Choose whole grains 2-3 servings per day.	Use in place of salt to season foods.
Salmon Sardines Cod Mackerel Herring Lake trout Tuna	Olive oil Walnut oil Canola oil Flaxseed oil Avocado oil	Flax seed/Chia seed Beans: black, black eye, kidney, chickpeas, lima, pinto Lentils Walnuts/Pecans Pistachios/Cashews Sunflower seeds	Eggplant, Squash broccoli, cauliflower Peppers, Onions Lettuce, All Greens Celery, Tomato Leeks, Kohlrabi	Apples Oranges Peaches Pears Pineapple Grapes Mango Pomegranates	Oats Whole wheat bread Rye Barley Couscous Whole wheat pasta Quinoa Brown rice Farro	Cloves Mustard seed Marjoram Tarragon Cumin Garlic Mint

Dietary Approaches to Stop Hypertension (DASH)

Ajala O. Am J Clin Nutr. 2013;97(3):505-16. Schwingshackl L. Eur J Epidemiol 2018;33(2): 157-70.

Key Recommendation Medical Nutrition Therapy

#	Recommendation	Strength	Category
Non-Pharmacologic Medical Nutrition Therapy			
13.	For adults with type 2 diabetes, we suggest a Nutrition Intervention Strategy providing 13-50% of total daily Caloric intake from carbohydrate for diabetes management..	Weak for	Reviewed, New Replaced

A nutrition intervention strategy providing reduced energy from Carbohydrate has been shown to:

- Effective in improving fasting plasma glucose
- Improving A1c
- Improve systolic and diastolic blood pressure
- Reduce pharmacological agent requirements
- Achieves a greater reduction in triglycerides and increases HDL-C

Graham-Kampmann. Diabetes, Obesity, Metabolism. 2022;24(4):693-703. Marco-Benedi' Clinical Nutrition 2020;24:693-703

Carbohydrate Counting Tool

Starches	Fruit	Milk	Sweets	Non-Starchy Vegetables	Protein	Fats
1 serving = 15 grams of carb	**1 serving = 15 grams of carb**	**1 serving = 12 grams of carb**	**1 serving = 15 grams of carb**	**1 serving = <5 grams of carb**		
Healthy Choices 1/3 cup brown rice ¼ lg. sweet potato ½ cup mashed potato 1 small baked potato ½ cup beans/peas (cooked) ½ cup corn 3 cups popped popcorn ½ cup cooked oatmeal ¾ cup dry cereal ½ cup bran cereal 1 slice whole grain bread **Less Healthy** 1/3 cup rice or pasta ¼ large bagel ½ hamburger bun ½ English muffin ½ large biscuit 6 crackers 4" pancake or waffle 10 french fries 12-15 chips **Combo Foods** 1 cup soup 1 slice thin pizza ½ cup casserole 2"square lasagna 2-3 chicken strips	1 small piece ▪ apple ▪ pear ▪ peach ▪ orange 1 cup melon cubes ▪ cantaloupe ▪ honeydew ▪ watermelon 1 cup berries ▪ strawberries ▪ blueberries ▪ raspberries 1./2 banana 15 grapes or cherries ½ cup canned fruit (light syrup or juice) 2 Tbsp. raisins 3-4 prunes ¼ - ½ cup fruit juice	1 cup whole milk 1 cup 2% milk 1 cup skim milk 6-8 oz. yogurt (varies by brand, check the label) **Milk Alternatives** 1 cup oat milk 1 -1 ½ cup soy milk 1-1 ½ cup almond milk 1 cup coconut milk (varies by brand, check the label)	½ cup ice cream ½ ice cream bar ¼ cup sherbet ½ doughnut 6 vanilla waters 2 Oreo cookies 2" unfrosted brownie 3 graham cracker squares 3 peppermint candies 5 chocolate kisses ½ cup gelatin 1 small granola bar 1 popsicle 9 jelly beans	1 cup raw or 1 cup cooked asparagus green beans beets broccoli brussel sprouts cabbage carrots cauliflower celery cucumbers greens lettuce mushrooms okra onions peppers radishes squash spinach tomatoes turnips zucchini	chicken turkey beef pork fish shellfish bison venison cheese cottage cheese eggs tofu	**Monounsaturated** canola oil olive oil peanut oil nuts avocado olives **Polyunsaturated** soybean oil corn oil sunflower oil margarine mayonnaise salad dressing pumpkin seeds sunflower seeds **Saturated** butter shortening cream cheese sour cream lard

Key Recommendation Medical Nutrition Therapy

#	Recommendation	Strength	Category
Non-Pharmacologic Medical Nutrition Therapy			
14.	For adults with type 2 diabetes, we suggest a vegetarian dietary pattern for glycemic control and weight loss	Weak for	Reviewed, New Replaced

A vegetarian / plant powered nutrition intervention has been shown to

- Effective in improving Fasting glucose
- Reduce A1c
- Improve blood pressure
- Improve lipid profile
- Reduce Weight

Viguiliouk. Clinical Nutr. 2019;38(3):133-45.

Online Resources

Diabetes Information: VA Nutrition and Food Services:

https://www.nutrition.va.gov/Diabetes.asp

VA Healthy Teaching Kitchen:

https://www.nutrition.va.gov/Healthy_Teaching_Kitchen.asp

Key Recommendation Exercise and Prediabetes

#	Recommendation	Strength	Category
Non-Pharmacologic Diabetes Self Management Education and Support			
1.	In adults with pre-diabetes, we suggest aerobic exercise such as walking 8-9 miles a week and eating healthy (with a goal weight loss of >3%) to achieve a reduction in body fat mass and improve fasting glucose.	Weak for	Reviewed, New-Added

Aerobic Exercise and Healthy eating for prediabetes

Improvement in Fasting Plasma Glucose

Improvement in Matsuda Index

Stents FB. BMJ Open Diabetes Res Care. 2016;4(1). Mora-Rodriguez Rl Diabetes Metab. 2020;46(3)210-8.

Key Recommendation Physical Activity and Diabetes

#	Recommendation	Strength	Category
Non-Pharmacologic Diabetes Self Management Education and Support			
15.	In adults with type 2 diabetes, we suggest regular physical activity to improve glycemic control, including but not limited to aerobic exercise, resistance training or tai chi	Weak for	Reviewed, New-added

General Physical Activity is associated with

- Improved blood glucose
- Decrease body fat mass
- Increased muscle strength
- Balance improvement (single limb standing test)

Shah SZA. Diabetes Ther 2021; 12(3):707-32. Zhu X. Int J Sports Nutr Exerc Metab 2022;32(3)186-94. Bock BC Complement Ther Med 2019;42;125-31 .

Physical Activity Recommendations

- 150 minutes or more of endurance activity, per week
  - Walking, Biking, Swimming
- 2-3 sessions per week of resistance training
  - Resistance Bands, Weights
- Flexibility Training 2-3 times per week
  - Yoga, Dance, Tai Chi
- Do not sit for more than 30 minutes at a time
- No more than two days in a row without exercise

Polling Question

5. The VA/DoD T2DM CPG recommends all of the following non-pharmacologic management strategies in the management of T2DM **except:**

a. Nutrition intervention providing 13-50% daily caloric intake from carbohydrates
b. A Mediterranean or vegetarian pattern style diet
c. Aerobic exercise
d. Keto diet

Key Recommendation Diabetes Self-Management Education

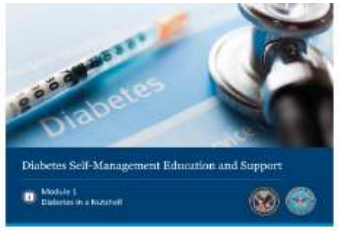
#	Recommendation	Strength	Category
Non-Pharmacologic Diabetes Self Management Education and Support			
15.	In adults with Type 2 diabetes, we recommend diabetes Self-management Education and Support.	Strong for	Not Reviewed, Amended

Structured Diabetes Self-Management Education and Support

- Improves A1c
- Reduces blood pressure
- Improves disease knowledge
- Increases engagement in self-care behaviors

Chrvala C. Patient Educ Couns. 2016;99(6)926-43. Steinsbekk A. BCM Health Serv Res 2012; 12:213.

Diabetes Self Management Education Core Classes



Module 3 - Healthy Coping

Module 4 - Taking Medications

Module 5 - Healthy Eating

Module 6 - Being Active

Module 7 - Reducing Risks

Module 8 - Problem Solving

https://vaww.nutrition.va.gov/DiabetesToolkit.asp

Case Study

75 y.o. Male Veteran

- Consult to receive all Meds from VHA.
- DM of 8 years on:
  - Metformin 1 gm bid
  - Glipizide 10 mg bid

Case Study

PMH:

- HTN
- Hyperlipidemia
- CKD w/Proteinuria
- Heart Failure
- CVA-3 years ago
- Pancreatitis x 1 w/cholelithiasis/cholecystectomy
- Uti (uncomplicated) x 1 w/diagnosis of DM

Case Study

Labs

- eGFR 48
- microalbuminuria/cr ratio 300
- A1c of 7.3% w/occasional lows ~ 1 x wk

- BMI-35

Case Study

Considerations for DM Meds after DSMES referral offered:

1. **Empagliflozin 10 instead of glipizide (will help proteinuria/HF/CVA risk) point out that uncomplicated UTI in not C/I but urosepsis would be)**
2. Alogliptin (avoid in HF)
3. Glargine (avoid risk of lows)
4. None of the above

Case Study

3 years later pt now has eGFR of 26, Metformin has been stopped and replaced w/Glargine 34 units. He is still on empagliflozin 10 what would be the best choice for DM meds?

1. Addition of mealtime insulin (may need this)
2. Stop Empagliflozin and start GLP-1 (Pancreatitis as a result of cholelithiasis/cholecystectomy not C/I but recurrent pancreatitis might give one pause)
3. Low dose Alogliptin-(C/I in HF)
4. All of the above

New Patient Summary

VA/DoD CLINICAL PRACTICE GUIDELINE FOR THE MANAGEMENT OF TYPE 2 DIABETES MELLITUS

Department of Veterans Affairs
Department of Defense

Patient Summary

I. What is prediabetes and what is the concern?

A fasting blood sugar between 100-125mg/dL could mean that you have prediabetes. Individuals with prediabetes are at higher risk of heart disease, stroke, and eye disease. Prediabetes is important in middle-aged adults, but there is less risk of progression to diabetes for adults older than 75.

A. Could you have prediabetes?

Take the test here: Could you have prediabetes?

II. What is diabetes and what is the concern?

Diabetes is a condition where the body is unable to produce enough insulin or properly use the insulin it has produced. In type 2 diabetes mellitus (T2DM), the body is not able to use the insulin it makes, and insulin production may be lower than it should be. In type 1 diabetes, the body is not able to make insulin.

People with diabetes are at higher risk of small vessel diseases such as eye disease, nerve disease, and kidney disease. Diabetes also increases the risk of large vessel diseases including heart attack and stroke. Poor management can increase the risk of developing additional complications related to diabetes.

A. How is diabetes diagnosed?

There are several ways to diagnose diabetes, and each test usually needs to be repeated to confirm the diagnosis. If you have an HbA1c of 6.5% or higher, you may have diabetes mellitus. Ask your doctor about additional testing.

Access to VA/DoD Diabetes Guidelines- [Management of Type 2 Diabetes Mellitus (2023) - VA/DoD Clinical Practice Guidelines]

http://www.healthquality.va.gov

Audience Q&A