Team-Based Approaches to Help Older Adults With Type 2 Diabetes Achieve Individualized Glycemic Goals

1. Which one of the agents listed here is widely considered the first-line therapy in type 2 diabetes due to its well-known efficacy and safety profile, yet should be used with caution in renally impaired older adults?

A. Insulin  
B. Sitagliptin  
C. **Metformin**  
D. Glyburide


2. ________________ and ________________ can both affect cognition.

A. Polypharmacy, urinary incontinence  
B. Engaging colleagues, meal planning  
C. Caregiver priorities, patient priorities  
D. **Hyperglycemia, hypoglycemia**


3. Which one of the following organizations has the most liberal goals with respect to A1c targets for older adults?

A. They all have the same A1c targets for older adults  
B. **American Geriatrics Society**  
C. American Diabetes Association  
D. International Diabetes Foundation

4. Assessing a patient’s self-management ability, inquiring about lifestyle priorities, and consulting with family members may all be considered ways to ________________?

A. Truly engage the patient as a member of the health care team  
B. Win the cooperation of colleagues such as dietitians  
C. Become better acquainted with the older generation  
D. Achieve A1C targets more quickly

To really engage the patient as a member of the health care team, clinicians need to have some idea of his or her self-management ability and any competing priorities. It is important to know what the patient thinks is important. [Kirkman MS, Briscoe VJ, Clark N, et al. Diabetes in older adults. Diabetes Care. 2012;35(12):2650-2664, esp. discussion of shared decision making.]

5. According to a hazard analysis published in 2002, patients with severe hypoglycemia requiring emergency services or hospitalization are ____________?

A. at lower risk of developing any form of dementia  
B. at lower risk of developing Alzheimer’s disease  
C. at higher risk of developing any form of dementia  
D. at higher risk of developing Alzheimer’s disease only

In the study by Whitmer et al, the more severe hypoglycemic events patients had, the more their hazard ratio increased, up to an almost 2-fold risk of any form of dementia (not just Alzheimer’s disease). [Whitmer RA, Karter AJ, Yaffe K, Quesenberry CP, Selby JV. Hypoglycemic episodes and risk of dementia in older patients with type 2 diabetes mellitus. JAMA. 2009;301(15):1565-1572.]

6. Which of the following variables must be assessed when setting glycemic targets for older adults?

A. Vascular complications  
B. Social support systems  
C. Life expectancy  
D. Time elapsed since diagnosis  
E. All of the above  
F. None of the above

A one-size-fits-all approach is not appropriate for many older individuals, and that includes people who are less motivated, potentially non-adherent, or who may have poor self-care capacities. Life expectancy and time since diagnosis are also important variables to consider when setting glycemic targets. [diagram from Inzucchi SE, Bergenstal RM, Buse JB, et al. Management of hyperglycemia in type 2 diabetes: a patient-centered approach: position statement of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). Diabetes Care. 2012;35(6):1364-1379.]
7. Cost savings, reduced hospitalization rates, and improved monitoring for T2DM-related complications have been associated with which one of the following?

A. Demonstration projects of patient-centered medical homes
B. Pioneer assisted living facilities
C. All pioneer accountable care organizations
D. Intergenerational retirement centers

Patient-centered medical homes have been studied, and demonstration projects involving patients with T2DM have been shown to impart cost savings, aid in the achievement of self-management goals, reduce hospitalization rates, and improve the monitoring of T2DM-related complications. [Tuttle KR, Bakris GL, Bilous RW, et al. Diabetic kidney disease: a report from an ADA Consensus Conference. Diabetes Care. 2014;37(10):2864-2883.]

8. Urinary incontinence, vision impairment, and cognitive impairment are all examples of ___________.

A. geriatric syndromes that should be considered when formulating glycemic goals for older adults
B. symptoms of insulin resistance in older adults with multiple comorbidities
C. sequelae of undiagnosed clinical depression in older adults with multiple comorbidities
D. side effects of incretin-based therapies

In addition to depression, the following geriatric syndromes should be considered: polypharmacy, cognitive impairment, urinary incontinence, injurious falls and fractures, pain, vision and hearing impairments. [Kirkman MS, Briscoe VJ, Clark N, et al. Diabetes in older adults. Diabetes Care. 2012;35(12):2650-2664.]

9. Which one of the following would NOT be included in a list of consensus recommendations aimed at improving care for older adults with T2DM?

A. Assess patients for hypoglycemia and cognitive function regularly
B. Take steps to avoid physical exertion
C. Choose antihyperglycemic therapies carefully
D. Keep recommendations in line with patient priorities

Consensus recommendations include the following: screen older adults regularly; assess patients regularly for hyperglycemia; assess the burden of treatment; keep recommendations in line with patient priorities; choose antihyperglycemic therapies carefully; individualize goals and reassess goals frequently. [Kirkman MS, Briscoe VJ, Clark N, et al. Diabetes in older adults. Diabetes Care. 2012;35(12):2650-2664.]
10. Regular physical activity to stimulate muscle uptake of glucose may be considered ____________?

A. less appropriate than pharmacological approaches for older adults with a sedentary lifestyle
B. less feasible if poor dietary habits are firmly established
C. more feasible due to comorbidities associated with aging
D. a critically important way to help older adults with T2DM to achieve their glycemic goals

Non-pharmacological approaches are critically important, especially appropriate intake of carbohydrates as well as regular physical activity to stimulate muscle uptake of glucose. [Kirkman MS, Briscoe VJ, Clark N, et al. Diabetes in older adults. *Diabetes Care*. 2012;35(12):2650-2664.]

11. With respect to the risk of hypoglycemia when added to metformin, which set of relationships between classes of agents shown below is most accurate?

A. biphasic insulin > basal insulin > sulfonylureas
B. GLP-1 receptor agonists > DPP-4 inhibitors > sulfonylureas
C. biphasic insulin > glinides > TZDs
D. sulfonylureas > biphasic insulin > GLP-1 receptor agonists

Metformin is often used at baseline and carries negligible risk for hypoglycemia. Risk increases with various metformin combinations (See Figure 4). [Liu SC, Tu YK, Chien MN, Chien KL. Effect of antidiabetic agents added to metformin on glycaemic control, hypoglycaemia and weight change in patients with type 2 diabetes: a network meta-analysis. *Diabetes Obes Metab*. 2012;14(9):810-820.]

12. Investigators in the ACCORD-MIND trial found a significant association between a 1% higher A1c level and ________________?

A. improved performance on cognitive function tests
B. impaired performance on cognitive function tests
C. increased likelihood of depressive symptoms
D. decreased likelihood of depressive symptoms

In a sub-study of the ACCORD trial called the ACCORD-MIND trial, investigators studied the relationship between A1c at baseline and performance on several cognitive tests. . . . Investigators found that a 1% higher A1c was significantly associated with worse performance on a variety of cognitive function tests. [Cukierman-Yaffe T, Gerstein HC, Williamson JD, et al. Relationship between baseline glycemic control and cognitive function in individuals with type 2 diabetes and other cardiovascular risk factors: the action to control cardiovascular risk in diabetes-memory in diabetes (ACCORD-MIND) trial. *Diabetes Care*. 2009;32(2):221-226.]
13. Autonomic neuropathy is a risk factor for hypoglycemia in older adults. Which of the following medication classes should be avoided in an older adult with autonomic neuropathy?

A. SGLT-2 inhibitors  
B. GLP-1 receptor agonists  
C. DPP-4 inhibitors  
**D. secretagogues like the sulfonylureas**

Autonomic neuropathy is another risk factor for hypoglycemia in older adults. This is far more common in older adults, and when present, agents such as insulin secretagogues should be used with extreme caution. [Neumiller JJ, Setter SM. Pharmacologic management of the older patient with type 2 diabetes mellitus. *Am J Geriatr Pharmacother*. 2009;7(6):324-342.]

14. Which one of the following is NOT normally considered a risk factor for hypoglycemia among older adults with T2DM?

A. Overtreatment with antidiabetic medications  
B. Weight loss due to changed eating habits over time  
C. Dementia  
**D. Weight gain due to sedentary lifestyle**

Older adults are an at-risk population for hypoglycemia for many reasons. First of all, older adults are sometimes overtreated in an effort to achieve tight glycemic control. As people age, eating habits change and they may lose weight. If A1c falls below 5.5%, the risk of hypoglycemia is greatly elevated. [Neumiller JJ, Setter SM. Pharmacologic management of the older patient with type 2 diabetes mellitus. *Am J Geriatr Pharmacother*. 2009;7(6):324-342.]

15. The greatest risk of hypoglycemia derives from ______________ when combined with metformin.

**A. biphasic insulin**  
B. glinides  
C. sulfonylureas  
D. basal insulin

Metformin is often used at baseline and carries negligible risk for hypoglycemia. Risk increases with various metformin combinations (See Figure 4). [Liu SC, Tu YK, Chien MN, Chien KL. Effect of antidiabetic agents added to metformin on glycaemic control, hypoglycaemia and weight change in patients with type 2 diabetes: a network meta-analysis. *Diabetes Obes Metab*. 2012;14(9):810-820.]

16. This agent is generally avoided in older adults with T2DM due to its 5-fold greater risk for hypoglycemia when compared to glimepiride.

A. metformin  
**B. glyburide**  
C. sitagliptin  
D. empagliflozin

17. Agents within this class of pharmaceuticals have a strong capacity to lower blood glucose levels. They are associated with significant weight loss along with the potential for nausea and vomiting during drug initiation.

A. biguanides
B. SGLT-2 inhibitors
C. DPP-4 inhibitors
D. GLP-1 receptor agonists

GLP-1 receptor agonists are more powerful than DPP-4 inhibitors, so their capacity to lower blood glucose is twice as great. They can induce significant weight loss, which is a major benefit. However, some patients cannot tolerate the nausea and vomiting these agents can cause. [Bode BW, Brett J, Falahati A, Pratley RE. Comparison of the efficacy and tolerability profile of liraglutide, a once-daily human GLP-1 analog, in patients with type 2 diabetes ≥65 and <65 years of age: a pooled analysis from phase 3 studies. Am J Geriatr Pharmacother. 2011;9(6):423-433.]

18. These agents have a moderate capacity to lower blood glucose and depend on good renal function. Hypoglycemia risk is negligible, but risks of genitourinary tract infections and fainting are elevated.

A. biguanides
B. SGLT-2 inhibitors
C. DPP-4 inhibitors
D. GLP-1 receptor agonists

SGLT-2 inhibitors cause glucose wasting through the kidneys. Hypoglycemia risk is negligible, but they carry an increased risk of genitourinary tract infections. In older adults an additional concern may be the way these agents can cause osmotic diuresis. [Mikhail N. Use of sodium-glucose cotransporter type 2 inhibitors in older adults with type 2 diabetes mellitus. South Med J. 2015;108(2):91-96.]

19. Which one of the following condensed T2DM patient profiles (all age 65) would be most suited for intense pursuit of normal or near-normal A1c targets?

A. Highly motivated, good adherence, high risk of hypoglycemia, diagnosed 10 years ago, established cardiovascular disease, chronic kidney disease
B. Poorly motivated, diagnosed 2 years ago, chronic kidney disease, moderate risk of hypoglycemia, previous MI
C. Highly motivated, recently diagnosed, chronic kidney disease, low risk of hypoglycemia, moderate microvascular complications, some hypertension
D. **Highly motivated, recently diagnosed, no end organ damage, low risk of hypoglycemia, early signs of microvascular disease, some hypertension**
Treatment goals can be more intense for some patients than others. Intense treatment is most appropriate for patients who are highly motivated, have good adherence, excellent capacity for self-care, low risk of hypoglycemia, age in their 40s, have only recently been diagnosed, and have few comorbidities. [Ismail-beigi F, Moghissi E, Tiktin M, Hirsch IB, Inzucchi SE, Genuth S. Individualizing glycemic targets in type 2 diabetes mellitus: Implications of recent clinical trials. *Ann Intern Med.* 2011;154(8):554-559.]

20. Which one of the following condensed T2DM patient profiles would be least suited for intense pursuit of normal or near-normal A1c targets?

A. **Highly motivated, recently diagnosed, no end organ damage, age 85, early signs of microvascular disease, some hypertension**

B. Highly motivated, recently diagnosed, no end organ damage, age 75, early signs of microvascular disease, some hypertension

C. Highly motivated, recently diagnosed, no end organ damage, age 65, early signs of microvascular disease, some hypertension

D. Highly motivated, recently diagnosed, no end organ damage, age 55, early signs of microvascular disease, some hypertension

At the other end of the spectrum are patients with poor self-care behaviors or those who are much older, who have had diabetes for decades, and who have many comorbidities. In these patients, an A1c target somewhere above 8% is perfectly acceptable. [Ismail-beigi F, Moghissi E, Tiktin M, Hirsch IB, Inzucchi SE, Genuth S. Individualizing glycemic targets in type 2 diabetes mellitus: implications of recent clinical trials. *Ann Intern Med.* 2011;154(8):554-559.]

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