



Diabetes in Older Adults

Guidelines, Special Considerations and Cases

RGPEO 2019 Geriatric Refresher Day
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DISCLOSURES, CONFLICTS OF INTEREST

None

Objectives

01

List the key 2018 CDA recommendations on managing diabetes in older adults.

02

Discuss special considerations for older adults living with cognitive impairment and diabetes.

03

Apply deprescribing algorithms to the older adult living with frailty and multimorbidity.



01

List the key 2018 CDA recommendations on managing diabetes in older adults.



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DIABETES
CANADA



2018 Clinical Practice Guidelines

Diabetes in Older People

Diabetes Canada Clinical Practice Guidelines Expert Committee

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KEY MESSAGES

- Diabetes in older people is distinct from diabetes in younger people and the approach to therapy should be different. This is especially true in those who have functional dependence, frailty, dementia or who are at end of life. This chapter focuses on these individuals. Personalized strategies are needed to avoid overtreatment of the frail elderly.
- In the older person with diabetes and multiple comorbidities and/or frailty, strategies should be used to strictly prevent hypoglycemia, which include the choice of antihyperglycemic therapy and a less stringent glycated hemoglobin (A1C) target.
- Sulphonylureas should be used with caution because the risk of hypoglycemia increases significantly with age.
- DPP-4 inhibitors should be used over sulphonylureas because of a lower risk of hypoglycemia.
- Long-acting basal analogues are associated with a lower frequency of hypoglycemia than intermediate-acting or premixed insulin in this age group.

KEY MESSAGES FOR OLDER PEOPLE WITH DIABETES

sometime around age 70 and is characterized by a slow, progressive impairment in function that continues until the end of life (1). There are many people with type 2 diabetes who are over the age of 70 who are otherwise well, functionally independent/not frail and have at least a decade of healthy life expectancy. These people should be treated to targets and with therapies described elsewhere in this guideline (see Targets for Glycemic Control chapter, p. S42 and Pharmacologic Glycemic Management of Type 2 Diabetes in Adults chapter, p. S88). This chapter focuses on older people who do not fall into any or all of those categories. Decisions regarding therapy should be made on the basis of age/life expectancy and the person's functional status. Where possible, evidence is based on studies where either the main focus was people over the age of 70 years or where a substantial subgroup, specifically reported, were in this age group.

Diagnosis and Screening

As noted in the Definition, Classification and Diagnosis of Diabetes, Prediabetes and Metabolic Syndrome chapter, p. S10, glycated

FIVE KEY MESSAGES

1. Assess level of frailty.
2. Individualize targets.
3. Avoid hypoglycemia in cognitive impairment.
4. Select antihyperglycemic drugs carefully.
5. Give regular diets in nursing homes.

FRAMEWORK FOR MULTIMORBIDITY



PREFERENCES

Recognize preference-sensitive decisions.



EVIDENCE

Number needed to treat, number needed to harm, time-to-benefit, clinical significance.



PROGNOSIS

Incorporate multimorbidity adjusted prognosis.



FEASIBILITY

Consider the treatment complexity.



OPTIMIZATION

Balance the benefits and the harms.

How do we determine if an older adult is frail and hence may consider more lenient targets?

What evidence-based prognostication tools are there to inform whether an older adult will live long enough to benefit from the medications (i.e., the TTB – time to benefit)?

How do we discuss preferences and values? Are the clinical/surrogate outcomes we are trying to achieve with pharmacotherapy meaningful and what are the trade-offs?

How does aging impact on the risk and consequences of hypoglycemia?

What resources are available to support insulin use?

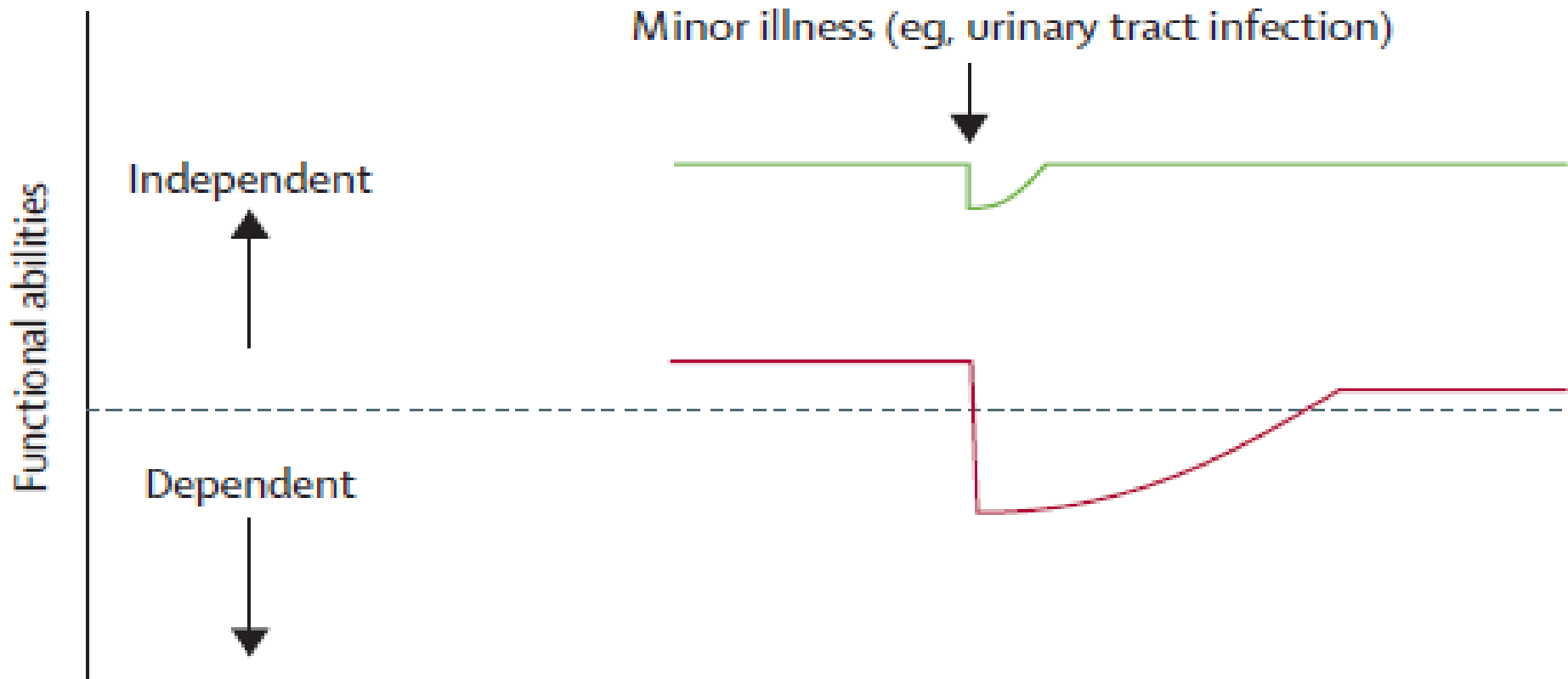
CONSIDERATIONS

in older adults

Diagnosis and screening.

Normal aging is associated with a progressive increase in A1C giving rise to discordance with FPG.

Normal	FPG <5.6 mmol/L and/or A1C <5.5%
At risk	FPG 5.6-6.0 mmol/L and/or A1C 5.5%-5.9%
Pre-diabetes	FPG 6.1-6.9 mmol/L and/or A1C 6.0%-6.4%
Diabetes	FPG \geq 7.00 mmol/L and/or A1C \geq 6.5%



FRAILTY

A STATE WITH HIGH
VULNERABILITY TO ADVERSE
HEALTH CARE OUTCOMES


“

**The more individuals have
wrong with them, the more
likely they are to be FRAIL.**


...

CUMULATIVE DEFICIT MODEL OF FRAILITY


Clinical Frailty Scale*



1 Very Fit – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.




2 Well – People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g. seasonally.




3 Managing Well – People whose **medical problems are well controlled**, but are **not regularly active** beyond routine walking.




4 Vulnerable – While **not dependent** on others for daily help, often **symptoms limit activities**. A common complaint is being “slowed up”, and/or being tired during the day.




5 Mildly Frail – These people often have **more evident slowing**, and need help in **high order IADLs** (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.




6 Moderately Frail – People need help with **all outside activities** and with **keeping house**. Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.



7 Severely Frail – **Completely dependent for personal care**, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).



8 Very Severely Frail – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.



9. Terminally Ill - Approaching the end of life. This category applies to people with a **life expectancy <6 months**, who are **not otherwise evidently frail**.

Scoring frailty in people with dementia

The degree of frailty corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.


In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia**, they cannot do personal care without help.

* 1. Canadian Study on Health & Aging, Revised 2008.

2. K. Rockwood et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005; 173:489-495.

INDIVIDUALIZE A1C targets.

≤ 6.5	Adults with type 2 diabetes to reduce the risk of CKD and retinopathy at low risk of hypoglycemia.
≤ 7.0	Most adults with Type 1 or Type 2 diabetes.
7.1  8.5	7.1-8.0%: Functionally dependent. 7.1-8.5%: <ul style="list-style-type: none">• Recurrent severe hypoglycemia and/or hypoglycemia awareness.• Limited life expectancy.• Frail older adult and/or living with dementia.
Avoid higher A1c to minimize risk of symptomatic hyperglycemia and acute and chronic complications.	
End of life	A1C measurement not recommended. Avoid symptomatic hyperglycemia and any hypoglycemia.

FRAILITY at the forefront of decision-making.

Glycemic targets guided by frailty and life expectancy.

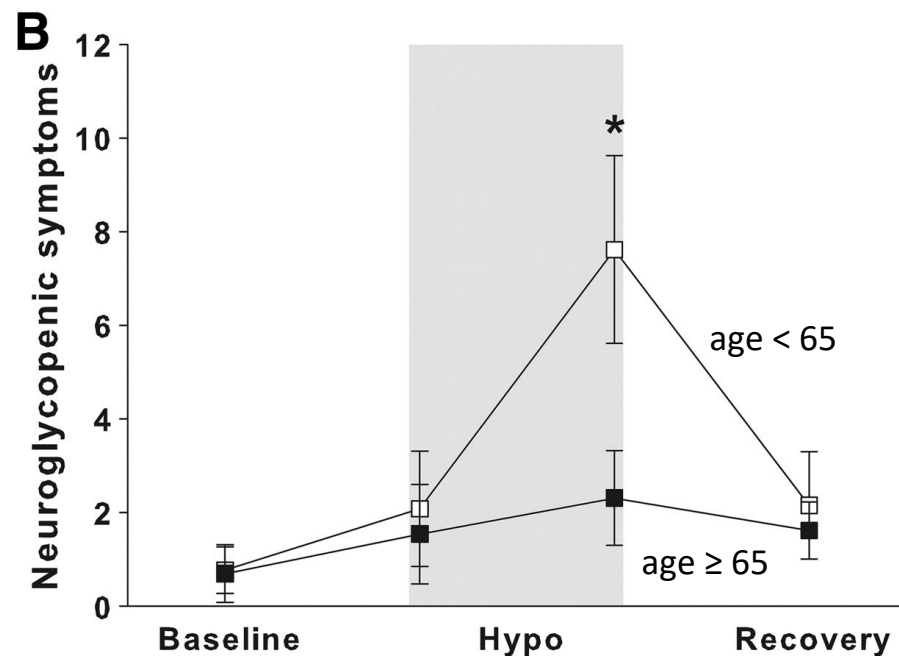
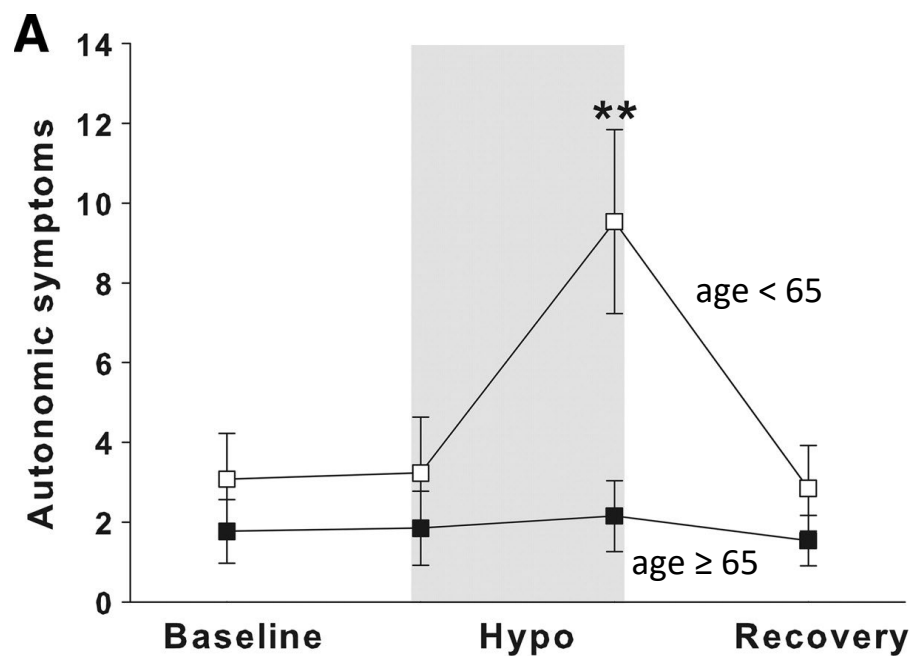
Clinical Frailty Scale	1-3 (functionally independent)	4-5 (functionally dependent)	6-8 (frail and/or with dementia)	9 (end of life)
A1C target <i>Low risk hypoglycemia</i>	≤7.0%	<8.0%	<8.5%	A1C measurement is not recommended.
A1C target <i>Higher risk hypoglycemia</i>		7.1-8.0%	7.1-8.5%	
CBGM Preprandial: Postprandial:	4-7 mmol/L 5-10 mmol/L	5-8 mmol/L <12 mmol/L	6-9 mmol/L <14 mmol/L	Individualize.

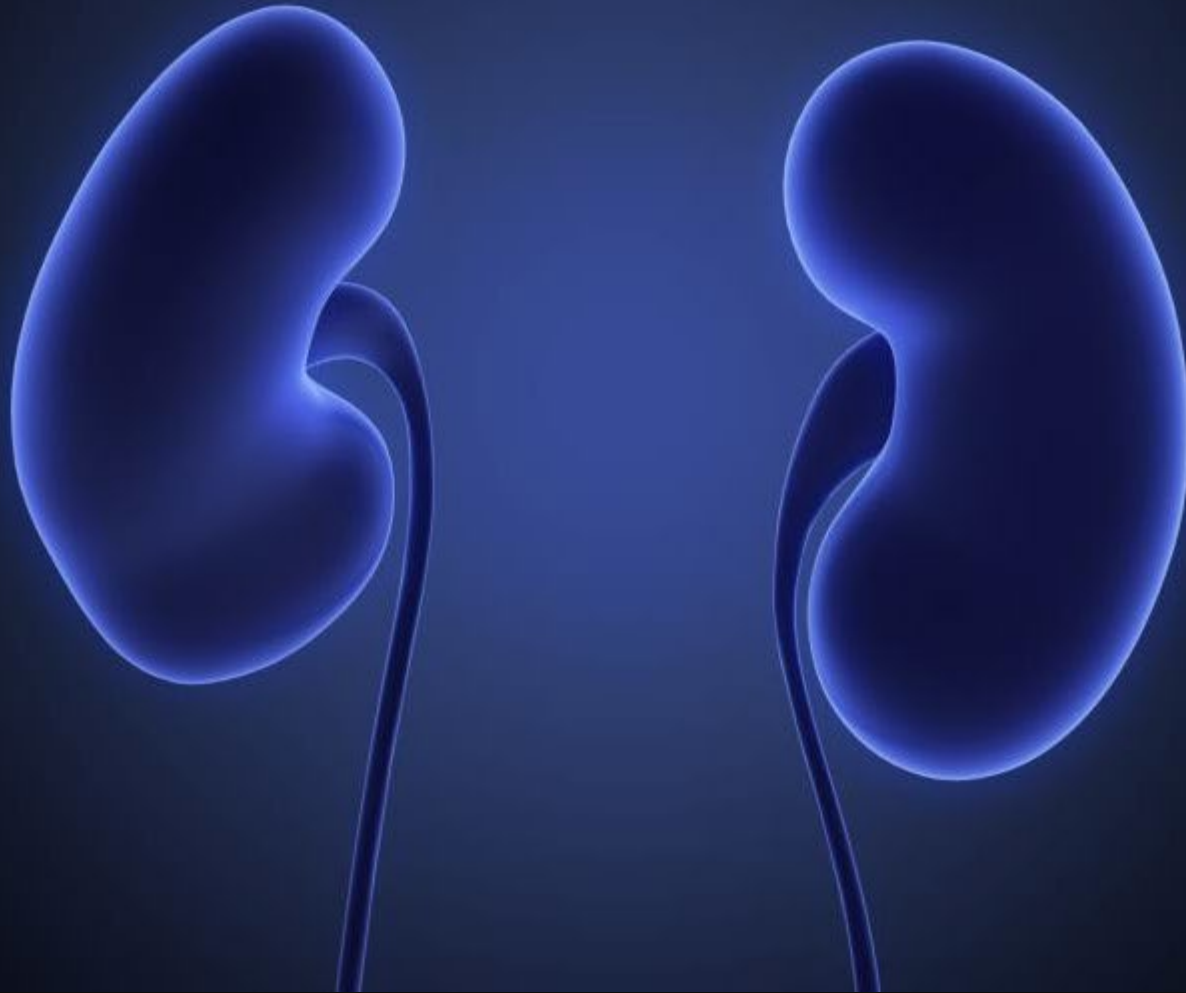


Intensive control reduces risk of microvascular complications over **MANY** years.
There is no reduction in cardiovascular events or overall mortality.

Older adults have less perception of hypoglycemia.

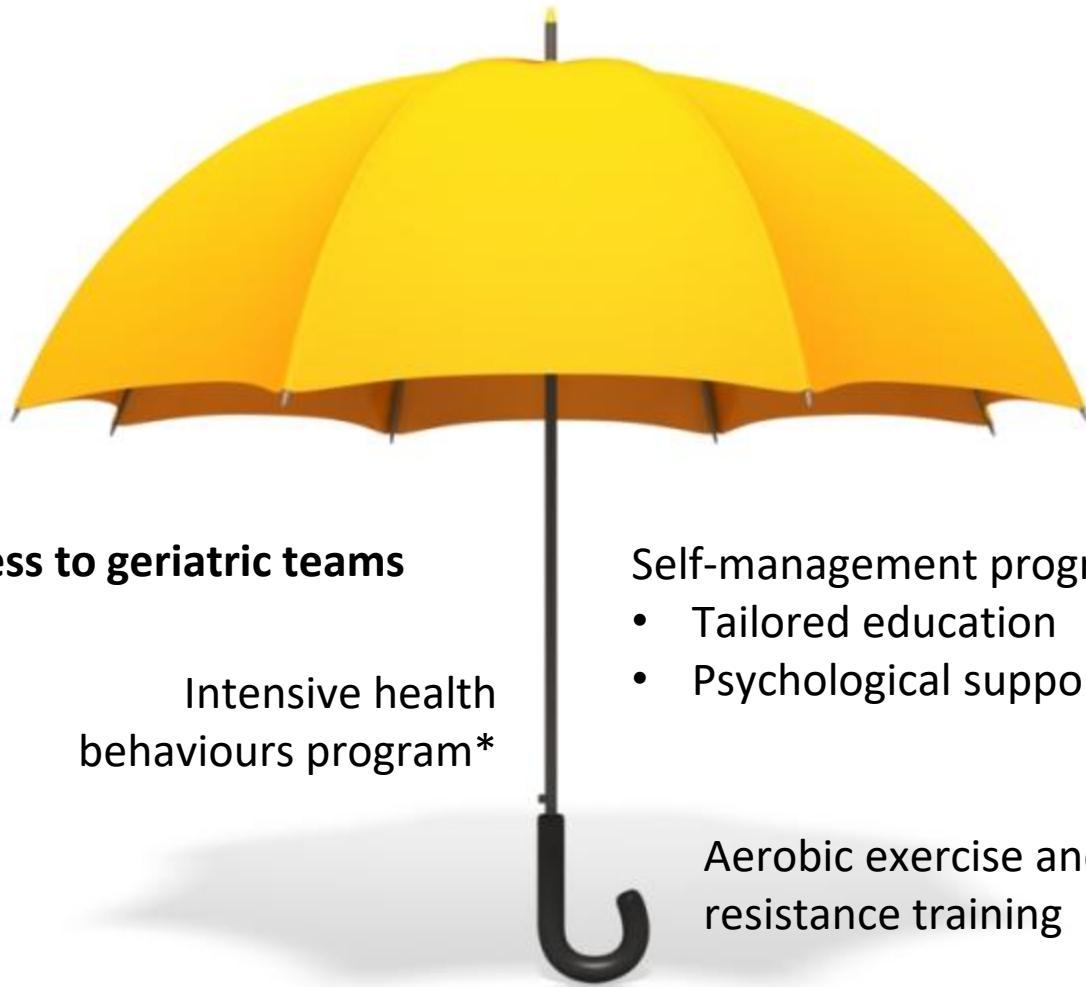
Age-related reduction in glucagon secretion, medications mask symptoms and impaired awareness.





GFR declines with age.

Adjust antihyperglycemic agents.



Access to geriatric teams

Intensive health behaviours program*

Self-management programs

- Tailored education
- Psychological support

Aerobic exercise and/or resistance training

Better glycemic control.



- How far off target?
- Symptomatic hyperglycemia?
- Clinical cardiovascular disease?
- Concern for weight gain?
- Need to avoid hypoglycemia?
- What is the eGFR?
- Cardiovascular risk factors?
- Other co-morbidities (CHF, hepatic disease, amputation)?
- Financial insecurity?
- Patient preference?

At diagnosis of type 2 diabetes

Start healthy behaviour interventions (nutritional therapy, weight management, physical activity) +/- metformin

A1C <1.5% above target

A1C ≥1.5% above target

Symptomatic hyperglycemia and/or metabolic decompensation*

If not at glycemic target within 3 months, Start/Increase metformin

Start **metformin** immediately
Consider a second concurrent agent

Initiate insulin +/- metformin

If not at glycemic target

If not at glycemic target

Clinical CVD?

YES

NO

Start antihyperglycemic agent with demonstrated CV benefit empagliflozin (Grade A, Level 1A)

**SGLT2 inhibitors
GLP-1 receptor agonists**

(Grade C, Level 2)

If not at glycemic target

Add additional antihyperglycemic agent best suited to the individual based on the following:

Clinical Considerations

Avoidance of hypoglycemia and/or weight gain with adequate glycemic efficacy

Other considerations:
Reduced eGFR and/or albuminuria
Clinical CVD or CV risk factors
Degree of hyperglycemia
Other comorbidities (CHF, hepatic disease‡)
Planning pregnancy‡
Cost/coverage
Patient preference

Choice of Agent

DPP-4 inhibitor, GLP-1 receptor agonist or SGLT2 inhibitor

See Table below

Class**	Effect on CVD outcomes	Hypoglycemia	Weight	Relative A1C lowering when added to metformin	Other therapeutic considerations	Cost
GLP-1 receptor agonists	lira: Superiority in people with type 2 diabetes with clinical CVD	Rare	↓ ↓	↓ ↓ to ↓ ↓ ↓	GI side-effects Gallstone disease Contraindicated with personal/family history of medullary thyroid cancer or MEN 2 Requires subcutaneous injection	\$\$\$\$
SGLT2 inhibitor	2 diabetes with clinical CVD			↓ ↓ to ↓ ↓ ↓	Genital infections, UTI, hypotension, dose-related changes in LDL-C. Caution with renal dysfunction, loop diuretics, in the elderly. Dapagliflozin not to be used if bladder dysfunction Reduced progression of nephropathy and CHF hospitalizations with empagliflozin and canagliflozin in persons with clinical CVD	\$\$\$
DPP-4 Inhibitors				↓ ↓	Caution with saxagliptin in heart failure Rare joint pain	\$\$\$
Insulin	glar: Neutral degludec: noninferior to glar	Yes	↑ ↑	↓ ↓ to ↓ ↓ ↓ ↓	No dose ceiling, flexible regimens Requires subcutaneous injection	\$- \$\$\$\$
Thiazolidinediones	Neutral	Rare	↑ ↑	↓ ↓	CHF, edema, fractures, rare bladder cancer (piperazine), cardiovascular controversy (pioglitazone), 6-12 weeks required for maximal effect	\$\$
Alpha-glucosidase inhibitors (acarbose)		Rare	Neutral	↓	GI side effects	\$\$
Insulin secretagogue: Meglitinide			↑	↓ ↓	More rapid BG-lowering response Reduced postprandial glycemia with meglitinides but usually requires 3 to 4 times daily dosing	\$\$
Sulfonylurea		Yes	↑	↓ ↓	Gliclazide and glimepiride associated with less hypoglycemia than glyburide Poor durability	\$
Weight loss agent (orlistat)		None	↓	↓	GI side effects Requires 3 times daily dosing	\$\$\$

reduction in major cardiovascular outcomes with empagliflozin, canagliflozin, liraglutide

cost

caution in older adults

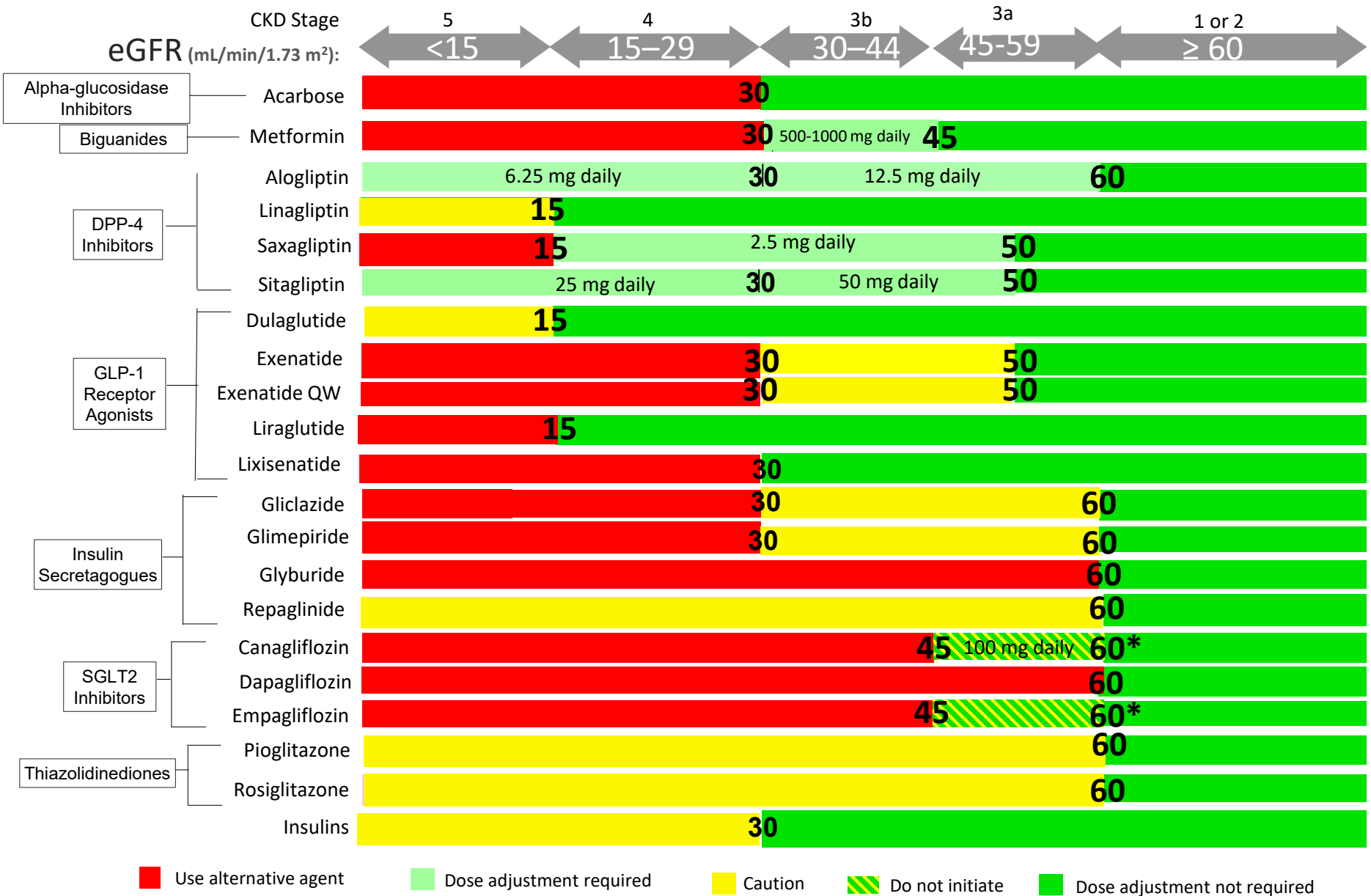
less hypoglycemia

CHF

GI side effects

hypoglycemia

Adjust antihyperglycemic agents to renal function.



Navigating common obstacles to Metformin use

Condition	Suggested approach
GI intolerance	<ul style="list-style-type: none">• Reduce dose until adverse effects resolve• Consider use of extended-release form
Impaired kidney function	<ul style="list-style-type: none">• Use freely if eGFR \geq45 mL/min• Use with caution if eGFR 30-45 mL/min• Do not use if eGFR <30 mL/min
Heart failure	<ul style="list-style-type: none">• Acceptable to use with stable, chronic heart failure• Do not use with acute heart failure and evidence of end-organ hypoperfusion
Liver disease	<ul style="list-style-type: none">• Acceptable to use with chronic liver disease (including mildly elevated liver enzymes, but intact liver function)• Do not use with functional hepatic failure or acute liver injury



DPP-4 inhibitors should be used over sulfonylureas as second line therapy because of a lower risk of hypoglycemia.

Initial doses of sulfonylureas should be half of those used for younger adults and increased more slowly.

Gliclazide and gliclazide MR and glimepiride should be used instead of glyburide to reduce hypoglycemia.

Meglitinides may be used instead of glyburide to reduce the risk of hypoglycemia particularly in individuals with irregular eating habits.



Can J Diabetes 2018;42:S283–S295

Insulin pens.

Use pre-mixed and prefilled insulin pens to reduce dosing errors.



Can J Diabetes 2018;42:S283–S295

Detemir, glargine (U-300), and degludec.

Use instead of NPH or human 30/70 insulin to lower the frequency of hypoglycemia.



ICES 2013.

Diabetes in long term care is common.

Over 25% of residents in long term care in Canada are living with diabetes.

AVOID sliding scale (reactive) and correction (supplemental) insulin protocols in older adults living in long term care.

Sliding scales worsen glycemic control and result in more hypoglycemia.

Under nutrition is a problem in long term care.

“Regular diets” may be used in long term care instead of “diabetic diets” or “diabetic nutritional formulas.”



INTERACTION

Diabetes and Cognitive Impairment



02

Discuss special
considerations for older
adults living with cognitive
impairment and diabetes.

REVIEW

Diabetes as a risk factor for dementia and mild cognitive impairment: a meta-analysis of longitudinal studies

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Key words

diabetes, dementia, mild cognitive impairment, meta-analysis.

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Abstract

This study examined the association of diabetes with the onset of dementia (including Alzheimer's disease (AD), vascular dementia (VD) and any dementia) and mild cognitive impairment (MCI) by using a quantitative meta-analysis of longitudinal studies. EMBASE and MEDLINE were searched for articles published up to December 2010. All studies that examined the relationship between diabetes and the onset of dementia or MCI were included. Pooled relative risks were calculated using fixed and random effects models. Nineteen studies met our inclusion criteria for this meta-analysis, and 6184 subjects with diabetes and 38 530 subjects without diabetes were included respectively. All subjects were without dementia or MCI at baseline. The quantitative meta-analysis showed that subjects with diabetes had higher risk for AD (relative risk (RR):1.46, 95% confidence interval (CI): 1.20–1.77), VD (RR: 2.48, 95% CI: 2.08–2.96), any dementia (RR: 1.51, 95% CI: 1.31–1.74) and MCI (RR: 1.21, 95% CI: 1.02–1.45) than those without. The quantitative meta-analysis showed that diabetes was a risk factor for incident dementia (including AD, VD and any dementia) and MCI.

Intern Med J. 2012;42(5):484-91.

Diabetes increases the risk of dementia.

1.5 fold higher incidence of Alzheimer's and 2.5 fold higher incidence of vascular dementia.

T2DM

Impaired
neurogenesis

BBB
dysfunction

Inflammation

Hyperglycemia

Insulin
resistance

Vascular
dysfunction



Acceleration of
AD pathology

Ischemia

Other
mechanisms

“Type 3 diabetes”



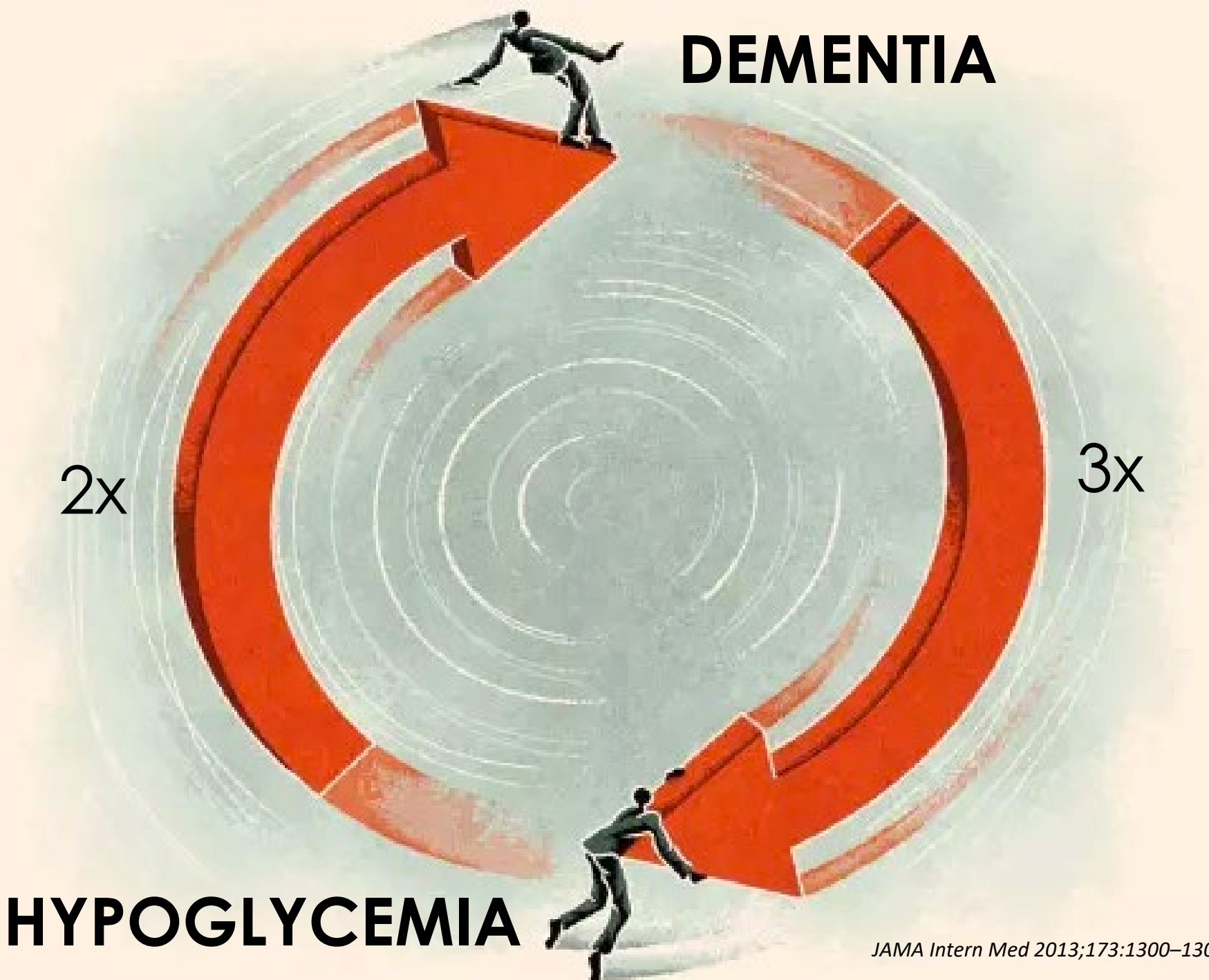
Cognitive dysfunction

DEMENTIA

2x

3x

HYPOGLYCEMIA



CLOCK DRAWING TEST

“Draw a clock with all the numbers, and set the hands for 10 after 11.”



Cognitive Domain	Impact on Diabetes Self-Care	Improvement Strategies
Memory impairment	<ul style="list-style-type: none"> • Forget to monitor • Forget medications • Forget insulin • Forget to eat on time • Forget to eat before exercise • Forget appointments 	<ul style="list-style-type: none"> • Seek caregiver availability • Use a dosette /blister pack • Switch to long-acting formulation • Involve caregivers • Choose supervised exercise programs • Provide multiple reminders
Problem-solving difficulty	<ul style="list-style-type: none"> • Unable to recognize or treat hypoglycemia 	<ul style="list-style-type: none"> • Repeated education • Avoid complex regimens
Difficulty in stopping old or starting new regimen	<ul style="list-style-type: none"> • Labeled as ‘stubborn’ • Errors with new routines 	<ul style="list-style-type: none"> • Minimize changes • Involve caregivers during transitions • May need to restrict access to medications (if old medications/doses taken)
Difficulty with mental flexibility	<ul style="list-style-type: none"> • Feels anxious about ‘failing’ the treatment plan • Obsessed with diabetes management 	<ul style="list-style-type: none"> • Simplify regimen • Avoid sliding scales

Keep it simple.

Regimen Challenge	Strategies
Forgets mealtime insulin	<ul style="list-style-type: none">• Use basal insulin once day to control fast glucose• Replace mealtime insulin with non-insulin agents to control postprandial hyperglycemia
Makes errors in insulin scale	<ul style="list-style-type: none">• Avoid insulin sliding scale with fixed dose before meals
Hypoglycemia at fasting but high glucose during the daytime	<ul style="list-style-type: none">• Use basal insulin in the morning and titrate up the dose to get fasting glucose control the next morning
Forgets to take medications as scheduled	<ul style="list-style-type: none">• Use dosette/blister-pack• Involve caregiver to provide reminders• Switch to long-acting formulations

DEPRESCRIBING

frailty and multimorbidity



03

Apply deprescribing algorithms to the older adult living with frailty and multimorbidity.

THE NEW OLD AGE

A New Rx for Diabetes: Lighten Up

In older patients, rigorous lowering of blood sugar may offer few benefits and pose unexpected risks.

By **Paula Span**

April 12, 2019

     80



Polypharmacy

- Altered hemodynamics.
- Drug-drug interactions.
- Adverse drug events.
- Withdrawal.
- Cost.
- Adherence.





THERAPEUTIC HARMONIZATION

ALIGNING PROGNOSIS AND GOALS WITH CARE.

Example Diabetes Discussion

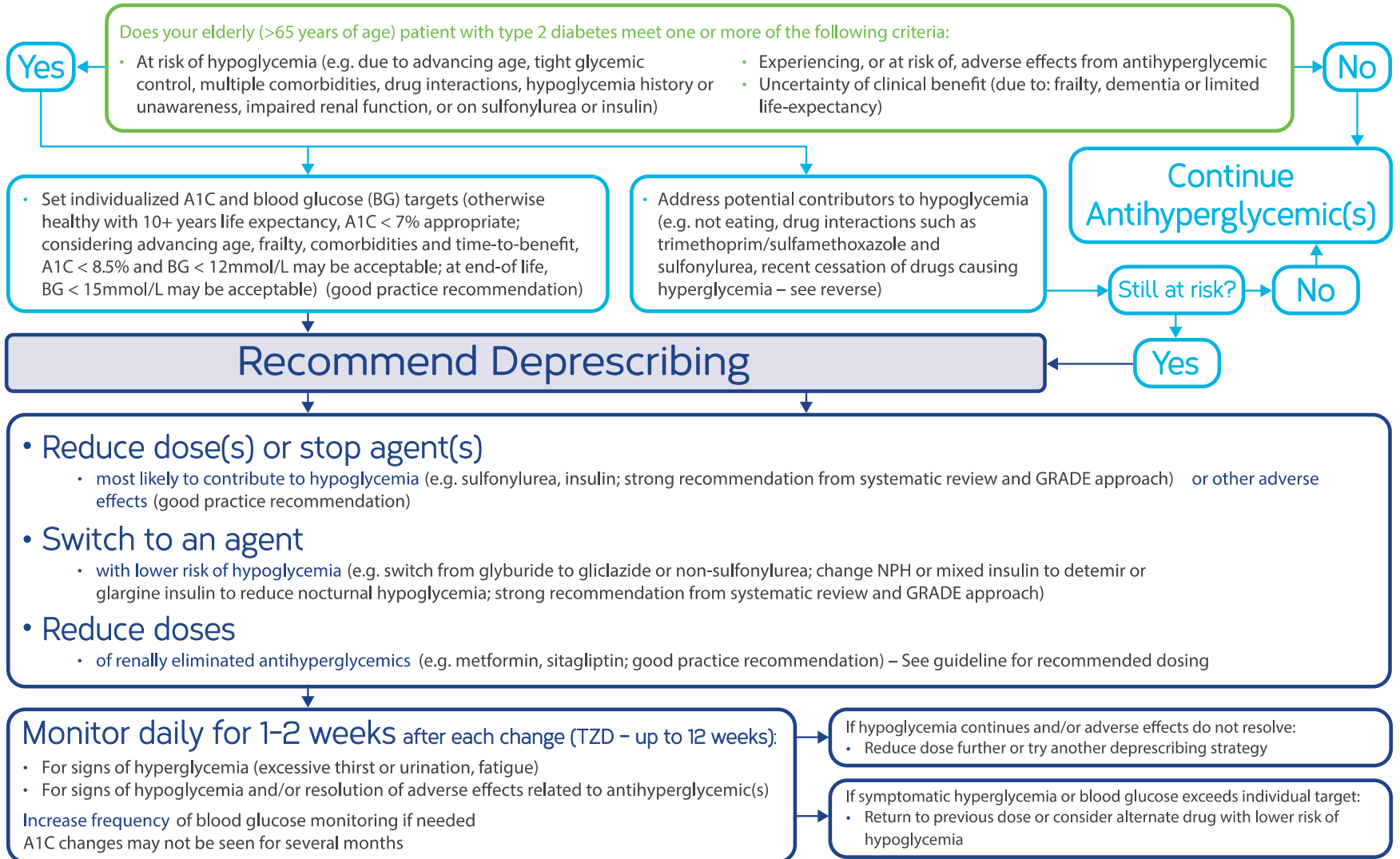


This video is an example of how to incorporate prognosis into discussions about tight glucose control for older adults with diabetes.

In this video, the clinician uses the following communication skills:

- [Making a recommendation](#)
- [Discussing lag time to benefit](#)
- [Reframing by focusing on care that is constant with goals](#)
- [Discussing trade-offs](#)
- [Individualizing prognosis](#)

[Back to Communication Home](#)



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Antihyperglycemics and Hypoglycemia Risk

Does your elderly (>65 years of age) patient with type 2 diabetes meet one or more of the following criteria:

Drug	Causes hypoglycemia?	Additional criteria
Alpha-glucosidase inhibitors	No	At risk of hypoglycemia if on multiple comorbidities, drug interactions, hypoglycemia history or unawareness; impaired renal function, or on sulfonylurea or insulin
Dipeptidyl peptidase-4 (DPP-4) inhibitors	No	
Glucagon-like peptide-1 (GLP-1) agonists	No	
Insulin	Yes (highest risk with regular insulin and NPH)	Individualized A1C and blood glucose targets (otherwise healthy with 10+ years life expectancy, A1C < 7% appropriate; considering advancing age, frailty, comorbidities and time-to-benefit, A1C < 8.5% and BG < 12mmol/L may be acceptable; at end-of-life, BG < 15mmol/L may be acceptable) (good practice recommendation)
Meglitinides	Yes (low risk)	

No

Continue Antihyperglycemic(s)

Still at risk? No

- Address potential contributors to hypoglycemia (e.g. not eating, drug interactions such as trimethoprim/sulfamethoxazole and sulfonyleurea, recent cessation of drugs causing hyperglycemia – see reverse)
- previous doses will help engage patients and caregivers

Recommend Deprescribing

Yes

Reduce dose(s) or stop agent(s)

- most likely to contribute to hypoglycemia (e.g. sulfonylurea, insulin; symptoms of hypoglycemia from a sulfonylurea, insulin, or other adverse effects (good practice recommendation)

Switch to an agent

- with lower risk of hypoglycemia (e.g. switch from glyburide to short-acting glimepiride or insulin glargine insulin to reduce nocturnal hypoglycemia; strong recommendation)

Reduce doses of renally eliminated antihyperglycemics (e.g. metformin, sitagliptin; good practice recommendation)

- Older frail adults are at higher risk of hypoglycemia
- There is a greater risk of hypoglycemia with tight control
- Some drugs can mask the symptoms of hypoglycemia (e.g. beta blockers)
- Harms of hypoglycemia may be severe and include impaired cognition and physical function, falls and fractures, seizures, emergency room visits and hospitalizations

Drugs affecting glycemic control

- Drugs reported to cause hyperglycemia (when these drugs administered can result in hypoglycemia from antihyperglycemic drugs) e.g. quinolones (especially gatifloxacin), beta-blockers (except carvedilol), thiazides, atypical antipsychotics (especially olanzapine and clozapine), corticosteroids, calcineurin inhibitors (such as cyclosporine, sirolimus, tacrolimus), protease inhibitors

Tapering advice – See guideline for recommended dosing

Monitor daily for 1-2 weeks after each change (TZD – up to 12 weeks):

- Drugs that interact with antihyperglycemics (e.g. for signs of hypoglycemia: excessive thirst, urination, fatigue)
- For signs of hypoglycemia and/or resolution of adverse effects related to antihyperglycemics (e.g. salicylates, quinolones, quinine, beta-blockers, ACEIs, pentamidine)
- Increase frequency of blood glucose monitoring if needed
- A1C changes may not be seen for several months

Set blood glucose & A1C targets, plus thresholds for returning to previous dose, restarting a drug or maintaining a dose

Develop tapering plan with patient

Reduce dose in the order of best to de-prescribing strategy

Can stop oral antihyperglycemics, switch drugs, or lower doses gradually e.g. changes every 1-4 weeks, to the minimum (if symptomatic hyperglycemia or blood glucose exceeds individual target: if symptoms do not resolve, or simply deplete patient's supply)

Consider alternate drug with lower risk of hypoglycemia

Doses may be increased or medication restarted if blood glucose falls below target (12-15 mmol/L) or symptomatic hyperglycemia returns



What are Antihyperglycemic(s)?

Antihyperglycemic(s) are drugs that are used to reduce blood sugar levels to treat diabetes. There are many different types of antihyperglycemic drugs.

- Insulin
- Acarbose (e.g. Glucobay®)
- Metformin (e.g. Glucophage®)
- Alogliptin (Nesina®), linagliptin (Trelispa®), sitagliptin (Januvia®), saxagliptin (Onglyza®)
- Dapagliflozin (Farxiga®), empagliflozin (Jardiance®)
- Pioglitazone (Actos®), rosiglitazone (Avandia®)
- Products are available that combine 2 different drugs in 1 pill
- Gliclazide (e.g. Diamicon®), glimepiride (Amaryl®), glyburide

Stopping, reducing or changing an Antihyperglycemic(s)

Antihyperglycemic(s) may be at risk of adverse effects from antihyperglycemic(s). If the expected risk for low blood sugar, you are not having any side effects and you and your prescriber feel there is clear benefit to taking the medications, then, you do not need to make any changes.

No

Continue Antihyperglycemic(s)

Healthy older people may choose to stick with an A1C target less than 7% and blood sugar goals similar to their younger days. But, people over 75 who are at risk of low blood sugar or want to revisit their diabetes treatment goals should talk to their health care provider about whether deprescribing is the right choice for them.

Still at risk?

No

Recommend Deprescribing

Yes in Antihyperglycemic

When antihyperglycemic drugs are first given, the goal is to keep blood sugar levels within a certain range to prevent problems like heart attacks, strokes or nerve damage. It can take several years of treatment to reduce risk of these problems.

Reduce doses or stop agent(s)

With age, benefits go down and the risk of hypoglycemia (low blood sugar) gets higher. Very low blood sugar targets (tight control) may not be needed and can be avoided. People may need lower doses to avoid other side effects that can happen with low kidney function (e.g. switch from glyburide to short-acting gliclazide to reduce nocturnal hypoglycemia; strong recommendation from systematic review and GRADE approach).

First, work with your health care provider to choose appropriate blood sugar and A1C targets for your age and state of health. For example, blood sugars less than 12mmol/L and A1C less than 8.5% may be appropriate for an older, frailer person with many other medical conditions.

Together, develop a plan for medication changes. This might involve reducing a dose, changing to a safer medication or stopping a medication altogether. Such changes could occur over 2-4 weeks, always under the supervision of your health care provider (strong recommendation from systematic review and GRADE approach)

Many healthcare providers can be involved in helping to decide on the best approach to changing your antihyperglycemic medications. These include doctors, nurses, pharmacists, certified diabetes educators or dieticians. They can advise on how to safely reduce doses, change medications, stop medications and/or change targets that can be achieved.

When hypoglycemia continues and/or adverse effects do not resolve, reduce risk of low blood sugar further or try another deprescribing strategy

If symptomatic hyperglycemia or blood glucose exceeds individual target:
• Return to previous dose or consider alternate drug with lower risk of hypoglycemia

- Reduce doses if you have dementia
- Have many medical conditions or low kidney function or renal insufficiency
- Have tight blood sugar control
- Have a history of low blood sugar or do not have symptoms when their blood sugars are low

Monitor daily for 1-2 weeks after each change (TZD – up to 12 weeks)

- Are taking insulin or sulfonylurea type drugs like glyburide
- For signs of hypoglycemia (excessive thirst, hunger, fatigue), or cause low blood sugar
- For signs of hypoglycemia and/or resolution of adverse effects related to antihyperglycemic(s)

Increase frequency of blood glucose monitoring if needed. A1C changes may not be seen for several months

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ruyere.org or visit deprescribing.org for more information.



deprescribing.org

INSTITUT DE RECHERCHE



CIHR IRSC Canadian Institutes of Health Research Institut de recherche en santé du Canada



What to monitor while making changes

Yes **Antihyperglycemic**

An risk of hypoglycemia (e.g. due to advancing age, overly intense glycemc control, multiple comorbidities, drug interactions, hypoglycemia history or withdrawal of insulin) could check your blood sugar daily for 1-2 weeks after each change. You may need a longer time for monitoring depending on the type of medication you are taking (up to 12 weeks for some).

- Set individualized A1C and blood glucose (BG) targets (otherwise healthy with no years life expectancy, A1C < 7% appropriate, considering advancing age, frailty, comorbidities and time-to-benefit, A1C < 8% and BG < 12 mmol/L may be acceptable; at end of life, BG < 15 mmol/L may be acceptable) (good practice recommendation)
- Watch for improvement in low blood sugar (with fewer symptoms such as sweating, fast heart rate or tremor)
- Watch for improvement in other side effects.

Personalized Antihyperglycemic dose reduction, or stoppage

Expectation of adverse effects from antihyperglycemic

- Uncertainty of clinical benefit (due to: frailty, dementia or limited life expectancy)

Blood glucose target: _____

No

A1C target: _____

- Address potential contributors to hypoglycemia (e.g. not eating, drug interactions such as trimethoprim/sulfamethoxazole and sulfonylurea, recent cessation of drugs causing hyperglycemia – see reverse)

Continue Antihyperglycemic(s)

Still at risk?

No

Yes

Recommend Deprescribing

What to do if low blood sugars or drug side effects continue?

- **Reduce dose(s) or stop agent(s)**
 - most likely to contribute to hypoglycemia (e.g. sulfonylurea, insulin; strong recommendation from systematic review and GRADE approach) or other adverse effects (good practice recommendation)
- **Switch to an agent**
 - Talk to your health care provider. They may suggest eating at regular times (to reduce risk of low blood sugar). They may check your other medications to make sure none are interacting with lower risk of hypoglycemia (e.g. switch from glyburide to short-acting gliclazide or non-sulfonylurea; change NPH or mixed insulin to detemir or glargine insulin to reduce nocturnal hypoglycemia; strong recommendation from systematic review and GRADE approach)
- **Reduce doses**
 - of renally eliminated antihyperglycemics (e.g. metformin, sitagliptin; good practice recommendation) – See guideline for recommended dosing

What to do if blood sugars go above your individualized target?

Monitor daily for 1-2 weeks after each change (TZD – up to 12 weeks):

- If blood sugar readings or A1C go above the agreed upon target, your health care provider may decide to return to the previous dose or consider changing to a different drug with less risk of low blood sugar.
- **Increase frequency** of blood glucose monitoring if needed
- A1C changes may not be seen for several months

If hypoglycemia continues and/or adverse effects do not resolve:

- Reduce dose further or try another deprescribing strategy

If symptomatic hyperglycemia or blood glucose exceeds individual target:

- Return to previous dose or consider alternate drug with lower risk of hypoglycemia

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Cases




Ms. X

75 year old female with type 2 diabetes for 2 years. She had an MI and had PCI 3 years ago, but recovered well. She lives in a condo with her husband and is his primary caregiver. She walks for 30 minutes daily. She enjoys having her children and grandchildren over for on the weekends.


1. What is her level of frailty?
2. What is her A1c target?




Clinical Frailty Scale*




1 Very Fit – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.




2 Well – People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g. seasonally.




3 Managing Well – People whose **medical problems are well controlled**, but are **not regularly active** beyond routine walking.




4 Vulnerable – While **not dependent** on others for daily help, often **symptoms limit activities**. A common complaint is being “slowed up”, and/or being tired during the day.




5 Mildly Frail – These people often have **more evident slowing**, and need help in **high order IADLs** (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.




6 Moderately Frail – People need help with **all outside activities** and with **keeping house**. Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.



7 Severely Frail – **Completely dependent for personal care**, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).



8 Very Severely Frail – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.



9. Terminally Ill - Approaching the end of life. This category applies to people with a **life expectancy <6 months**, who are **not otherwise evidently frail**.

Scoring frailty in people with dementia

The degree of frailty corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia**, they cannot do personal care without help.

* 1. Canadian Study on Health & Aging, Revised 2008.

2. K. Rockwood et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005; 173:489-495.

FRAILITY at the forefront of decision-making.

Glycemic targets guided by frailty and life expectancy.

Clinical Frailty Scale	1-3 (functionally independent)	4-5 (functionally dependent)	6-8 (frail and/or with dementia)	9 (end of life)
A1C target <i>Low risk hypoglycemia</i>	≤7.0%	<8.0%	<8.5%	A1C measurement is not recommended.
A1C target <i>Higher risk hypoglycemia</i>		7.1-8.0%	7.1-8.5%	
CBGM Preprandial: Postprandial:	4-7 mmol/L 5-10 mmol/L	5-8 mmol/L <12 mmol/L	6-9 mmol/L <14 mmol/L	Individualize.

Current medications:

1. Metformin 1000 mg BID
2. Perindopril 4 mg daily
3. Hydrochlorothiazide 25 mg daily
4. Aspirin 81 mg daily
5. Atorvastatin 40 mg daily

- A1C is 8.0%
- eGFR > 60 mL/min/1.73m²

You counsel her on self-management strategies. What would an appropriate second line therapy?

- A. Empagliflozin
- B. Liraglutide
- C. Glyburide
- D. Linagliptin



You decided to add Empagaflozin and her medication regimen is now:

1. Metformin 1000 mg BID
2. Perindopril 4 mg daily
3. Hydrochlorothiazide 25 mg daily
4. Aspirin 81 mg daily
5. Atorvastatin 40 mg daily
6. Empagliflozin 10 mg daily

She has joined the YWCA. 6 months later, she has lost five pounds and:

- A1C is 7.4%
- eGFR is 55 mL/min/1.73m²
- albumin: creatinine 2.5 mg/mmol
- home BP 100-110/65-75

She feels dizzy when she gets up. There are no other cardiac symptoms. She has urinary frequency.



Which of her medications may you consider reducing or stopping?

1. Metformin 1000 mg BID
2. Perindopril 4 mg daily
3. Hydrochlorothiazide 25 mg daily
4. Aspirin 81 mg daily
5. Atorvastatin 40 mg daily
6. Empagliflozin 10 mg daily






Mr. X


Her husband, 82 years old, living with mild cognitive impairment is dependent on Ms. X for his IADLs because of osteoarthritis. He has had type 2 diabetes for 12 years. He has hypertension and dyslipidemia.

1. What is his level of frailty?
2. What is his target A1C?


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Which of the following is TRUE about self-monitoring of blood glucose in the older adult?

- A. If there is discrepancy between the A1C value and the home blood glucose monitoring results, the A1C value should always take priority in directing glycemic therapy.
- B. Postprandial glucose values are a better predictor of outcome, rather than A1C or preprandial glucose values
- C. Capillary blood glucose monitoring can reveal fluctuations of glucose; and greater variability is associated with worse cognition.



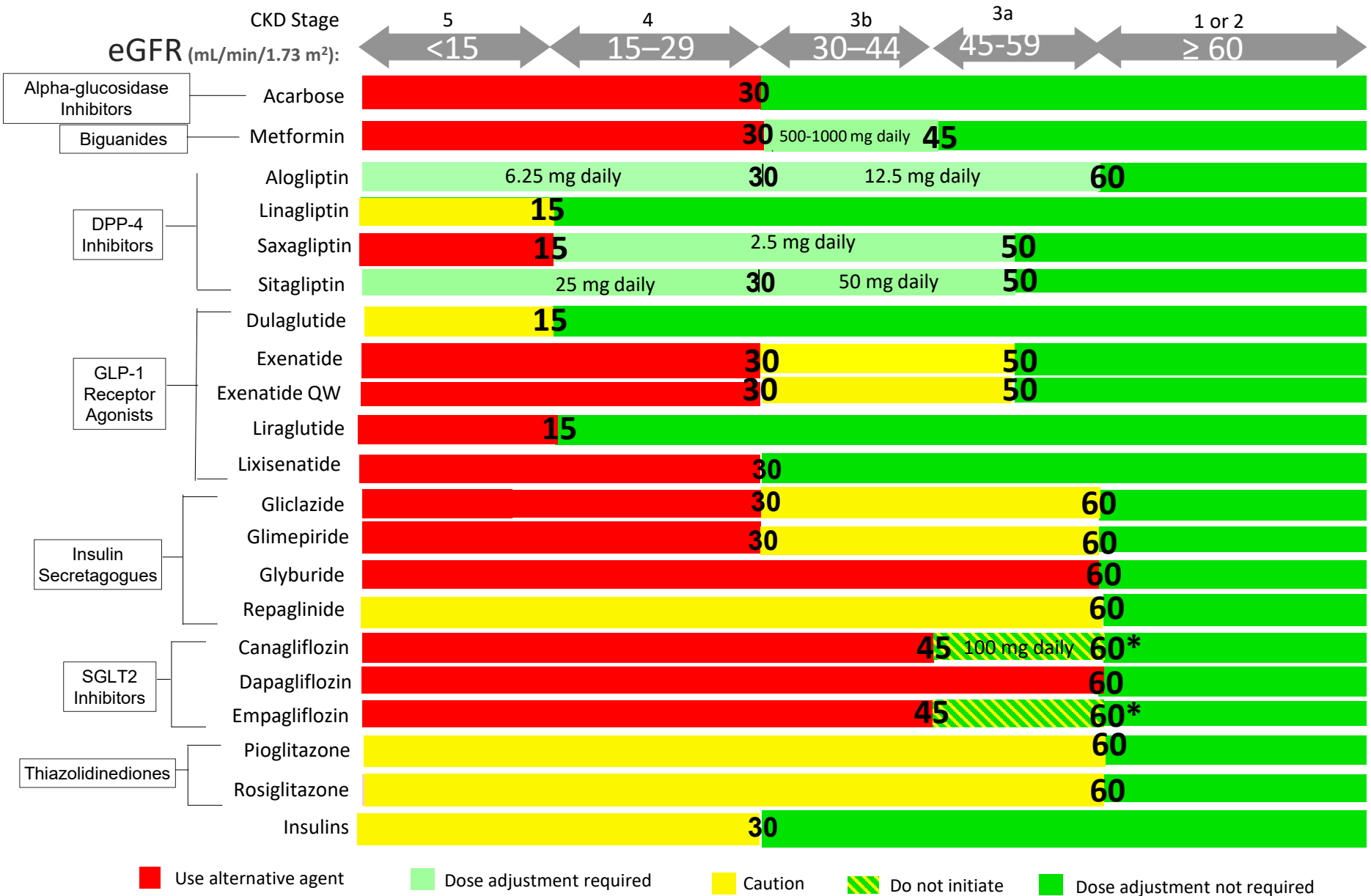
He is taking these medications to manage diabetes:

1. Glicazide MR 120 mg qam
2. Metformin 1000 mg BID
3. Canagliflozin 100 mg OD
4. Linagliptin 5 mg OD

His A1C is 8.9% and his eGFR is 40 mL/min/1.73m². How should his medications be adjusted for his renal function?

Date	AC Breakfast	AC Lunch	AC Supper	Bedtime
1	13.5		12.5	
2		17.1		13.2
3	12.5		14.3	
4		13.2		14.5

Adjust antihyperglycemic agents to renal function.





You decide to target an A1C of 7.1-8.0, post-prandial < 12, pre-prandial 5-8 and made the following adjustments:

- Reduce Metformin to 500 mg BID
- Stop Canagliflozin
- Stop Glicazide
- Continue Linagliptin

Should insulin be started?

Date	AC Breakfast	AC Lunch	AC Supper	Bedtime
1	13.5		12.5	
2		17.1		13.2
3	12.5		14.3	
4		13.2		14.5



Through shared decision-making, he starts a simple regimen of Humalog Mix 25 at 10 units BID, to be titrated up. His wife helps to administer the insulin.

Now, he is on:

- 14 units at breakfast
- 36 units at dinner
- Metformin 500 mg BID
- Linagliptin 5 mg OD

Fasting: 3.3-4.7

AC Lunch: 10.9-12.9

AC Dinner: 9.2-13.8

Bedtime: 7.1-8.6

Now what?



You adjust the Humalog Mix 25:

- 18 units at breakfast
- 32 units at dinner
- Metformin 500 mg BID
- Linagliptin 5 mg OD

Fasting: 4.3-6.9

AC Lunch: 10.9-12.2

AC Dinner: 5.1-7.8


Mr. X – 8 years later

He now has moderate dementia and resides in a long term care facility. He is mostly wheel-chair bound.


1. What is his level of frailty?
2. What is his target A1C?
3. What is the purpose of glycemic control at this stage?




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His A1C is 8.6% and eGFR is 35 ml/min/1.73m².

His diabetes medications are:

1. Metformin 500 mg BID
2. Linagliptin 5 mg OD
3. Insulin glargine U-100 55 units at bedtime



Which of the following is true?

1. To further minimize the risk of hypoglycemia events, glargine U-300 or degludec may be used instead of glargine U-100.
2. Hypoglycemia is not a concern as the A1C is 8.6%, he reports no symptoms, and he is too sedentary to have hypoglycemic episodes.
3. A diabetic nutritional formula should be used as a non-pharmacologic strategy to improve glycemic control.
4. He has no identifiable risk factors for severe hypoglycemia.





Thank you.