

COMPREHENSIVE DIABETES & CKD MANAGEMENT



ALL PATIENTS



Glycemic control



Blood pressure control



Lipid management



Exercise



Nutrition



Smoking cessation



MOST PATIENTS



SGLT2 inhibitors
Patients with T2D (Type 2 Diabetes) and CKD (Chronic Kidney Disease)



RAS inhibition
Patients with T2D albuminuria, and hypertension



SOME PATIENTS



Aspirin
Secondary prevention in established cardiovascular disease
Primary prevention among high-risk individuals



Dual antiplatelet therapy
After acute coronary syndrome or percutaneous coronary intervention

RENIN-ANGIOTENSIN SYSTEM (RAS) BLOCKADE



RECOMMENDATION

★ We recommend that treatment with an angiotensin-converting enzyme inhibitor (ACEi) or an angiotensin II receptor blocker (ARB) be initiated in patients with diabetes, hypertension, and albuminuria, and that these medications be titrated to the highest approved dose that is tolerated. **1B**



For patients with diabetes, albuminuria, and normal blood pressure, **treatment with an ACEi or ARB may be considered**



Advise **contraception** in women who are receiving ACEi/ ARB therapy. **Discontinue ACEi/ARB** in women who are considering **pregnancy** or who become pregnant



Manage hyperkalemia by other measures to **reduce serum potassium** rather than decreasing the dose or stopping ACEi/ARB immediately



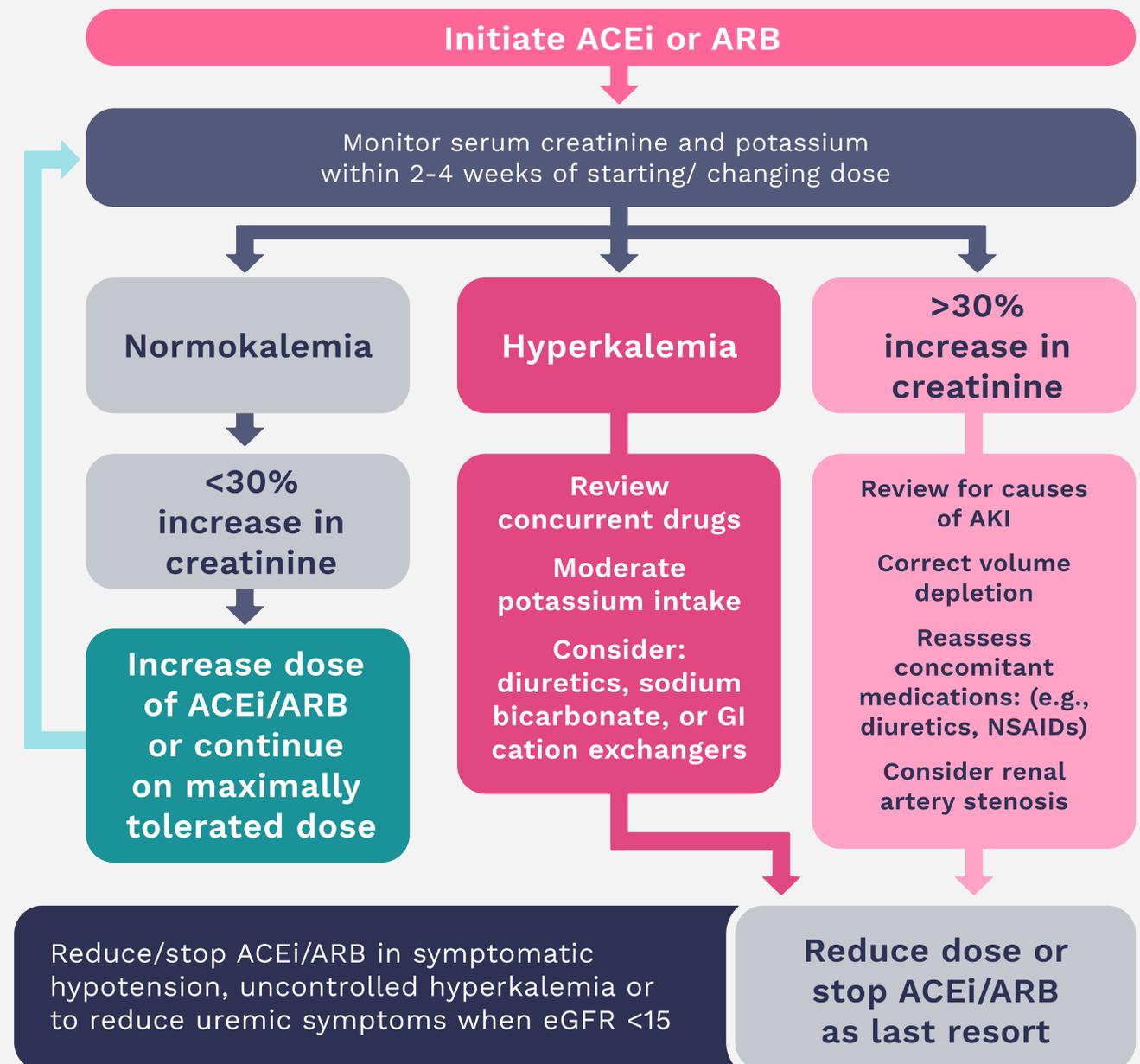
Use only **one agent at a time** for RAS blockade since the combination of an ACEi with an ARB, or the combination of an ACEi or ARB with a direct renin inhibitor, is potentially harmful



Mineralocorticoid receptor antagonists are effective in refractory hypertension but can cause **hyperkalemia** or a **reversible decline in GFR**, particularly among patients with low eGFR



TREATMENT ALGORITHM



GLYCEMIC MONITORING & TARGETS



RECOMMENDATION

- ★ We recommend using HbA1c to monitor glycemic control in patients with diabetes and CKD **1C**
- ★ We recommend an individualized HbA1c target ranging from <math><6.5\%</math> to <math><8.0\%</math> in patients with diabetes and CKD not treated with dialysis **1C**

Frequency of monitoring HbA1c



Twice yearly for patients with diabetes

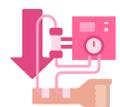


Up to four times yearly if glycemic target not met or with change in therapy

Accuracy and precision of HbA1c

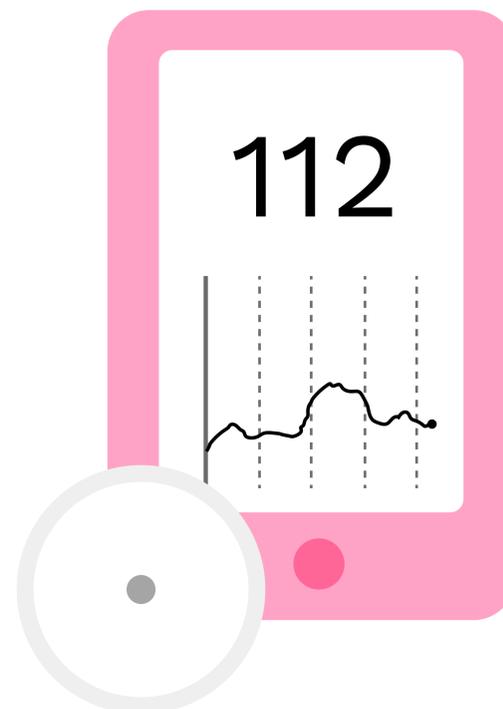


Declines with advanced CKD (G4-G5)



Low reliability particularly in patients treated by dialysis

Continuous glucose monitoring (CGM) and self-monitoring of blood glucose (SMBG)



Can provide a glucose management indicator (GMI) to index glycemia for individuals in whom HbA1c is unreliable

Daily monitoring may help prevent hypoglycemia

CGM metrics (e.g., time in range and time in hypoglycemia) may be considered as alternatives to HbA1c for defining glycemic targets

Newer CGM devices may offer advantages for certain individuals depending on their values, goals and preferences

Choice of antihyperglycemic agents



Advanced CKD substantially increases the risk of hypoglycemia in patients treated with oral agents and insulin



Consider agents (metformin SGLT2i, GLP-1 RA and DPP-4i) that pose a lower risk of hypoglycemia especially with patients not using CGM/SMBG



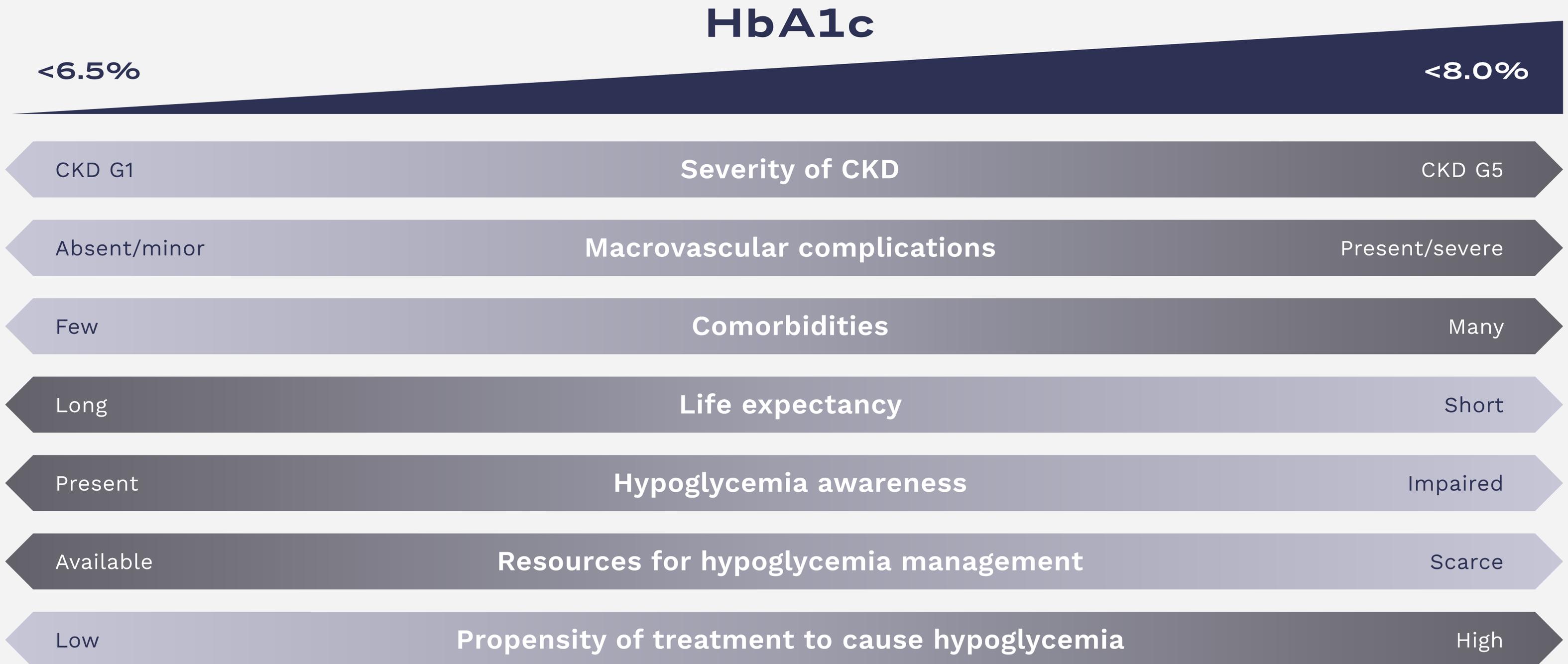
Doses of agents might need to be reduced according to level of CKD



CGM/SMBG may facilitate safe achievement of lower HbA1c targets in conjunction with use of agents that are not associated with hypoglycemia



FACTORS GUIDING DECISIONS ON INDIVIDUAL HbA1c TARGETS



LIFESTYLE INTERVENTIONS IN PATIENTS WITH DIABETES & CKD



RECOMMENDATION

- ★ We suggest maintaining a protein intake of 0.8 g protein/kg (weight)/day for those with diabetes and CKD not treated with dialysis **2C**
- ★ We suggest that sodium intake be <2 g of sodium/day (< 5 g of sodium chloride/day) in patients with diabetes and CKD **2C**
- ★ We recommend that patients with diabetes and CKD be advised to undertake moderate-intensity physical activity for a cumulative duration of at least 150 minutes/week, or to a level compatible with their cardiovascular and physical tolerance **1D**
- ★ We recommend advising patients with diabetes and CKD who use tobacco to quit using tobacco products **1D**



NUTRITION INTAKE



Encourage a **varied diet** high in vegetables, fruits, whole grains, fiber, legumes, plant-based proteins, unsaturated fats, and nuts

Reduce intake of processed meats, refined carbohydrates, and sweetened beverages



Aim for **1.0 – 1.2 g protein/kg/day** in patients treated with **hemodialysis**, and particularly **peritoneal dialysis**



Shared decision-making should be a cornerstone of patient-centered nutrition management. Accredited nutrition providers, registered dietitians and diabetes educators, community health workers, peer counselors, or other health workers should be engaged in the multidisciplinary nutrition care of patients with diabetes and CKD



Health care providers should consider cultural differences, food intolerances, variations in food resources, cooking skills, comorbidities, and cost when recommending dietary options to patients and their families.



PHYSICAL ACTIVITY



Recommendations for physical activity should consider **age, ethnic background, presence of other comorbidities, and access to resources**



Advise patients to **avoid sedentary behavior**



Tailor advice on intensity of physical activity and type of exercises for patients at higher risk of falls



Encourage patients with obesity, diabetes, and CKD to **lose weight**, particularly if $eGFR \geq 30$ ml/min/1.73 m²

ANTIHYPERGLYCEMIC THERAPIES

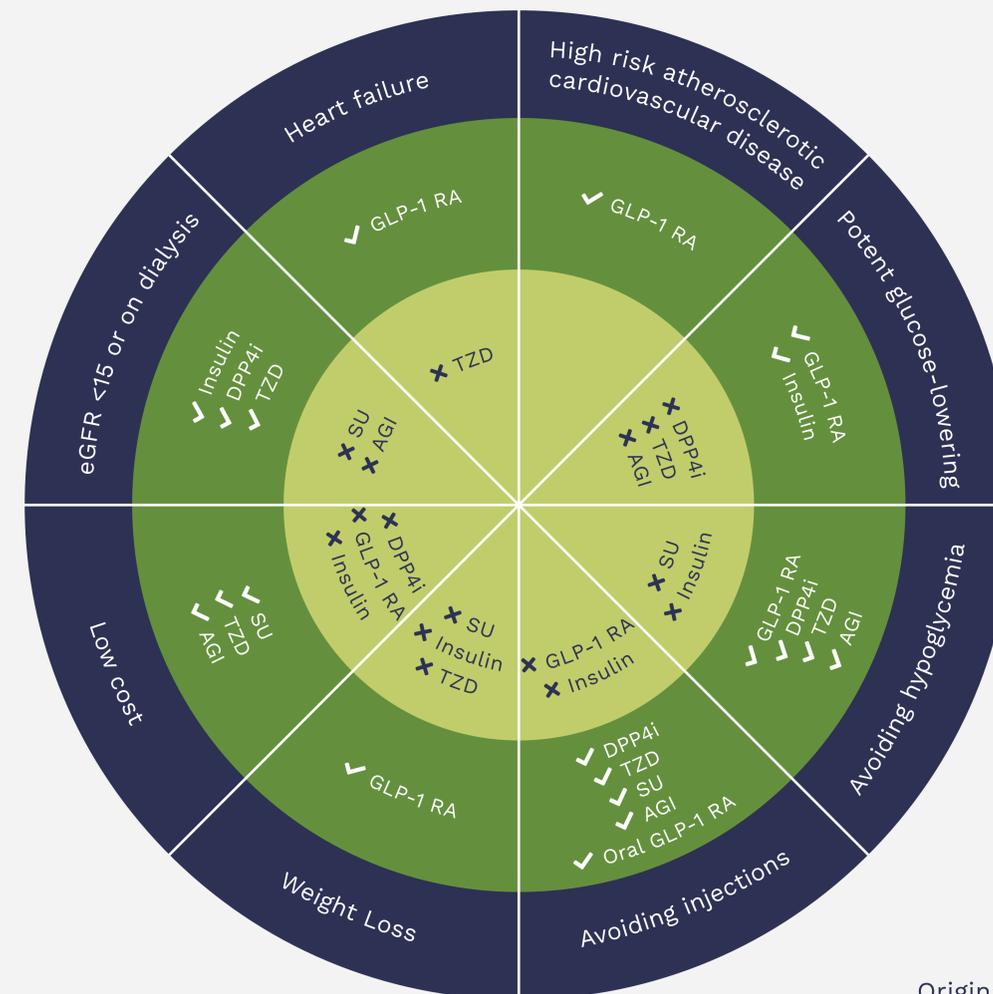
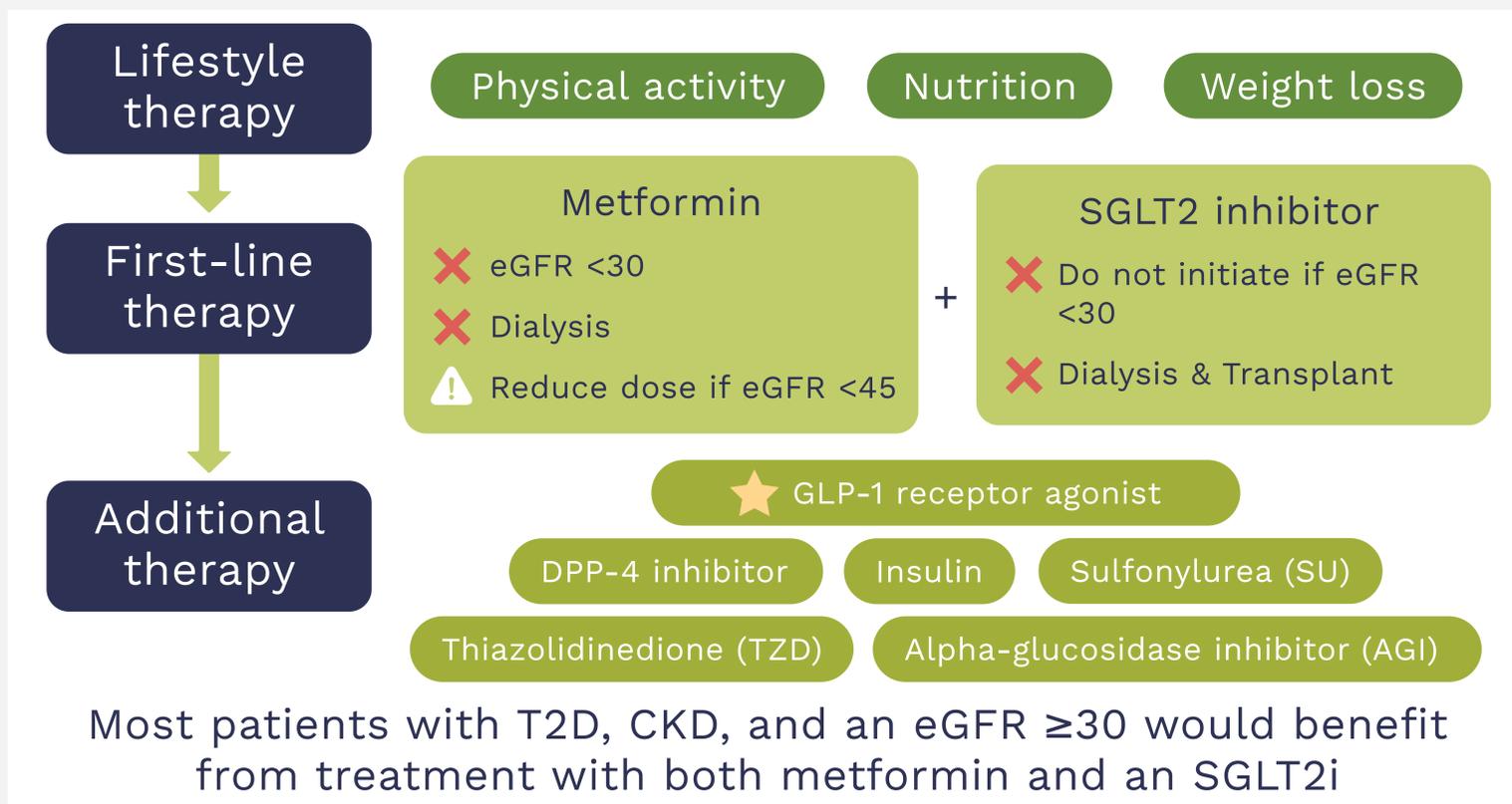


RECOMMENDATION

- ★ We recommend treatment for patients with T2D, CKD and eGFR ≥ 30 with SGLT2i **1A** and metformin **1B**
- ★ In patients with T2D and CKD who have not achieved individualized glycemic targets despite use of metformin and SGLT2i, or who are unable to use those medications, we recommend a long-acting GLP-1 RA **1B**



TREATMENT ALGORITHM



Factors governing choice of antihyperglycemic agents after metformin and SGLT2i

Patient preferences, comorbidities, eGFR, and cost should guide selection of additional drugs to manage glycemia, when needed, with glucagon-like peptide-1 receptor agonist (GLP-1 RA) generally preferred

METFORMIN



RECOMMENDATION

We recommend treatment for patients with T2D, CKD and eGFR ≥ 30 with metformin **1B**



BENEFITS



Effective as an antihyperglycemic agent; can be used to treat transplant recipients as well for those with eGFR ≥ 30



Efficacy comparable to thiazolidinediones and sulfonylureas



Reduced risk of hypoglycemia compared to sulfonylureas and insulin



May be helpful with weight control



May offer protection against cardiovascular events



CAUTION



Closer monitoring required when eGFR < 60



Doses should be halved when eGFR < 45



Conflicting reports of lactic acidosis



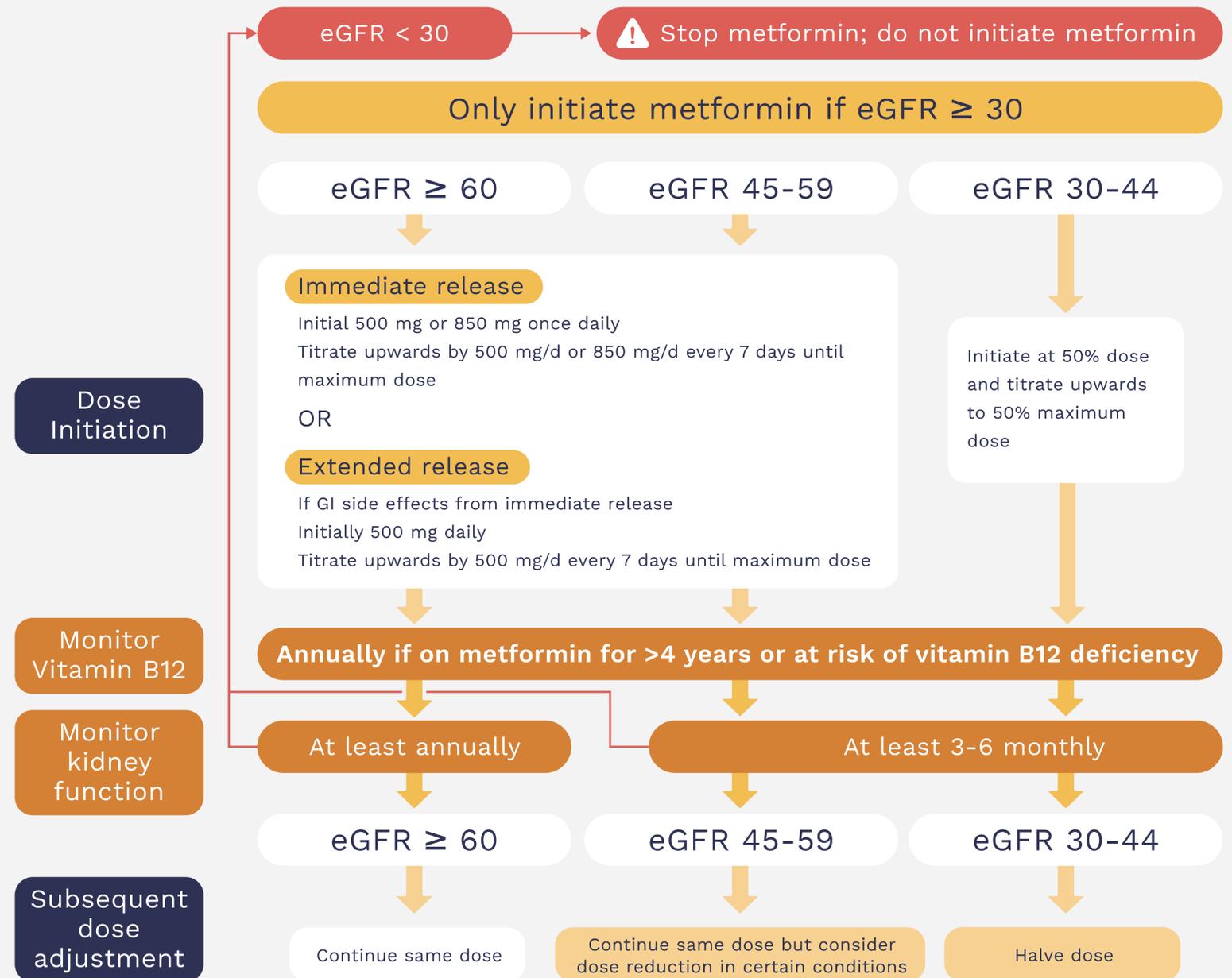
Gastrointestinal side effects particularly with immediate release formulations



Interferes with intestinal vitamin B12 absorption



TREATMENT ALGORITHM



SODIUM-GLUCOSE COTRANSPORTER-2 INHIBITORS (SGLT2i)



RECOMMENDATION

We recommend treatment for patients with T2D, CKD and eGFR ≥ 30 with SGLT2i **1A**



BENEFITS



Can **reduce major adverse cardiovascular events (MACE)**



Reduces **risk of hospitalization due to heart failure**



Helps **slow progression** of CKD and albuminuria



CAUTION



May need to be withheld when patients are at greater risk of **ketosis** (e.g. **fasting, surgery, critical illness**)



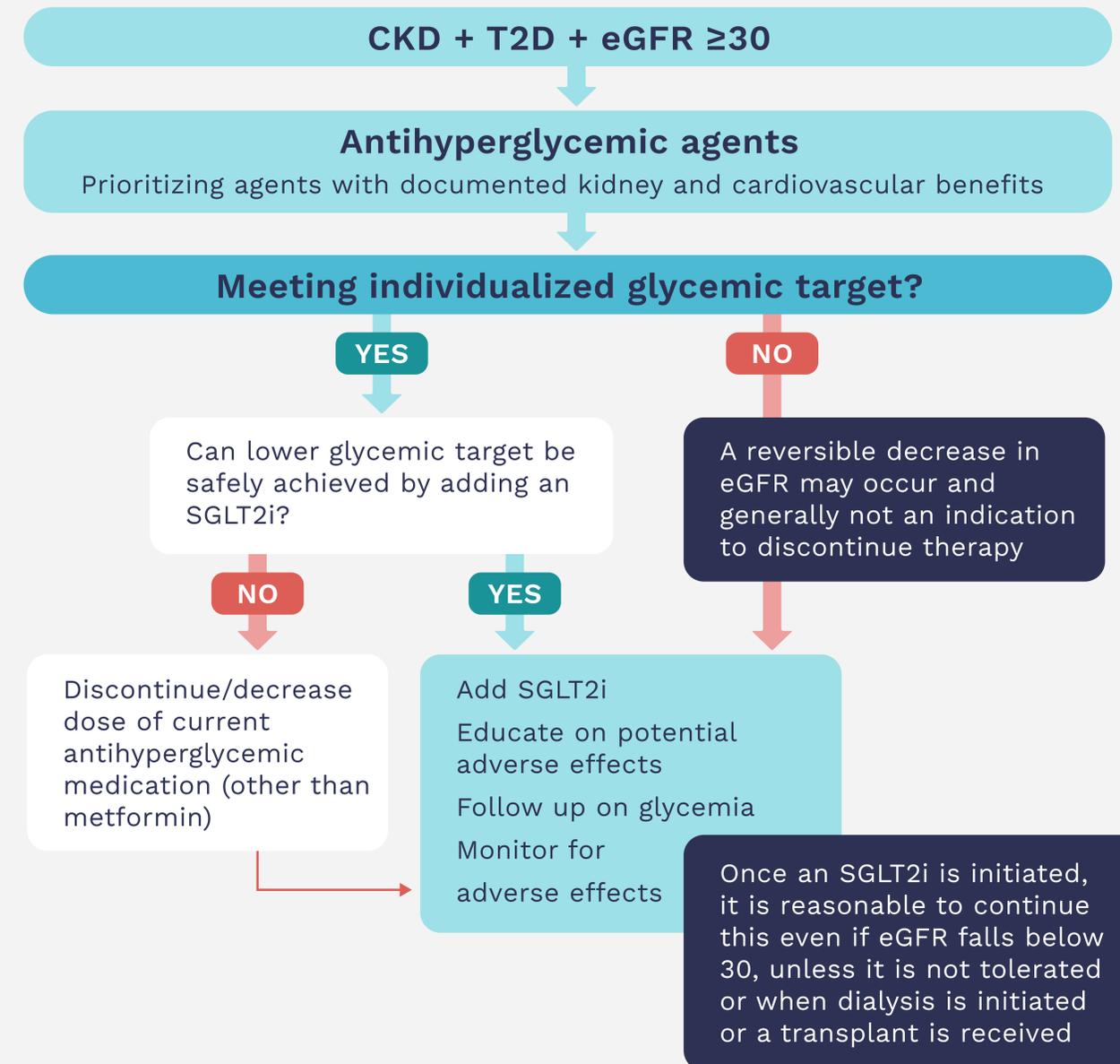
Consider reducing dose of concurrent thiazide or loop diuretics if at risk of **hypovolemia**



Not yet adequately studied for use in patients with kidney transplants; therefore recommendations do not apply to this population



TREATMENT ALGORITHM



GLUCAGON-LIKE PEPTIDE-1 RECEPTOR AGONISTS (GLP-1 RA)



RECOMMENDATION

In patients with T2D and CKD who have not achieved individualized glycemic targets despite use of metformin and SGLT2i treatment, or who are unable to use those medications, we recommend a long-acting GLP-1 RA **1B**



BENEFITS



Long-acting GLP-1 RA substantially improve blood glucose and HbA1c control



May be helpful with weight control



Can help lower blood pressure



Can reduce major adverse cardiovascular events (MACE)



Risk of hypoglycemia is generally low but doses of sulfonylureas or insulin may need to be reduced if used concomitantly



Substantially reduces albuminuria and likely helps preserve eGFR



CAUTION



Gastrointestinal side effects can be minimized by starting with a low dose and titrating up slowly



Should not be used in conjunction with DPP-4 inhibitors



Prioritize agents with documented cardiovascular benefits



Can cause a slight increase in heart rate



Avoid in individuals at risk of medullary thyroid tumors



Avoid in individuals with a history of acute pancreatitis



DOSING + ADJUSTMENTS IN CKD

GLP-1 RA	Dose	CKD dose adjustment
Dulaglutide	0.75 and 1.5 mg Once weekly	No adjustment Use if eGFR >15
Exenatide	10 µg Twice daily	Use if CrCl >30
Exenatide Extended release	2 mg Once weekly	Use if CrCl >30
Liraglutide	0.6, 1.2, and 1.8 mg Once daily	No adjustment Limited data for severe CKD
Lixisenatide	10 µg and 20 µg Once daily	No adjustment Limited data for severe CKD
Semaglutide Injectable	0.5 mg and 1 mg Once weekly	No adjustment Limited data for severe CKD
Semaglutide Oral	3 mg, 7 mg, and 14 mg Once daily	No adjustment Limited data for severe CKD

SELF-MANAGEMENT EDUCATION PROGRAMS



RECOMMENDATION

★ We recommend that a structured self-management educational program be implemented for care of people with diabetes and CKD **1C**



Based on figures from *The Lancet Diabetes & Endocrinology*, Volume 6, Chatterjee S, Davies MJ, Heller S, et al. and *Diabetes Structured Self-management Education Programmes: A Narrative Review and Current Innovations*, 130–142, Copyright 2018.

TEAM-BASED INTEGRATED CARE



RECOMMENDATION

★ We suggest that policymakers and institutional decision-makers implement team-based, integrated care focused on risk evaluation and patient empowerment to provide comprehensive care in patients with diabetes and CKD **2B**



GOALS OF CARE

Treat to glycemia, BP, and lipids targets

Use of organ-protective drugs
(RASi, SGLT2i, GLP-1 RA, statins)

Ongoing support to promote self-care

Uncoordinated care

✗ Poorly informed patients with suboptimal control

Coordinated care

✓ Empowered patients with optimal control



Periodic audits should be conducted to identify care gaps and provide feedback to practitioners with support to improve quality of care

