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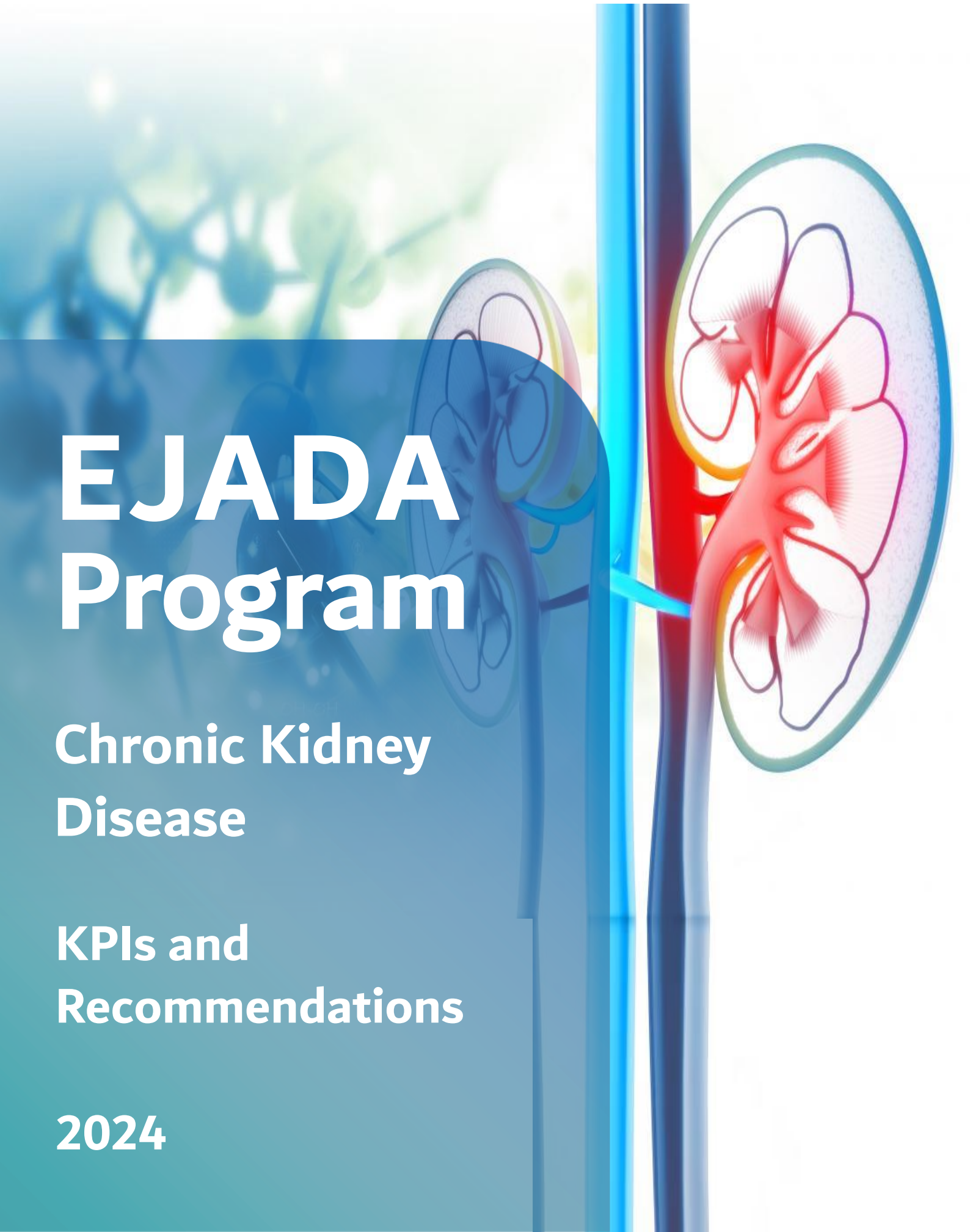

EJADA Program

Chronic Kidney Disease

KPIs and Recommendations

2024

Content

Introduction

Chronic kidney disease (CKD) is a complex and multifaceted disease associated with significant morbidity and mortality. The global incidence of chronic kidney disease (CKD) is on the rise, and it is expected that CKD will rank as the fifth most common chronic disease by the year 2040. Despite the widespread occurrence and the significant clinical and economic impact of its related complications, there is still a remarkably low level of awareness about the disease. Awareness of Chronic Kidney Disease (CKD) remains limited, largely because symptoms of CKD often do not appear until the disease has progressed to advanced stages. Early diagnosis of CKD is crucial as it provides more chances to avert negative health consequences. It is essential for physicians to be aware of CKD to initiate timely evidence-based treatments that can decelerate the worsening of kidney function, prevent metabolic complications, and decrease the risk of cardiovascular events.

Treatment of CKD requires a multifaceted approach utilizing both non-pharmacological approach such as diet and exercise regimes and pharmacological interventions such as antihypertensive and antihyperglycemic drugs. In last 2 decades, novel therapies that target the mineralocortiocoid receptor antagonists and sodium-glucose co-transporter 2 inhibitors (SGLT2i), have emerged. SGLT2 inhibitors provide significant clinical benefits, including cardiovascular and renal protection, regardless of their impact on blood sugar levels. The positive clinical outcomes and safety data from these studies underscore the potential application of SGLT2 inhibitors in diminishing the cardiovascular load and slowing down the progression of Chronic Kidney Disease (CKD) across various CKD causes at both initial and advanced stages where there exists a lack of adequate treatment. Presently, the SGLT2 inhibitor category of medications, which includes canagliflozin, dapagliflozin, and empagliflozin, has received approval from the US FDA for managing Type 2 Diabetes Mellitus (T2DM). Additionally, dapagliflozin and canagliflozin have been more recently authorized for the treatment of CKD and Diabetic Kidney Disease (DKD), respectively.

Scope

The Ejada KPIs are quality indicators and ratings for physicians, facilities and insurance companies based on information collected by DHA systems from providers, payers and patients.

The Chronic Kidney Disease (CKD) KPIs and Recommendations are based on regional and International guidelines on CKD assessment and management. The KPIs are designed for healthcare practitioners and providers to follow international best practices in the assessment and management of CKD patients.

The CKD KPIs cover the following aspects:

- Screening to facilitate early detection of CKD and thereby to prevent the progression of disease
- Regular monitoring of kidney function, proteinuria and other risk factors for CKD progression
- Pharmacological management including focus on the novel therapies such as SGLT2i
- Referrals to specialists for initiation of appropriate therapy

The KPIs and recommendations have been reviewed by leading experts in the UAE.

List of Abbreviations

S.No	Abbreviation	Full term
1	ACE	Angiotensin-converting enzyme
2	ACR	Albumin-to-creatinine ratio
3	AED	Arab Emirates dirham
4	ARB	Angiotensin II receptor blockers
5	ASCVD	Atherosclerotic cardiovascular disease
6	CKD	Chronic kidney disease
7	CV	Cardiovascular
8	CVD	Cardiovascular disease
9	DDC	Dubai drug code
10	DM	Diabetes mellitus
11	ESA	Erythropoietin stimulating agents
12	ESRD	End stage renal disease
13	GFR	Glomerular filtration rate
14	GLP-1RA	Glucagon-like peptide-1 receptor agonists
15	HbA1c	Glycated hemoglobin
16	HDL	High density lipoprotein
17	HF	Heart failure
18	HIF-PHIs	Hypoxia-inducible factor prolyl hydroxylase inhibitors
19	KDOQI	Kidney Disease: Improving Global Outcomes
20	LDL	Low density lipoprotein
21	LDL-C	Low density lipoprotein-cholesterol
22	MI	Myocardial infarction
23	PAD	Peripheral artery disease
24	PCR	Protein-to-creatinine ratio
25	PPV	Pneumococcal polysaccharide vaccine
26	PTH	Parathyroid hormone
27	RAAS	Renin-angiotensin-aldosterone system
28	SGLT-2	Sodium-glucose transport protein 2
29	SLE	Systemic lupus erythematosus
30	T2DM	Type 2 diabetes mellitus
31	uACR	urine albumin-creatinine ratio

KPIs and their Measuring Parameters

	KPIs	Measuring Parameters	Pillar
1	Percentage of patients with CKD in whom GFR and albuminuria is tested annually	urine albumin-to-creatinine ratio (ACR); urine protein-to-creatinine ratio (PCR), serum creatinine and, GFR estimating equation, cystatin C	Health Outcome
2	Percentage of patients with CKD who maintain good glycemic control	HbA1c	Health Outcome
3	Percentage of patients with CKD who were assessed for anemia and metabolic bone disease	Hb, calcium, phosphate, PTH, and alkaline phosphatase levels	Health Outcome
4	Percentage of Diabetes Patients with Chronic Kidney Disease	Diagnosis of DM and CKD	Health Outcome
5	Kidney Health Evaluation for Patients with Diabetes	Urinalysis for microalbuminuria, GFR assessment, Nephrology consult	Health Outcome
6	Percentage of Hypertension Patients with Chronic Kidney Disease	Diagnosis of DM and Hypertension	Health Outcome
7	ACEi / ARBs & SGLT2 Inhibitors for management of CKD Patients with microalbuminuria	DDC List of drugs	Health Outcome
8	Antihypertensives for management of CKD Patients with Hypertension	DDC List of drugs	Health Outcome
9	Vitamin D supplementation in CKD patients	DDC List of drugs	Health Outcome
10	Prescription of GLP-1RA/SGLT-2 in T2DM Patients with CKD	DDC List of drugs	Health Outcome
11	Prescription of SGLT-2 in patients with CKD without diabetes	DDC List of drugs	Health Outcome
12	Prescription of Erythrolein Stimulating Agents (ESAs) and Hypoxia-Inducible Factor Prolyl Hydroxylase Inhibitors (HIF-PHIs) for the treatment of anemia in Chronic Kidney Disease (CKD) patients	DDC List of drugs	Health Outcome
13	LDL- Cholesterol Measurement in CKD patients	Lipid Profile	Health Outcome
14	Percentage of End Stage Renal Disease (ESRD) patients who underwent renal transplantation	Renal Transplantation	Health Outcome
15	Referral of CKD Patients for Nephrology Consultation	Referral	Health Operational
16	Referral of CKD Patients for Dietary Consultation	Referral	Health Operational
17	Avoidable Hospitalization in Patients with Chronic Kidney Disease	In-patient Hospitalization	Health Operational
18	Percentage Cost Decrease for Managing Patients with Chronic Kidney Disease	Cost (AED)	Health Economic
19	Yearly Cost of Dialysis Therapy	Cost (AED)	Health Economic
20	Vaccination of CKD patients with Influenza vaccine annually	DDC list of Vaccinations	Health Safety
21	Vaccination of CKD patients with Pneumococcal and Hepatitis B vaccine	DDC list of Vaccinations	Health Safety

Evaluation and Management of CKD in Primary Care

Treatment Algorithm Guidance		
1	Identification of high-risk CKD patient	1 or more of the following:
2	Know the criteria for Chronic Kidney Disease (CKD)	• Abnormalities of kidney structure or function, present for >3 months, with implications for health • Either of the following must be present for >3 months: – Markers of kidney damage (one or more*) – GFR <60 ml/min/1.73 m2 *Markers of kidney damage can include nephrotic syndrome, tubular syndromes, urinary tract symptoms, asymptomatic urinalysis abnormalities, asymptomatic radiologic abnormalities, hypertension due to kidney disease.
3	Screen for CKD with two simple tests	• "Spot" urine for albumin-to-creatinine ratio (ACR) to detect albuminuria • Serum creatinine to estimate glomerular filtration rate (GFR)
4	Understanding how to classify CKD	• Identify cause of CKD • Assign GFR category • Assign albuminuria category
5	After detection of CKD	• Implement a clinical action plan based on patient's CKD classification (refer to algorithm below) or consider referral to a nephrologist if the clinical action plan cannot be carried out • Refer to a nephrologist when GFR <30 mL/min/1.73 m2 or ACR >300 mg/g
6	Upon devising clinical action plan, the use of ACEi/ARB to follow:	• Check renal function and potassium 2-3 weeks after starting • Do not modify the ACEi/ARB dose if the change in eGFR is less than 25%, or the change in serum creatinine is less than 30%. Repeat the test in 1-2 weeks. • Caution if prestart potassium is 5-5.5 mmol/L
7	Upon devising clinical action plan, the use of SGLT2i to follow:	• Assess volume status and BP prior to initiation. • Monitor renal function 2 weeks after starting. • Increase in creatinine of up to 30 % of the baseline is acceptable. No need to stop, but monitor. • Stop if creatinine increase > 30% from the baseline and assess volume status and seek Nephrology advice. • Reduce dose of insulin, Sulphonylureas and glinides for T2DM. • Educate patients on sick day protocol • Beware of S/S of DKA (nausea, vomiting, abdominal pain, high AG metabolic acidosis and ketonemia).

Pharmacotherapy for patients with or at risk of chronic kidney disease

Conditions with high CKD risk (1 or more of the following)

- Diabetes
- Age >60 years
- Family history of CKD
- Hypertension
- AKI
- Ethnic / Racial Minority
- History of cardiovascular disease
- Obesity
- Smoking

YES

Screen for CKD

- "Spot" urine for albumin-to creatine ratio (ACR) to detect albuminuria >30 mg/g
- Serum creatinine to estimate glomerular filtration rate (GFR) <60ml/min/1.73m^2

If no abnormality → **Repeat in 6 -12 months if patient is high risk for CKD**

If either is abnormal

- **Urine analysis for presence of protein, RBCs or casts.**
- **USG KUB to rule out obstruction and structural abnormalities.**

Is either of the following present for 3 months or more?

- eGFR <60 ml/min/1.73m^2
- Albuminuria ACR >30 mg/g
- Abnormal urine analysis
- Abnormal USG

YES

Classify CKD stage

Identify and treat specific cause of CKD

Cause of CKD is classified based on presence or absence of systemic disease and the presence within the kidney of observed or presumed pathological-anatomical findings

GFR categories (mL/min/1.73 m^2) description and range			Albuminuria categories description and range: A1 Normal to mildly increased <30 mg/g <3 mg/mmol	A2 Moderately increased 30–300 mg/g 3–30 mg/mmol	A3 Severely increased >300 mg/g >30 mg/mmol
G1	Normal or high	≥90			
G2	Mild	60–89			
G3a	Mild to moderately decreased	45–59			
G3b	Moderately to severely decreased	30–44			
G4	Severely deceased	15–29			
G5	Kidney failure	<15			

PHARMACOTHERAPY

			A1 <30 mg/g <3 mg/mmol	A2 30–300 mg/g 3–30 mg/mmol	A3 >300 mg/g >30 mg/mmol
G1	Normal or high	≥90	ACEi / ARB SGLT2i (T2DM) OPTIMIZE BLOOD PRESSURE STATINS OPTIMIZE HbA1c	ACEi / ARB SGLT2i OPTIMIZE BLOOD PRESSURE STATINS OPTIMIZE HbA1c (T2DM) MRA (T2DM)	Treat & Consult
G2	Mild	60–89	ACEi / ARB SGLT2i (T2DM) OPTIMIZE BLOOD PRESSURE STATINS OPTIMIZE HbA1c (T2DM)	ACEi / ARB SGLT2i OPTIMIZE BLOOD PRESSURE STATINS OPTIMIZE HbA1c (T2DM) MRA (T2DM)	Treat & Consult
G3a	Mild to moderately decreased	45–59	ACEi / ARB SGLT2i OPTIMIZE BLOOD PRESSURE STATINS OPTIMIZE HbA1c (T2DM)	ACEi / ARB SGLT2i OPTIMIZE BLOOD PRESSURE STATINS OPTIMIZE HbA1c (T2DM) MRA (T2DM)	Treat & Consult
G3b	Moderately to severely decreased	30–44	ACEi / ARB SGLT2i OPTIMIZE BLOOD PRESSURE STATINS OPTIMIZE HbA1c (T2DM)	ACEi / ARB SGLT2i OPTIMIZE BLOOD PRESSURE STATINS OPTIMIZE HbA1c (T2DM) MRA (T2DM)	Treat & Consult
G4	Severely deceased	15–29	Treat & Consult	Treat & Consult	Treat & Consult
G5	Kidney failure	<15	Treat & Consult	Treat & Consult	Treat & Consult

Pharmacotherapy for patients with or at risk of chronic kidney disease

Patient Safety

eGFR <60 Patient Safety Risk
- Vaccinate for COVID
- Drug dosing consider eGFR
- Reduce risk of AKI volume depletion
- Contrast-induced AKI prevention:
  - Avoid contrast or minimize dose
  - Consider isotonic saline infusion before, during and after procedure
  - Withhold metformin, RAAS blockers
  - Consider holding diuretics prior to procedure if volume status allows.

eGFR 45 - <60 Patient Safety Risk
- Avoid prolonged NSAIDS
- Metformin can be used
- Pneumococcal vaccine
- Yearly flu vaccine

eGFR 30 - <45 Patient Safety Risk
- Avoid prolonged NSAIDS
- Use metformin with close monitoring at 50% dose

eGFR <30 Patient Safety Risk
- Vaccinate for Hepatitis B
- Avoid any NSAIDS
- Avoid bisphosphonates
- Avoid metformin
- Avoid PICC lines, use single and double lumen central
- catheters instead.
- Avoid Warfarin if possible. Monitor PT INR closely given increased risk of bleeding. Consider Apixiban as an alternative

Reduce CKD Progression

Treat high blood pressure
- Blood Pressure Goal <140/90 (target range 120 to 139 mmHg)
- Consider BP goal <130/80 if ACR >300 (target range 120 to 129 mmHg)
  - ACEi or ARB to treat high blood pressure if ACR >30 mg/mmol
    Refer to page 6 for data outcomes on ACEi/ARB
  - Diuretic is usually required
  - Dietary sodium <2000 mg/day

Refer to page 6 for data outcomes on ACEi/ARB

Treat Type II Diabetes
- Target HbAlc = 7%
- Refer to *EJADAH KPIs and Recommendations_Diabetes 2023*

Use of SGLT2i to prevent or treat CKD for non-diabetic and T2DM
- Recommended to treat adults with eGFR ≥20 mL/min/1.73 m^2 with UACR ≥200 mg/g with an SGLT2 inhibitor (1A)
- Recommended to treat adults with eGFR ≥20-45 mL/min/1.73 m^2 with UACR <200 mg/g with an SGLT2 inhibitor (2B)

Refer to page 7 for data outcomes on SGLT2i

Use of MRA to treat CKD for adults with T2DM
- Recommended a nonsteroidal mineralocorticoid receptor antagonist with proven kidney or cardiovascular benefit for adults with T2D, an eGFR >25 ml/min per 1.73 m2, normal serum potassium concentration, and albuminuria (>30 mg/g [>3 mg/mmol]) despite maximum tolerated dose of RAS inhibitor (RASi) (2A).
- Practice Points:

1. Nonsteroidal MRA are most appropriate for adults with T2D who are at high risk of CKD progression and cardiovascular events, as demonstrated by persistent albuminuria despite other standard-of-care therapies.
2. A nonsteroidal MRA may be added to a RASi and an SGLT2i for treatment of T2D and CKD in adults.
3. To mitigate risk of hyperkalemia, select people with consistently normal serum potassium concentration and monitor serum potassium regularly after initiation of a nonsteroidal MRA.
4. The choice of a nonsteroidal MRA should prioritize agents with documented kidney or cardiovascular benefits.
5. A steroidal MRA may be used for treatment of heart failure,
6. hyperaldosteronism, or refractory hypertension, but may cause hyperkalemia or a reversible decline in glomerular filtration, particularly among people with a low GFR.

Refer to page 8 for data outcomes on MRA

Reduction of Cardiovascular complications

CKD = increased CVD risk

Consider lipid lowering therapy
- All >50 years
- 18-50 years at high CVD risk (h/o CAD, DM, h/o ischemic CVA, 10-year risk of MI >10%)
- Aspirin for secondary prevention unless bleeding risk outweighs benefits

Nephrology Referral

- eGFR<30 or ACR>300mg/g
- 25% decrease in eGFR over 1 year (AKI or progressive
  CKD may be difficult to distinguish)
- Persistent hyperkalaemia / metabolic acidosis
- Recurrent kidney stones
- Unexplained haematuria
- Difficult to control BP
- Secondary hyperparathyroidism
- Possibly inherited or unknown cause of CKD

CKD Complications management

- Anaemia - CKD 3 -5, Evaluation if Hb <13.0 g/dl for men and <12.0 g/dl for women. Treat iron deficiency first. Use ESA to treat Hb <10 g/dl (Target 9-12) or refer to nephrology.
- Acidosis - Bicarbonate goal >22-26 mmol/L use oral sodium bicarbonate to achieve this goal. Start with 650 mg thrice daily.
- CKD-MBD - CKD 3-5 check calcium, phosphate, 25-OH vitamin D, and IPTH. Supplement vitamin D deficiency.
- If hyperphosphatemia or significantly elevated IPTH, refer to nephrology.

Pharmacotherapy for patients with or at risk of chronic kidney disease

THE USE OF ACEi/ARB

REIN[11]

CKD outcome trial to evaluate the effect of Ramipril on decline in glomerular filtration rate and risk of terminal renal failure in proteinuric, non-diabetic nephropathy on patients with chronic nephropathy and persistent proteinuria:

- **Mean eGFR 40.2 mL/min/1.73m2**
- **Mean urinary protein excretion 5.6 g/24 h**

In the analysis of renal outcomes, results showed

- *The decline in eGFR per month was significantly lower in the ramipril group than the placebo group (0·53 [0·08] vs 0·88 [0·13] mL/min, p=0·03).*
- *Reduction in risk of doubling of baseline creatinine or endstage renal failure (18 ramipril vs40 placebo, p=0·04).*
- *Blood-pressure control and the overall number of cardiovascular events were similar in the two treatment groups.*

IDNT[12]

CKD outcome trial to evaluate the effect of Irbesartan on slowing the progression of nephropathy in patients with type 2 diabetes independently of its capacity to lower the systemic blood pressure, compared with Amlodipine or placebo:

- **Mean serum creatinine 1.67 mg/dl**
- **Median urinary protein excretion 2.9 g/24 h**

In the analysis of renal outcomes, results showed

- *Reduction in the composite of doubling of the base-line serum creatinine concentration, the onset of ESRD (Initiation of dialysis, renal transplantation, or a serum creatinine concentration of at least 6.0 mg/dl), or death from any cause by 20% vs placebo and 23% vs Amlodipine*
- *Reduction in the risk of doubling of serum creatinine concentration by 33% vs placebo and 37% vs amlodipine*
- *Reduction in risk of ESRD by 23% lower than that in both other groups*
- *The serum creatinine concentration increased 24% more slowly in the irbesartan group than in the placebo group and 21% more slowly than in the amlodipine group*
- *There were no significant differences in the rates of death from any cause or in the cardiovascular end point (composite of death from cardiovascular causes, nonfatal myocardial infarction, heart failure resulting in hospitalization, a permanent neurologic deficit caused by a cerebrovascular event, or lower limb amputation above the ankle)*

RENAAL[13]

Effects of Losartan on Renal and Cardiovascular Outcomes in Patients with Type 2 Diabetes and Nephropathy:

- **Mean serum creatinine 1.9 ± 0.5 mg/dl**
- **Median urinary albumin:creatinine ratio 1237 mg/mmol**

In the analysis of renal outcomes, results showed

- *Reduction in the composite of doubling of the base-line serum creatinine concentration, end-stage renal disease, or death by 16%*
- *Reduction in the incidence of a doubling of the serum creatinine concentration by 25%*
- *Reduction in risk of end-stage renal disease by 28%*
- *Losartan had no effect on the rate of death*
- *The level of proteinuria declined by 35% with losartan*

ROADMAP[14]

Effects of Olmesartan for the Delay or Prevention of Microalbuminuria in Type 2 Diabetes

- **Mean eGFR 85.0 ±17.0 mL/min/1.73m2**
- **Mean urinary albumin:creatinine ratio 6.3 ±7.6 mg/g**

In the analysis of renal outcomes, results showed

- *The time to the onset of microalbuminuria was increased by 23% with Olmesartan*
- *The serum creatinine level doubled in 1% of the patients in each group similarly*
- *A higher rate of death from cardiovascular causes was found in the Olmesartan group than in the placebo group among patients with pre-existing coronary heart disease*

Pharmacotherapy for patients with or at risk of chronic kidney disease

THE USE OF SGLT2i

KIDNEY PROTECTION

Prevention of new onset/progression of nephropathy for T2DM
For patients with eGFR ≥60 mL/min/1.73m2

DECLARE TIMI-58[8]

CardioVascular Outcome Trial with Dapagliflozin on 17,160 patients with T2DM and:

- **Indicators of risk factors only for CVD (**i.e.; patients with ≥55-year-old plus at least one of the following: dyslipidaemia, hypertension or current smoking)

OR

Established ASCVD (i.e.; ≥40 years old with ischemic heart disease (like prior history of Myocardial Infarction, single or multi vessel coronary artery disease, coronary artery bypass graft), or peripheral artery disease or cerebrovascular disease (like ischaemic stroke) or cardiac failure)

- **Mean eGFR 85.2 mL/min/1.73m2**
- **Mean Albuminurea 30.2 mg/mmol**

Renal composite as a secondary endpoint was defined as "sustained ≥40% decrease in eGFR to eGFR <60 mL/min/1.73 m2 and/or ESRD and/or renal death"

In the analysis of renal outcomes, results showed Dapagliflozin significantly reduced

- *Incident or worsening nephropathy* (47%)
- *Need for starting renal-replacement therapy* (69%)
- *Need for starting renal-replacement therapy or Renal death* (59%)
- *Prevention of new onset of micro/macro albuminuria* (21%)
- *Risk of progression to macroalbuminuria* (46%)
- *Regression of micro/macro albuminuria to normo/micro albuminuria* (54%)

EMPA-REG[7]

CardioVascular Outcome Trial with Empagliflozin on 7020 patients with T2DM and:

- **Established ASCVD (**i.e.; patients with prior history of Myocardial Infarction, single or multi vessel coronary artery disease, coronary artery bypass graft, stroke, peripheral artery disease or cardiac failure**)**
- **Mean eGFR 74.1 mL/min/1.73m2**
- **Mean Albuminurea 40.6 mg/mmol**

Renal composite as a secondary endpoint was defined as "the rate of incident or worsening nephropathy defined as progression to macroalbuminuria, doubling of creatinine level, with eGFR of ≤45 ml/min/1.73 m2, the initiation of dialysis, or death from renal disease"

In the analysis of renal outcomes, results showed Empagliflozin significantly reduced

- *Incident or worsening nephropathy* (39%)
- *Risk of progression to macroalbuminuria* (38%)
- *Doubling of creatinine* (44%)
- *Need of starting renal-replacement therapy* (55%).

KIDNEY TREATMENT

Prevention of progression of nephropathy for Non-Diabetic & T2DM
For patients with eGFR ≥20 mL/min/1.73m2

DAPA-CKD[10]

CKD Outcome Trial to evaluate the effect of Dapagliflozin on renal and CV outcomes and mortality in 4303 patients with CKD, with or without T2DM and:

- **eGFR ≥25 to ≤75 mL/min/1.73m2**
- **UACR ≥200 to ≤5000 mg/g**

Outcomes:

Primary endpoint

- *Composite of sustained ≥50% eGFR decline, ESKD, renal or CV death* (39%)

Secondary endpoint

- *Composite of sustained ≥50% eGFR decline, ESKD, or renal death* (44%)
- *CV Death or Hospitalization for Heart Failure* (29%)
- *All-Cause Mortality* (31%)

Exploratory analysis

- *All-Cause Hospitalization or Death* (21%)
- *Chronic Dialysis, Kidney Transplant or Renal Death* (34%)
- *Incidence of Acute Kidney Injury* (32%)
- *New-Onset of T2DM* (38%)

Primary endpoint for special population

- *IgA Nephropathy* (71%)
- *FSGS* (39%)
- *Ischemic/Hypertensive Nephropathy* (25%)

EMPA-KIDNEY[9]

CKD Outcome Trial to evaluate the effect of Empagliflozin on 6609 patients with chronic kidney disease who are at risk for disease progression, with or without T2DM and:

- **eGFR ≥20 to <45 mL/min/1.73m²**
  OR eGFR ≥45 to <90 mL/min/1.73m² with UACR ≥200 mg/g

Outcomes:

Primary endpoint

- *Composite of ≥40% sustained eGFR decline, ESKD [dialysis / transplantation], sustained eGFR decline to <10 mL/min/1.73m2, or renal death or CV death* (28%)*

Secondary endpoint

- *CV Death or Hospitalization for Heart Failure* (Empagliflozin did not show statistical significance)
- All-Cause Hospitalization (14%)
- *All-Cause Mortality* (Empagliflozin did not show statistical significance)

Exploratory analysis

- *Progression of Kidney Disease* (29%)
- *ESKD or CV Death* (27%)
- *Incidence of Acute Kidney Injury* (22%)
- *New-Onset of T2DM* (Empagliflozin did not show statistical significance)

Primary endpoint for special population

- *Glomerular Disease* (23%)
- *Hypertensive/Renovascular Disease* (18%)

* *Empagliflozin showed benefit for 1ᵀʸ endpoint for patient population with UACR ≥300 mg/g*

Pharmacotherapy for patients with or at risk of chronic kidney disease

THE USE OF MRA

FIDELIO-DKD[15]

CKD outcome trial to evaluate the effect of Finerenone on Chronic Kidney Disease Outcomes in Type 2 Diabetes

- **Mean eGFR 44.4±12.5 mL/min/1.73m2**
- **Median urinary albumin:creatinine ratio 833 mg/g**

In the analysis of renal outcomes, results showed

- *Finerenone reduced the composite of kidney failure, a sustained decrease of at least 40% in the eGFR from baseline, or death from renal causes by 18%.*
- *Finerenone reduced the composite of death from cardiovascular causes, nonfatal myocardial infarction, nonfatal stroke, or hospitalization for heart failure by 14%.*
- *The frequency of adverse events was similar in the two groups.*
- *The incidence of hyperkalaemia-related discontinuation of the trial regimen was higher with Finerenone than with placebo (2.3% and 0.9%, respectively).*

FIGARO-DKD[16]

Cardiovascular Events with Finerenone in Kidney Disease and Type 2 Diabetes

- **Mean eGFR 67.6±21.7 mL/min/1.73m2**
- **Median urinary albumin:creatinine ratio 302 mg/g**

In the analysis of renal outcomes, results showed

- *Finerenone reduced the composite of death from cardiovascular causes, nonfatal myocardial infarction, nonfatal stroke, or hospitalization for heart failure by 13%.*
- *Finerenone reduced hospitalization for heart failure by 29%.*
- *Finerenone reduced the composite of kidney failure, a sustained decrease of at least 40% in the eGFR from baseline, or death from renal causes by 13%.*
- *The overall frequency of adverse events did not differ substantially between groups.*
- *The incidence of hyperkalaemia-related discontinuation of the trial regimen was higher with Finerenone (1.2%) than with placebo (0.4%).*

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Health Outcomes Indicators

Percentage of patients with CKD in whom GFR and albuminuria is tested annually

Description title	Percentage of patients with CKD in whom GFR and albuminuria is tested annually
Definition	Percentage of patients with CKD in whom GFR and albuminuria is determined at least once during a measurement year
Numerator	Number of patients with CKD in whom GFR and albuminuria is determined at least once during a measurement year
Denominator	Total number of patients of CKD in the measurement year
Range of measure	Once in a measurement year
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure Target and/or Threshold	Higher is better
Rationale	Patients with CKD should undergo regular testing for glomerular filtration rate (GFR) and microalbuminuria for early detection of kidney disease. A decline in GFR may indicate kidney damage even before symptoms appear. Detecting small amounts of protein (albumin) in urine is an early sign of kidney disease. Up to 40% of patients with diabetes have detectable CKD by GFR and/or urine albumin-creatinine ratio (uACR) and hypertensive patients are at increased risk of kidney complications.

Percentage of patients with CKD who maintain good glycemic control

Description title	Percentage of patients who maintain good glycemic control
Definition	Percentage of patients with CKD who maintained a target hemoglobin A1c (HbA1c) of ≤7.0% (53 mmol/mol) during the measurement year
Numerator	Number of patients with CKD who maintained a target hemoglobin A1c (HbA1c) of ≤7.0% (53 mmol/mol) during the measurement year
Denominator	Total number of patients of CKD in the measurement year
Range of measure	Once in a measurement year
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure Target and/or Threshold	Higher is better
Rationale	A target hemoglobin A1c (HbA1c) of ~7.0% (53 mmol/mol) is recommended to prevent or delay progression of the microvascular complications of diabetes, including diabetic kidney disease. In people with CKD and diabetes, glycemic control should be part of a multifactorial intervention strategy addressing blood pressure control and cardiovascular risk, promoting the use of angiotensin converting enzyme inhibition or angiotensin receptor blockade, statins, and antiplatelet therapy where clinically indicated.

Percentage of patients with CKD who were assessed for anemia and metabolic bone disease

Description title	Percentage of CKD patients who were tested for anemia and metabolic bone disease
Definition	Percentage of patients with CKD in whom Hb, calcium, phosphate, PTH, and alkaline phosphatase activity is determined at least once during a measurement year
Numerator	Number of patients with CKD in whom Hb, calcium, phosphate, PTH, and alkaline phosphatase activity is determined at least once during a measurement year
Denominator	Total number of patients of CKD in the measurement year
Range of measure	Once in a measurement year
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure Target and/or Threshold	Higher is better
Rationale	KDOQI recommends measuring serum levels of calcium, phosphate, PTH, and alkaline phosphatase activity at least once in adults with ≤GFR 45 ml/min/1.73 m^2 (GFR categories G3b-G5) to determine baseline values and inform prediction equations if used. Anemia leads to multiple complications in CKD patients and should be adequately monitored.

Percentage of Diabetes Patients with Chronic Kidney Disease

Description title	Percentage of Diabetes patients (Type 1 and Type 2) with Chronic Kidney Disease
Definition	Percentage of Diabetes Patients (Type 1 and Type 2 DM) who have been diagnosed with Chronic Kidney disease during the measurement year
Numerator	Number of Diabetes Patients (Type 1 and Type 2 DM) who have been diagnosed with Chronic Kidney disease during the measurement year
Denominator	Total number of Diabetes Patients (Type 1 and Type 2 DM) during the measurement year
Range of Measure	NA
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Numerator/Denominator x 100%
Measure Target and/or Threshold	Lower is better
Rationale	Diabetes patients are indeed at a higher risk of developing Chronic Kidney Disease (CKD). It is a leading cause of CKD. Elevated blood sugar levels over time can damage the small blood vessels (glomeruli) in the kidneys. Hyperglycemia causes inflammation and oxidative stress within the kidney tissues. Duration of Diabetes, Poor Blood Sugar Control, Hypertension and Genetics are risk factors associated with progression to CKD.

Kidney Health Evaluation for Patients with Diabetes

Description title	Percentage of CKD patients who were tested for anemia and metabolic bone disease
Definition	The percentage of adults aged ≥30 years with T2DM who received a kidney health evaluation (minimum of 2 times a year and maximum of four times a year) during the measurement year
Numerator	The percentage of adults aged ≥30 years with T2DM who received a kidney health evaluation (Nephropathy screening test/Evidence of treatment for nephropathy or ACE/ARB therapy/Evidence of stage 4 chronic kidney disease/Evidence of ESRD/Evidence of kidney transplant/A visit with a nephrologist/A positive urine macroalbumin test/A urine macroalbumin test where laboratory data indicates a positive result/At least one ACE inhibitor or ARB dispensing event) (maximum of four times a year) during the measurement year
Denominator	Total number of adults aged ≥30 years with T2DM during the measurement year
Range of measure	Minimum: twice/year; Maximum: four times/year
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure Target and/or Threshold	Higher is better
Rationale	Diabetic nephropathy is a serious complication of type 1 diabetes and type 2 diabetes. Urine albumin-to-creatinine ratio and estimated glomerular filtration rate should be obtained at the time of diagnosis and annually thereafter.

Percentage of Hypertension Patients with Chronic Kidney Disease

Description title	Percentage of patients with Hypertension who have Chronic Kidney Disease
Definition	Percentage of patients with hypertension who have been diagnosed with Chronic Kidney disease in the measurement year
Numerator	Number of patients with hypertension who have been diagnosed with Chronic Kidney disease in the measurement year
Denominator	Total number of patients with hypertension during the measurement year
Range of Measure	NA
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Numerator/Denominator x 100%
Measure Target and/or Threshold	Lower is better
Rationale	Patients with hypertension are at an increased risk of developing Chronic Kidney Disease (CKD). High blood pressure is known to damage the blood vessels in the kidneys over time. Narrowed or damaged blood vessels also reduce blood flow to the kidneys, affecting their function. Hypertension can lead to decreased GFR, impairing waste filtration. High blood pressure contributes to albuminuria. Risk factors include duration and severity of hypertension, uncontrolled Hypertension and coexistence with diabetes.

ACEi / ARB's & SGLT2i's for management of CKD patients with microalbuminuria

Description title	ACE Inhibitors, ARB Inhibitors and SGLT2 inhibitors for management of CKD Patients with microalbuminuria
Definition	Percentage of patients with CKD with a strongly increased albuminuria (> 300 mg/24 hours or equivalent) or moderately increased albuminuria (30-300 mg /24 hours or equivalent), who are treated with ACEi / ARB's and/or SGLT2i's in a measurement year
Numerator	Number of patients with CKD with a strongly increased albuminuria (> 300 mg/24 hours or equivalent) or moderately increased albuminuria (30-300 mg/24 hours or equivalent), who are treated with ACEi / ARB's and/or SGLT2i's in a measurement year
Denominator	Total number of patients with CKD with a strongly increased albuminuria (> 300 mg/24 hours or equivalent) or moderately increased albuminuria (30-300 mg / 24 hours or equivalent), who are treated with ACEi / ARB's and/or SGLT2i's in a measurement year
Range of measure	NA
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure Target and/or Threshold	Higher is better
Rationale	ACEIs and ARBs target the renin-angiotensin-aldosterone system (RAAS) by dilating efferent arteries. SGLT2is help constrict afferent arteries. RAASi & SGLT2i both reduce blood pressure and decrease proteinuria. RAASi & SGLT2i both can delay the progression of CKD by reducing glomerular pressure and protein leakage.

Antihypertensives for management of CKD Patients with Hypertension

Description title	Antihypertensives for management of CKD Patients with Hypertension
Definition	Percentage of patients with CKD with a normal albuminuria (<30 mg/24hours or equivalent) and blood pressure consistently >140 mm Hg systolic or >90 mm Hg diastolic, who are treated with blood pressure-lowering drugs to maintain a blood pressure ≤140 mm Hg systolic and ≤90 mm Hg diastolic
Numerator	Number of patients with CKD with a normal albuminuria (<30 mg/24hours or equivalent) and blood pressure consistently >140 mm Hg systolic or >90 mm Hg diastolic, who are treated with blood pressure-lowering drugs to maintain a blood pressure ≤140 mm Hg systolic and ≤90 mm Hg diastolic
Denominator	Total number of patients with CKD with a normal albuminuria (<30 mg/24hours or equivalent) and blood pressure consistently >140 mm Hg systolic or >90 mm Hg diastolic
Range of measure	NA
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure Target and/or Threshold	Higher is better
Rationale	Uncontrolled hypertension can further damage the kidneys and accelerate CKD progression. ACE and ARB inhibitors are preferred as they have a Renoprotective effect. Antihypertensives help reduce the risk heart attacks, strokes and cardiovascular events.

Vitamin D supplementation in CKD patients

Description title	Percentage of patients with CKD with a vitamin D deficiency (<15 ng/ml), who are prescribed vitamin D
Definition	Percentage of patients with CKD with a vitamin D deficiency (<15 ng/ml), who are prescribed Vit D supplementation
Numerator	Number of patients with CKD with a vitamin D deficiency (<15 ng/ml), who are prescribed Vit D supplementation
Denominator	Total number of patients with CKD with a vitamin D deficiency (<15 ng/ml)
Range of measure	NA
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure Target and/or Threshold	Higher is better
Rationale	CKD patients are at risk of bone disorders due to impaired kidney function. Vitamin D helps regulate calcium and phosphorus levels, promoting bone health. CKD often leads to secondary hyperparathyroidism (elevated parathyroid hormone levels). Vitamin D supplementation helps suppress parathyroid hormone (PTH) secretion.

Prescription of GLP-1RA/SGLT2i in T2DM Patients with established CKD

Description title	Prescription of GLP-1 RA in T2DM patients with established kidney disease
Definition	The percentage of adults ≥30 years with T2DM with established ASCVD and/or established kidney disease, prescribed with GLP-1 RA during the measurement year
Numerator	Number of adults ≥30 years with T2DM with established ASCVD and/or established kidney disease, prescribed with GLP-1 RA during the measurement year
Denominator	Total number of adults ≥30 years with T2DM with established ASCVD/ or kidney disease during the measurement year
Range of measure	NA
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure Target and/or Threshold	Higher is better
Rationale	Among individuals with type 2 diabetes who have established CKD an SGLT2 inhibitor and/or GLP-1 receptor agonist with demonstrated CVD benefit is recommended as part of the glucose-lowering regimen and comprehensive CV risk reduction, independent of A1C and in consideration of patient-specific factors

Prescription of Erythrolein Stimulating Agents (ESAs) and Hypoxia-Inducible Factor Prolyl Hydroxylase Inhibitors (HIF-PHIs) for the treatment of anemia

Description title	Prescription of ESAs and HIF-PHIs for the treatment of anemia in CKD
Definition	Percentage of patients who are prescribed approved ESAs and HIF-PHIs for the management of anemia in CKD in a measurement year
Numerator	Number of patients who are prescribed approved ESAs and HIF-PHIs for the management of anemia in CKD in a measurement year
Denominator	Total number of CKD patients with anemia in a measurement year
Range of measure	NA
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure Target and/or Threshold	Higher is better
Rationale	Treating anemia in CKD improves symptoms, quality of life, and overall health outcomes. Early anemia management reduces hospitalizations due to complications associated with CKD. Anemia management may also slow progression of CKD.

LDL- Cholesterol Measurement in CKD patients

Description title	LDL- Cholesterol Measurement in CKD patients
Definition	Percentage of patients with CKD in whom a one-time lipid profile (total cholesterol, LDL cholesterol, HDL cholesterol, triglycerides) is determined
Numerator	Number of patients with CKD in whom a one-time lipid profile (total cholesterol, LDL cholesterol, HDL cholesterol, triglycerides) is determined in a measurement year
Denominator	Total number of patients in a measurement year
Range of measure	Minimum: once/year; Maximum: Twice/year
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure Target and/or Threshold	Higher is better
Rationale	The Kidney Disease: Improving Global Outcomes (KDIGO) guidelines recommend lipid management for all forms of CKD. CKD patients face a significantly higher risk of cardiovascular disease (CVD). Elevated LDL cholesterol (LDL-C) is a major contributor to atherosclerosis and CVD. CKD patients are often underdiagnosed and undertreated for dyslipidemia. Cholesterol-lowering agents, such as statins, are crucial for managing CVD risk in this population.

Percentage of End Stage Renal Disease (ESRD) patients who underwent renal transplantation

Description title	Renal Transplantation in ESRD (Stage 5 CKD) patients
Definition	The percentage of End Stage Renal Disease patients (Stage 5 CKD) who underwent renal transplantation in a measurement year
Numerator	Number of End Stage Renal Disease patients (Stage 5 CKD) who underwent renal transplantation in a measurement year
Denominator	Number of End Stage Renal Disease patients (Stage 5 CKD) in a measurement year
Range of measure	NA
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure Target and/or Threshold	Higher is better
Rationale	KDOQI guidelines suggest that living donor preemptive renal transplantation in adults should be considered when the GFR is less than 20 ml/min/1.73 m^2 , and there is evidence of progressive and irreversible CKD over the preceding 6-12 months.

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Health Operational Indicators

Referral of CKD Patients for Nephrology Consultation

Description title	Referral of CKD Patients for Nephrology Consultation
Definition	Percentage of patients with confirmed CKD who were referred to nephrologist for consultation, during the measurement year.
Numerator	Number of patients with confirmed CKD who were referred to a nephrologist for consultation, during the measurement year.
Denominator	Total number of CKD patients during the measurement year
Range of measure	Once in a year or as advised by the healthcare practitioner
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure Target and/or Threshold	Higher is better
Rationale	Referral of patients with CKD from primary care to nephrologist is crucial for early evaluation and diagnosis and for initiating appropriate therapy.

Referral of CKD Patients for Dietary Consultation

Description title	Referral of CKD Patients for Dietary Consultation
Definition	Percentage of patients with confirmed CKD who were referred to dietitian/nutritionist for consultation, during the measurement year.
Numerator	Number of patients with confirmed CKD who were referred to a dietitian/nutritionist for consultation, during the measurement year.
Denominator	Total number of CKD patients during the measurement year
Range of measure	Once in a year or as advised by the healthcare practitioner
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure Target and/or Threshold	Higher is better
Rationale	Individuals with CKD should receive expert dietary advice and information in the context of an education program, tailored to severity of CKD and the need to intervene on salt, phosphate, potassium, and protein intake where indicated.

Avoidable Hospitalization in Patients with Chronic Kidney Disease

Description title	Avoidable Hospitalization in Patients with Chronic Kidney Disease
Definition	Percentage of patients with chronic kidney disease who were hospitalized during the measurement year
Numerator	Number of patients with chronic kidney disease who were hospitalized during the measurement year
Denominator	Total number of patients with chronic kidney disease in the measurement year
Range of measure	NA
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure Target and/or Threshold	Lower is better
Rationale	Chronic Kidney disease contributes to a significant healthcare burden worldwide. Hospitalizations for Chronic Kidney Disease accounts for significant morbidity, mortality and healthcare expense. Early diagnosis, effective therapy and appropriate preventive strategies to prevent or delay progression is crucial to reduce frequent hospitalizations related to chronic kidney disease.

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Health Economic Indicators

Percentage Cost Decrease for Managing Patients with Chronic Kidney Disease

Description title	Percentage Cost Decrease for Managing Patients with Chronic Kidney Disease
Definition	Percentage decrease in cost incurred (in AED) for managing patients with Chronic Kidney Disease during the measurement year when compared to previous year
Numerator	Difference of total cost (AED) incurred for managing patients with Chronic Kidney Disease in previous measurement year (A) from current measurement year (B)
Denominator	Total cost incurred for managing patients with Chronic Kidney Disease during the previous measurement year (A)
Range of measure	NA
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	A-B/A X 100
Measure Target and/or Threshold	Higher Percentage is better
Rationale	The disease and economic burden of Chronic Kidney disease is substantial. Improved clinical outcomes and reduction in associated healthcare costs can be achieved by addressing multiple factors including; greater focus on prevention, early diagnosis, appropriate medical management, implementation of comprehensive lifestyle changes.

Yearly Cost of Dialysis Therapy

Description title	Percentage Cost Decrease for Managing Patients with Dialysis
Definition	Percentage decrease in cost incurred (in AED) on dialysis for managing patients with Chronic Kidney Disease during the measurement year when compared to previous year
Numerator	Difference of total cost (AED) incurred on dialysis for managing patients with Chronic Kidney Disease in previous measurement year (A) from current measurement year (B)
Denominator	Total cost incurred on dialysis for managing patients with Chronic Kidney Disease during the previous measurement year (A)
Range of measure	NA
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	A-B/A X 100
Measure Target and/or Threshold	Higher Percentage is better
Rationale	Dialysis be initiated in CKD patients when one or more of the following are present: symptoms or signs attributable to kidney failure (serositis, acid base or electrolyte abnormalities, pruritus); inability to control volume status or blood pressure; a progressive deterioration in nutritional status refractory to dietary intervention; or cognitive impairment. This often but not invariably occurs in the GFR range between 5 and 10 ml/min/1.73 m^2 This Early therapy to reduce disease progression may delay initiation of dialysis in CKD patients.

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Health Safety Indicators

Vaccination of CKD patients with Influenza vaccine annually

Description title	Percentage of patients with CKD who are vaccinated with an influenza vaccine annually
Definition	Percentage of patients with CKD who are vaccinated with an influenza vaccine annually
Numerator	Number of CKD patients who have received influenza vaccine in the measurement year
Denominator	Total number of CKD patients in the measurement year
Range of measure	Once per year
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure Target and/or Threshold	Higher is better
Rationale	Patients with Chronic Kidney Disease are at high risk of developing serious complications from influenza (flu). Flu can lead to severe illness, hospitalization, and even death in CKD patients. People with CKD at any stage, those who have had a kidney transplant, and those undergoing dialysis are all at risk. Even if vaccinated individuals get sick, flu vaccination has been shown to reduce the risk of severe outcomes like hospitalization.

Vaccination of CKD patients with Pneumococcal and Hepatitis B vaccine

Description title	Percentage of patients with CKD who are vaccinated with Pneumococcal and Hepatitis B vaccine
Definition	Percentage of patients with CKD who are vaccinated with Pneumococcal and Hepatitis B vaccine
Numerator	Number of CKD patients who have received Pneumococcal and Hepatitis B vaccine during a measurement year
Denominator	Total number of CKD patients in the measurement year
Range of measure	One dose of PPV followed by booster every 5 years, 4 doses (0, 1m, 2m, 6m)
Exclusion criteria	MI, Stroke, HF, PAD, Kidney Stones, Enlarged Prostate, SLE, Pyelonephritis, Hypercalcemia, Rhabdomyolysis
Data collection frequency	Monthly
Unit of measure	Percentage (Numerator/Denominator x 100)
Measure Target and/or Threshold	Higher is better
Rationale	CKD patients are at risk of hepatitis B infection due to frequent medical procedures (such as dialysis) and potential exposure to infected blood or bodily fluids. CKD patients are at increased risk of severe pneumococcal infections, including pneumonia, bacteremia, and meningitis. CKD patients should receive a single dose of PPV, followed by a booster dose every five years. Higher and/or additional doses may be needed for people on hemodialysis. Hepatitis B vaccination is recommended for all susceptible chronic hemodialysis patients. It is also recommended for pre-end-stage renal disease patients before they become dialysis-dependent and for peritoneal and home dialysis patients.

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