Type 2 Diabetes - Chronic Kidney Disease

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CKD is eGFR < 60ml/min **or** kidney damage for ≥ 3 months (e.g. urine sediment, abnormal imaging, or albuminuria (UACR < 30mg/g = nl, 30-300 = micro, >300 = macro))

Stages of Chronic Kidney Disease (CKD)

	1	2	3	4	5
eGFR	> 60	> 60	30-59	15-29	< 15 ml/min/1.73m^2

Markers of progression: decreasing eGFR, increasing albuminuria, poor BP control

Workup of CKD and to r/o non-diabetes causes

CMP, UA, UACR, Uric Acid, Phos, CBC, ANA, RF, C3, C4, HepB sAg, HepC Ab, dilated retinal exam, and renal U/S; if pat >40 yrs & UACR is pos then check SPEP and UPEP

Referrals

Nephrologist: When eGFR < 30 or sooner if unsure of etiology or problems
Nutrition: Refer to RD for consult (protein, Na+, K+, PO4, fluids, saturated fat)

Managing Complications of CKD – Stages 3-5

Acidosis

If CO2 < 22mmol/L	Start sodium bicarbonate 325-650mg (1-2 tabs) TID-QID	Goal: CO2 ≥ 22mmol/L

Anemia

Check Hb at least yearly: Anemia = Hb <13.5 g/dL adult men, <12 g/dL adult women; r/o B12/folate deficiency, GI blood loss, other causes
Baseline Labs: Ferritin, transferrin % sat, iron studies (Fe, % Sat, TIBC), CBC+diff
Start oral iron therapy if ferritin/iron studies low
Ferrous Sulfate (FeSO4) 325mg daily to TID
Consider docusate 100mg BID to reduce constipation
Monitor ferritin to avoid iron overload
Consider IV iron or blood transfusion if needed
Safety of erythropoiesis stimulating agents (ESA) unclear; reserve for patients on dialysis, pending renal transplant, or Hb < 9 with symptoms unresponsive to treatment above

Blood Pressure

Most effective CKD intervention: **BP goal <130/80**; continue ACEI/ARB (watch K+)

Cardiovascular Disease (CVD)

CVD: CKD increases CVD risk – patients on aspirin (if no contraindications)
Achieve lipid targets, encourage tobacco cessation

Diabetes

Blood sugar control—as renal fxn declines pts' BGs often improve—titrate meds down as needed; Caution setting an A1c target <7% if advanced CKD or CVD
D/C metformin when Creatinine >1.5 men or >1.4 women
Peripheral Neuropathy: Foot ulcers common, check feet each visit, refer to shoe clinic
Retinopathy: Ophth/retinal visits regularly
Autonomic Neuropathy: Frequent BP fluctuations, including orthostatic symptoms.

Edema/Fluid Overload

Establish patient's dry wt; Titrate furosemide 20-240mg BID (diuresis lasts 6 hours-give AM & mid-day)

Metabolic Bone Disease

Evidence Based: **Phosphorus (PO_4)**: if >4.6 mg/dL, start binder (calcium); Refer to RD for dietary PO_4 restriction
Calcium (Ca): If <8.4, start/increase calcium supplementation; target: 8.4-9.5 mg/dL
If >10.2, correct causes (often 2° meds), need to hold Ca and/or Vit D/calcitriol
Consensus Opinion: If iPTH elevated, measure 25(OH) Vitamin D; If 25(OH)D >=30mg/mL, start calcitriol
If 25(OH) Vitamin D <30mg/mL, start ergocalciferol (Vitamin D2)

Follow Ca, PO_4, iPTH, and 25(OH)D (Vitamin D): if Ca or PO_4 above target or if iPTH below target, hold calcitriol and/or calcium

CKD Stage	eGFR	iPTH goal	PO_4 Goal	Ca Goal	Ca goal Ca x PO_4
3	30-59	35-70	2.7-4.6	8.4-9.5	< 55
4	15-29	70-110	2.7-4.6	8.4-9.5	< 55
5	< 15	150-300	3.5-5.4	8.4-9.5	< 55

Medication*	iPTH efect	PO_4 effect	Ca effect	Comments
Phosphate Binders				
$CaCO_3$ (Oyst-Cal or TUMS) 500-2000mg with meals	–	↓	↑	Use if Ca < 8.4; No more than 7g/d
Ca Acetate 1334-2868mg with meals	–	↓↓	↑	Use if Ca < 8.4 & PO_4 > 5
Sevelamer (Renagel) 800-1600mg TID	–	↓↓		Decrease PO_4, no effect on Ca; cost
Lanthanum 1500-3750mg/day w/ meals	–	↓↓	↓	Decrease PO4 and Ca; cost
Aluminum 600-1200mg TID between meals & HS	–	↓↓	–	ONLY if PO_4 > 7 and Ca x PO_4 > 55; not more than 30 days (toxicity)
Vitamin D and Analogs				
Vit D2 (Ergocalciferol) 1.25-5mg daily	↓	–	↑↑	Use if Vit D < 30 mg/mL
Calcitriol 0.25-1mcg daily or 0.5-3mcg TIW	↓	–	↑↑	Use only if Ca & PO_4 in normal range
Doxercalciferol 1-3mcg daily or 10-20mcg TIW	↓	–	↑	Hold if Ca x PO_4 > 55
Other				
Cinacalcet 30-180mg daily	↓	↓	↓↓	Do not use if Ca < 8.4

*Always include dietary phosphorous restriction
Drugs in italics are not on the IHS National Core Formulary

Lab Monitoring

Parameter	GFR > 60	GFR 30-59	GFR 15-29	GFR<15 not on Dialysis
Creatinine and eGFR	Annual	Each visit	Each visit	Each visit
UACR	Annual	Q3-6mos*	Each visit*	Each visit*
Hb	Annual	Q3mos	Q3mos	Q3mos
Fe, Transferrin Sat, Ferritin		Q3mos	Q3mos	Q3mos
Ca, PO_4, and iPTH		At least annually	Q3mos	Q3mos

Monitor more often if values are worsening or on medications that affect these labs
***Frequency of checking depends on rate of rise of urine albumin**

Ref: KDOQI/NKF and UK Renal Assoc 4th Ed. Clinical Practice Guidelines for Complications of CKD
ADA Clinical Practice Recommendations 2010. J Am Soc Nephrol 2010; 21:2-6.