

Type 2 DM – Chronic Kidney Disease

Stages of Chronic Kidney Disease (CKD)

	1	2	3	4	5
eGFR	> 60	> 60	30-59	15-29	< 15 ml/min
Proteinuria	micro	macro			

Referrals

Nephrologist: GFR < 60ml/min or sooner if unsure of etiology of renal disease
 Nutrition: Refer to RD for consult (protein, Na+, K+, PO₄, fluids, saturated fat)

Managing Complications of CKD – Stages 3-5

Acidosis

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

Anemia

Check Hb at least yearly: Anemia = Hb <13.5 g/dL adult men, <12 g/dL adult women
 Consider r/o B12/folate deficiency, GI blood loss, other causes

Baseline Labs: Ferritin, transferrin % sat, iron studies (Fe, % Sat, TIBC), and CBC with 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 if needed (see iron protocol)

Consider erythropoiesis stimulating agents (ESA) for Hb < 10 (see epo protocol)
 Dose ESA to maintain Hb > 10.5 and < 12

Diabetes & Cardiovascular Disease (CVD)

Blood sugar control—as renal fxn declines pts' BGs often improve—titrate meds down as needed.

D/C metformin when Creatinine >1.5 men or >1.4 women

Insulin usually the only/main medication used for patients with CKD

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 sx.

HTN: BP goal still <130/80; continue ACEI/ARB (watch K+)

CVD: CKD increases CVD risk – patients on aspirin (if no contraindications)

Achieve lipid targets, encourage tobacco cessation

Edema/Fluid Overload

Establish patient's dry weight

Titrate furosemide as needed 20-240mg BID (diuresis lasts 6 hours-give AM & mid-day)

Ref: KDOQI/NKF and UK Renal Assoc 4th Ed. Clinical Practice Guidelines for Complications of Chronic Kidney Disease

Type 2 DM – Chronic Kidney Disease

Metabolic Bone Disease

Phosphorus (PO₄): if >4.6 mg/dL, start binder (calcium); Refer to RD for dietary PO₄ restriction

Calcium (Ca): target: 8.4-9.5 mg/dL

If <8.4, start/increase calcium supplementation

If >10.2, correct causes (often 2° meds, need to hold Ca and/or Vit D/calcitriol)

iPTH: targets - Stage 3: 35-70pg/mL Stage 4: 80-100pg/mL

If iPTH elevated, measure 25(OH)D (Vitamin D)

If 25(OH)D >=30mg/mL, start calcitriol

If 25(OH)D <30mg/mL, start ergocalciferol (Vit D2)

Follow Ca, PO₄, iPTH, and 25(OH)D (Vitamin D): if Ca or PO₄ above target or if iPTH below target, hold calcitriol and/or calcium

CKD Stage	eGFR	iPTH goal	PO ₄ goal	Ca goal	Ca X PO ₄
3	30-59	35-70	2.7-4.6	8.4-9.5	< 55
4	15-29	80-100	2.7-4.6	8.4-9.5	< 55
5	< 15	150-300	3.5-5.5	8.4-9.5	< 55

Medication*	iPTH effect	PO ₄ effect	Ca effect	Comments
Phosphate Binders				
<i>CaCO₃ (Oyst-Cal or TUMS) 500-2000mg with meals (no more than 7g/d)</i>	-	↓	↑	Use if Ca < 8.4
<i>Ca Acetate 1334-2868mg with meals</i>	-	↓↓	↑	Use if Ca < 8.4 & PO ₄ > 5
<i>Sevelamer (Renagel) 800-1600mg TID</i>	-	↓↓	-	Decrease PO ₄ , no effect on Ca
<i>Lanthanum 1500-3750mg/day w/ meals</i>	-	↓↓	↓	Decrease PO ₄ and Ca ⁺⁺
<i>Aluminum 600-1200mg TID between meals & HS</i>	-	↓↓	-	ONLY if PO ₄ > 7 and Ca x PO ₄ > 55; not more than 30 days
Vitamin D and Analogs				
<i>Vit D₂ (Ergocalciferol) 1.25-5mg daily</i>	↓	-	↑↑	Use if Vit D < 30mg/ml
<i>Calcitriol 0.25-1mcg daily or 0.5-3mcg TIW</i>	↓	-	↑↑	Use only if Ca & PO ₄ in nl range
<i>Doxercalciferol 1-3mcg daily or 10-20mcg TIW</i>	↓	-	↑	Hold if Ca x PO ₄ > 55
Other				
<i>Cinacalcet 30-180mg daily</i>	↓	↓	↓↓	Do not use if Ca < 8.4

*Always include dietary phosphorus 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	Annual	Each visit	Each visit	Each visit
GFR	Annual	Each visit	Each visit	Each visit
Hb	Annual	Q3-4 mos*	Q3-4 mos*	Q3-4 mos*
Serum Fe		Q3-4 mos	Q3-4 mos	Q3-4 mos*
Transferrin Sat		Q3 mos	Q3 mos	Q3 mos*
Ferritin		Q3 mos	Q3 mos	Q3 mos
iPTH		At least annually*	Q3 mos*	Q3 mos*
Ca & PO ₄		At least annually*	Q3 mos*	Q month*

* Monitor more often if on medications that affect these labs