PLAN OF CARE AND ACTION PLAN FOR CHRONIC KIDNEY DISEASE STAGES 1–4

STAGE & GFR	DESCRIPTION	ACTION	CLINICAL TESTING	TREATMENT CONSIDERATIONS
Normal **>90 mL/min/1.73 m²**	**RISK Factors:** age >60 years, obesity, autoimmune disorders, DM, HTN, kidney stones, ADPKD, prior ARF, UTIs, toxic drug exposures, and FH of CKD, especially in African Americans, Native Americans, and Asians	**SCREEN** for general and specific conditions **SCREEN** for CKD w/GFR **INITIATE** CKD risk reduction/intervention strategies	**BP** monitoring: every 12 mo **FASTING LIPIDS:** every 6–12 mo to validate medication adherence **ELECTROLYTES**, Glucose, BUN, SCr, GFR: every 12 mo **UA** for hematuria or proteinuria & microscopic exam	**SMOKING** cessation **WEIGHT** reduction, if BMI >30 kg/m² **TARGETS:** **BP:** <140/90 mmHg **LIPIDS:** Use 2013 ACC/AHA Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults (ATP 4) **GLUCOSE:** Premeal level, 80–130 mg/dL; A1C ~7%
Stage 1 **>90 mL/min/1.73 m²**	**KIDNEY** damage with normal GFR (urinary, imaging or histologic abnormalities). **"CKD"** term is not applied clinically in the absence of albuminuria and/or abnormal imaging and/or abnormal urinalysis	**CAUSE:** diagnose etiology of CKD **IDENTIFY** and treat CVD risk factors and comorbid conditions. **ALBUMINURIA:** identify and quantitate by ACR or UPC **ESTIMATE** CKD progression rate.	**BP** monitoring: every 12 mo if normal **ELECTROLYTES**, Glucose, BUN, SCr, GFR: every 12 mo **FASTING LIPIDS:** every 6–12 mo to validate medication adherence **UA** with microscopic evaluation **ALBUMINURIA:** UPC or ACR every 12 mo, depending on severity	**CONSULT** Nephrology if GFR declines by ≥4 mL/min/yr **ANTIPROTEINURIC** therapy with ACEI or ARB **TARGETS:** **BP:** <140/90 mmHg **LIPIDs:** Use ATP 4 guidelines (see above) **ALBUMINURIA: UPC** <0.2 or **ACR** <30 mg/g
Stage 2 **60 – 89 mL/min/1.73 m²**	**KIDNEY** damage with mild GFR decrease (urinary, imaging or histologic abnormalities) **MOST** lower GFRs in this range are due to age-related GFR decline **"CKD"** term is not applied clinically in the absence of albuminuria and/or abnormal imaging and/or abnormal urinalysis	**CAUSE:** diagnose etiology of CKD **IDENTIFY** and treat CVD risk factors and comorbid conditions **ALBUMINURIA:** determine presence and quantitate by ACR or UPC **ESTIMATE** CKD progression rate	**BP** monitoring: every 3–12 mo **ELECTROLYTES**, Glucose, BUN, SCr, GFR: every 6–12 mo **FASTING LIPIDS:** every 6–12 mo to validate medication adherence **UA** with microscopic evaluation **ALBUMINURIA:** ACR or UPC every 3–12 mo, depending on severity	**RULE OUT** AKI (*eg*, obstruction) **RENAL DIETITIAN** consultation **TARGETS:** **BP:** <140/90 mmHg **LIPIDs:** Use ATP 4 guidelines (see above) **HGB:** 9–11 g/dL **ALBUMINURIA: UPC** <0.2 or **ACR** <30 mg/g
Stage 3A **45 – 59 mL/min/1.73 m²** **Stage 3B** **30 – 44 mL/min/1.73 m²**	**MODERATE** decline of GFR **COMPLICATIONS** more frequent at CKD stage 3B as GFR decreases to <45 mL/min/1.73 m² **PROTEINURIA** is a serious CV risk factor and has prognostic importance for CKD progression	**ESTIMATE** CKD progression rate **IDENTIFY** and treat CVD risk factors and comorbid conditions **ALBUMINURIA:** determine presence and quantitate by ACR or UPC **KIDNEY** imaging study, *eg*, US or CT **CONSIDER** Nephrology consultation	**BP** monitoring: every 1–3 mo **ELECTROLYTES**, Glucose, BUN, SCr, GFR: every 3–6 mo **CBC**, TSAT, ferritin: every 6–12 mo or at each ESA injection **CKD-MBD:** Ca/P/PTH/Alk Phos/25(OH)D: every 6–12 mo; follow-up levels depend on trend analysis and CKD progression. Evaluate for extraskeletal calcification (aorta, cardiac vessels and valves). **ALBUMINURIA: UPC** or **ACR**: every 3–12 mo	**RULE OUT** AKI (*eg*, obstruction) **NUTRITIONAL** assessment at any time during CKD stages 1–5 **IMMUNIZE:** QIV, PPV 13, PPSV 23, HBV, Tdap and VZ **TARGETS:** **Hb:** 9–11 g/dL **Iron parameters:** TSAT >20%, ferritin >100 ng/mL after oral or IV iron (initiate ESA after achieving iron parameters) **Lipids:** moderate to high intensity statin therapy **Ca & P:** normal ranges with P-binders & dietary restriction (no Ca-based P-binders if vascular/valvular calcification) **25(OH)D:** ≥30 ng/mL with vitamin D **PTH:** 130–600 pg/mL, treat with calcitriol or vitamin D analogs if PTH progressively increases **NaHCO3:** 22–26 mEq/L and titrate NaHCO3 therapy **ALBUMINURIA: UPC** <0.2 or **ACR** <30 mg/g
Stage 4 **15 – 29 mL/min/1.73 m²**	**SEVERE** decline of GFR **MAJOR** increase in CVD risk, *ie*, CKD Stage 4 should be considered equivalent to a major CVD clinical event	**NEPHROLOGY** consultation with transition of CKD care to Nephrology or co-management **INITIATE** decisions regarding kidney replacement therapy, vascular access, kidney transplantation (GFR ~20), and/or end-of-life discussion **DIAGNOSE** and treat CVD risk factors and comorbid conditions **ALBUMINURIA:** determine presence and quantitate by ACR or UPC **ADJUST** drug-dosing of renally excreted drugs for GFR (may substitute GFR for creatinine clearance)	**BP** monitoring: every 1 mo **ELECTROLYTES**, Glucose, BUN, SCr, GFR: every 1–3 mo **CBC**, TSAT, ferritin: every 6–12 mo or at each ESA injection **CKD-MBD:** Ca/P/PTH/Alk Phos/25(OH)D: every 3–6 mo; follow-up levels depend on trend analysis and CKD progression. Evaluate for extraskeletal calcification (aorta, cardiac vessels and valves). **ALBUMINURIA:** UPC or ACR: every 3–12 mo **RENAL REPLACEMENT THERAPY:** vascular access surgery evaluation (vascular access site selection, vein mapping, peritoneal catheter insertion)	**CKD-specific education:** kidney replacement therapy modality **NUTRITION:** dietary Na and K restriction. Renal dietitian consult **IMMUNIZE:** QIV, PPV 13, PPSV 23, HBV, Tdap and VZ **RENAL**-formulated MVI **PROTECT** non-dominant arm for future vascular access **TARGETS:** **Hb:** 9–11 g/dL **Iron parameters:** TSAT >20%, ferritin >100 ng/mL after oral or IV iron (initiate ESA after achieving iron parameters) **Lipids:** moderate to high intensity statin therapy **Ca & P:** normal ranges with P-binders and dietary restriction (no Ca-based P-binders if vascular/valvular calcification) **25(OH)D:** ≥30 ng/mL with vitamin D **PTH:** 130–600 pg/mL, treat with calcitriol or vitamin D analogs, if PTH progressively increases **NaHCO3:** 22–26 mEq/L with NaHCO3 or Na citrate therapy **ALBUMINURIA: UPC** <0.2 or **ACR** <30 mg/g **HBV Ab titer:** ≥10 mIU/mL after 3-dose immunization series

COMMENTS

- Early recognition, evaluation, and treatment of CKD in a multidisciplinary fashion, decreases morbidity, mortality, and healthcare costs.
- GFRs <45 mL/min/1.73 m² in persons >65 years may not require Nephrology evaluation in all cases, unless there is heavy albuminuria/proteinuria (ACR >300 mg/g or UPC 0.5–1.0 g/g) or a progressive decline in GFR (> 4 mL/min/1.73 m²).
- Always consider reversible etiologies of acute kidney injury (AKI) at any stage of CKD, *eg*, urinary tract outlet obstruction, volume depletion, and adverse drug reactions.
- Avoid or cautiously use nephrotoxic medications and contrast agents as required.
- CKD stage 5 patients require management by a nephrologist.