

Learning Objectives

- At the end of this session participants are expected to be able to:
 - Define chronic kidney disease
 - Describe risk factors, causes and classification of chronic kidney disease
 - Recognize clinical presentation and complications of chronic kidney disease

Learning Objectives (2)

- Provide management to patients with chronic kidney disease
- Recognize co-management model for chronic kidney disease and patient safety
- Implement referral pathway for patients with chronic kidney disease

Activity: Brainstorming

- What is chronic kidney disease ?



Definition of Chronic Kidney Disease

- Abnormalities of kidney structure or function, present for >3 months
- Either of the following must be present for >3 months:
 - Albumin Creatinine Ratio >30 mg/g
 - Markers of kidney damage (one or more*)
 - GFR <60 mL/min/1.73 m² (m squared)

Risk Factors of Chronic Kidney Disease

- Modifiable CKD Risk Factors
 - Frequent NSAIDs
 - Aminoglycosides,
 - iv Contrast and Herbal use
 - Overweight and Obesity

Risk Factors of Chronic Kidney Disease

- Non-Modifiable
 - Family history of kidney disease, diabetes, or hypertension
 - Congenital structural kidney abnormalities (Horse-shoe kidney)
 - Age 40 years or older (GFR declines normally with age)
 - African Ethnicity

Causes of Chronic Kidney Disease

- Diabetes Mellitus
- Hypertension
- Urinary bladder outlet obstruction
- Intrarenal kidney diseases (glomerular, tubular, interstitial and or vascular diseases)
- Kidney artery/vein stenosis
- Chronic Heart and Liver Failure

Causes of Chronic Kidney Disease (2)

- Certain toxins - including fuels, solvents (such as carbon tetrachloride), and lead
- Fetal developmental abnormalities
 - Low Birth Weight, Small for Gestational Age, Prematurity
 - Autoimmune diseases (e.g systemic lupus erythematosus)
 - Infections and Infestations (HIV, Hep B & C, Malaria)

Causes of Chronic Kidney Disease (3)

- Some medications – e.g NSAIDs, iv Contrast
- Illegal substance abuse - such as heroin or cocaine
- Injury - a sharp blow or physical injury to the kidney

Classification of CKD Based on GFR and Protein in Urine

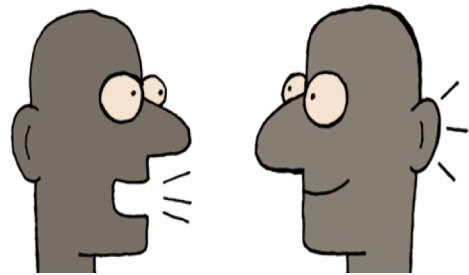
Classification of CKD Based on GFR and Protein in Urine

Prognosis of CKD by GFR and Albuminuria Categories

				Albuminuria categories Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30-299 mg/g 3-29 mg/mmol	≥300 mg/g ≥30 mg/mmol
GFR categories (ml/min/1.73 m ²) Description and range	G1	Normal or high	≥90			
	G2	Mildly decreased	60-90			
	G3a	Mildly to moderately decreased	45-59			
	G3b	Moderately to severely decreased	30-44			
	G4	Severely decreased	15-29			
	G5	Kidney failure	<15			
				Green: low risk (if no other markers of kidney disease, no CKD); Yellow: moderately increased risk; Orange: high risk; Red, very high risk. KDIGO 2012		

Activity: Buzzing

- What is the clinical presentation of chronic kidney disease?
- What are the complications of chronic kidney disease?



Symptoms of CKD (non-specific)

- Blood in urine, excessively froth urine, frank pain
- Oliguria(Reduced urine output),anuria, excessive urination at night(nocturia), pyuria
- LUTS (frequency, hesitancy, intermittency, terminal dribbling, incontinency, retention)
- Weight loss, poor appetite, nausea, vomiting

Symptoms of CKD (non-specific)

- Oedema
- Shortness of breath
- Tiredness
- Difficulty sleeping insomnia
- Itchy skin

Complications of Chronic Kidney Disease

- Anemia and other hematological disorders
- Weak bones and an increased risk of bone fractures
- Metabolic acidosis
- Electrolytes derangements especially hyperkalemia
- Cardiovascular disorders
- Skin disorders

Complications of Chronic Kidney Disease (2)

- Fluid retention
- Decreased sex drive, erectile dysfunction, or reduced fertility and menstrual dysfunction
- Pulmonary, Gastrointestinal and Neurological disorders

Complications of Chronic Kidney Disease (3)

- Decreased immune response
- Pregnancy complications that carry risks for the mother and the developing fetus
- Irreversible damage to your kidneys (end-stage kidney disease)
- Chronic Uremic complications (pleuritic, pericarditis

Goals of Care in Chronic Kidney Disease

- Progressive decline in kidney function
- Blood Pressure Control (Standardized BP Measurement)
 - $\leq 130/80$ mm Hg (with or without proteinuria)-KDIGO 2021
 - Individualize targets and agents according to age, coexistent CVD and other comorbidities
 - ACE or ARB (Anti-proteinurics)

Slowing CKD Progression: ACEi or ARB

- Risk/benefit should be carefully assessed in the elderly and medically fragile
- Check labs after initiation
 - If less than 25% SCr increase from baseline, continue ACEi/ARBs and monitor
 - If more than 25% SCr increase from baseline, stop ACEi/ARBs and evaluate for RAS

Slowing CKD Progression: ACEi or ARB (2)

- Continue until contraindication arises, no absolute eGFR cutoff
- Better proteinuria suppression with low Na diet and diuretics
- Avoid volume depletion
- Avoid ACEi and ARB in combination

Slowing CKD Progression: ACEi or ARB (3)

- Risk of adverse events (impaired kidney function, hyperkalemia)
 - Avoid combination of ACEi and ARB

Goals of Care in CKD: Glucose Control

- Target HbA1c ~7.0%
- Can be extended above 7.0% with comorbidities or limited life expectancy, and risk of hypoglycemia
- Risk of hypoglycemia increases as kidney function becomes impaired (Burnt-Out Diabetes Mellitus)
- Declining kidney function may necessitate changes to diabetes medications and renally-cleared drugs

Modification of Other CVD Risk Factors in CKD

- Smoking cessation
- Tolerable Moderate to Intense physical exercise (at least 150 minutes per week)
- Weight reduction to optimal targets
- Lipid lowering therapy

Modification of Other CVD Risk Factors in CKD (2)

- Lipid lowering therapy
 - In adults >50 yrs, statin when eGFR ≥ 60 ml/min/1.73m²; statin or statin/ezetimibe combination when eGFR < 60 ml/min/1.73m²
 - In adults < 50 yrs, statin if history of known CAD, MI, DM, stroke
- Aspirin is indicated for secondary but not primary prevention

Detect and Manage CKD Complications

- Anemia
 - Initiate iron therapy if TSAT \leq 30% and/or Ferritin \leq 500 ng/mL (IV iron for dialysis, Oral for non-dialysis CKD)
 - Individualize erythropoiesis stimulating agent (ESA) therapy: Start ESA if Hb $<$ 10 g/dl, and maintain Hb $<$ 11.5 g/dl. Ensure adequate Fe stores
- Appropriate iron supplementation is needed for ESA to be effective

Detect and Manage CKD Complications (2)

- CKD-Mineral and Bone Disorder (CKD-MBD)
 - Treat with D3 as indicated to achieve normal serum levels
 - 2000 IU po qd is cheaper and better absorbed than 50,000 IU monthly dose
 - Limit phosphorus in diet (CKD stage 4/5), with emphasis on decreasing packaged dairy products
 - May need phosphate binders

Detect and Manage CKD Complications (3)

- Metabolic acidosis
 - Usually occurs later in CKD
 - Serum bicarb $<22\text{mEq/L}$
 - Correction of metabolic acidosis may slow CKD progression and improve patients functional status

Detect and Manage CKD Complications (4)

- Hyperkalemia
 - Reduce dietary potassium
 - Stop NSAIDs, COX-2 inhibitors, potassium sparing diuretics (aldactone)
 - Stop or reduce beta blockers, ACEi/ARBs
 - Avoid salt substitutes that contain potassium
 - For severe/persistent hyperkalemia- give iv Calcium Gluconate 10mg and refer for comprehensive anti-hyperkalemic regimen

Medications in CKD

- CKD patients at high risk for drug-related adverse events
- Several classes of drugs renally eliminated
- Consider kidney function and current eGFR (not just SCr) when prescribing meds (renally adjusted dosing)
- Minimize pill burden as much as possible

Medications in CKD (2)

- Remind CKD patients to avoid NSAIDs
- No Dual RAAS blockade
- Any med with $>30\%$ renal clearance probably needs dose adjustment for CKD
- No bisphosphonates for eGFR <30
- Avoid iv contrasts for eGFR <30

Medications in CKD (3)

- What can primary care providers do?
 - Recognize and test at-risk patients
 - Educate patients about CKD and treatment
 - Manage blood pressure and diabetes
 - Address other CVD risk factors
 - Monitor eGFR and Albumin Creatinine Ratio (encourage labs to report these tests)

Medications in CKD (4)

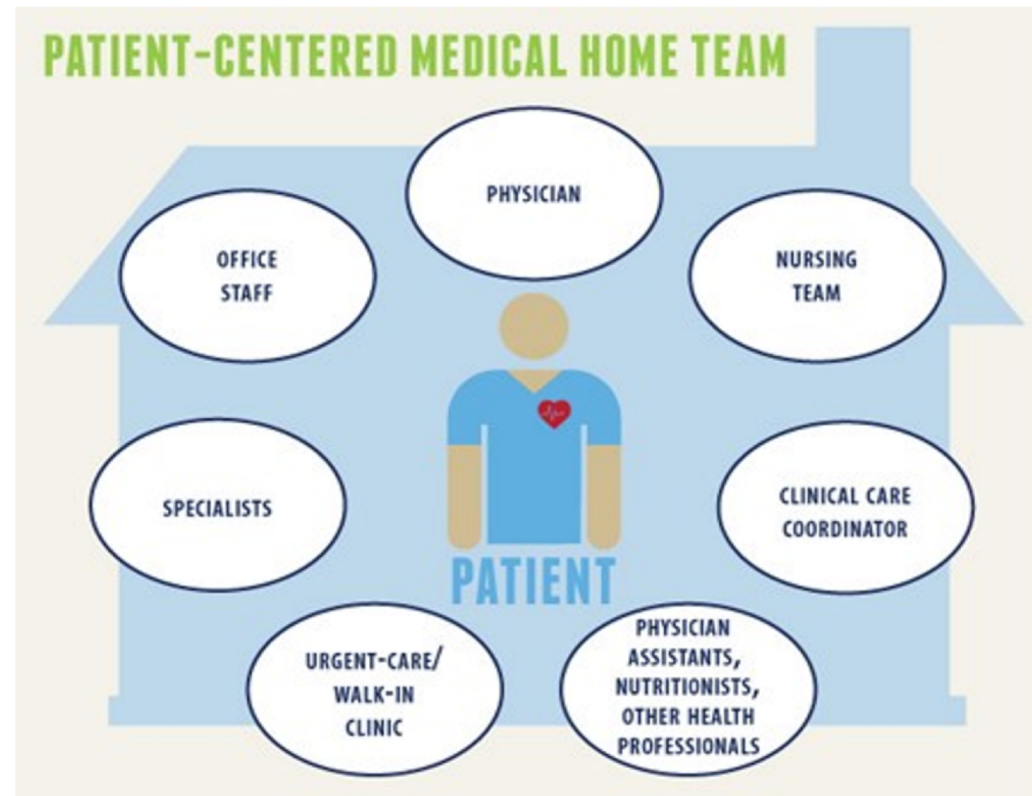
What can primary care providers do?

- Evaluate and manage anemia, malnutrition, CKD-MBD, and other complications in at-risk patients
- Refer to dietitian for nutritional guidance
- Consider patient safety issues in CKD
- Consult or team with a nephrologist (co-management)
- Refer patient to nephrology when appropriate

Co-Management and Patient Safety

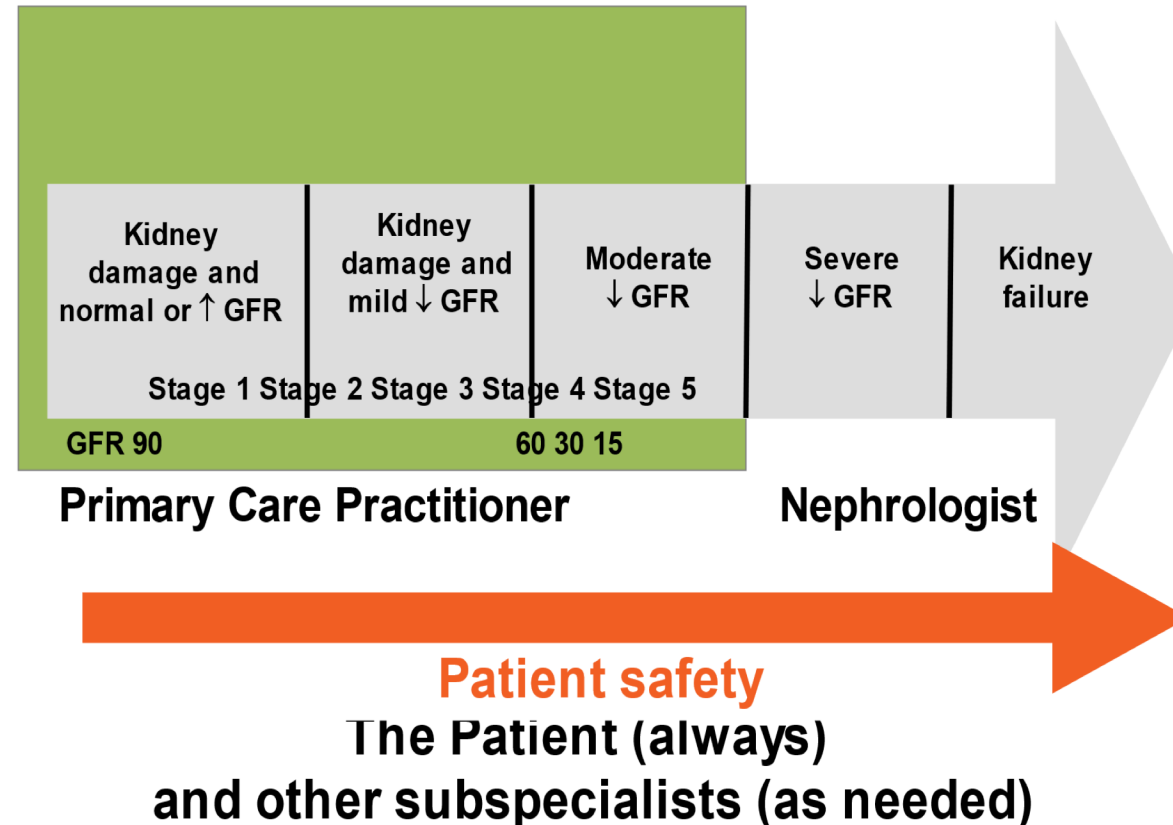
Co-Management Model

- Collaborative care
 - Formal arrangement
 - Curbside consult
- Care coordination
- Clinical decision support
- Population health
- Development of treatment protocols



Patient Safety Approach to CKD

Who Should be Involved in the Patient Safety Approach to CKD?



CKD Patient Safety Issues

- Medication errors
 - Toxicity (nephrologic or other)
 - Improper dosing
 - Inadequate monitoring
- Miscellaneous
 - Multidrug-resistant infections
 - Vessel preservation/dialysis access

CKD Patient Safety Issues (2)

- Electrolytes
 - Hyperkalemia
 - Hypocalcemia, dysnatremias
 - Hypoglycemia
 - Hypermagnesemia
 - Hyperphosphatemia

CKD Patient Safety Issues (3)

- Diagnostic tests
 - Iodinated contrast media: AKI
 - Gadolinium-based contrast: NSF
 - Sodium Phosphate bowel preparations: AKI, CKD

CKD Patient Safety Issues (4)

- CVD
 - Missed diagnosis
 - Improper management

CKD Patient Safety Issues (5)

- Fluid management
 - Hypotension
 - Acute Kidney Injury (AKI)
 - Congestive Heart Failure (CHF) exacerbation

Activity: Brainstorming

- When are you going to refer patient with chronic kidney disease?



Referral Pathway for Patients with Chronic Kidney Disease

- Indications for Referral to Specialist Kidney Care Services for People with CKD
 - Acute kidney injury or abrupt sustained fall in GFR
 - GFR <30 ml/min/1.73m²
 - Persistent albuminuria (ACR > 300 mg/g)*
 - Atypical Progression of CKD**
 - Urinary red cell casts, persistent hematuria detected

Referral Pathway for Patients with Chronic Kidney Disease (2)

- Indications for Referral to Specialist Kidney Care Services for People with CKD
 - Hypertension refractory to treatment with 4 or more antihypertensive agents
 - Persistent abnormalities of serum potassium
 - Recurrent or extensive nephrolithiasis
 - Hereditary kidney disease

Key Points

- The goals of care for CKD include slow decline in kidney function, Blood pressure control
 - $\leq 130/80$ mm Hg if there is no proteinuria
 - $\leq 125/75$ mm Hg if there is proteinuria
- Follow up monitoring of patient closely
- Refer for further management

Key Points (2)

- The goals of care for CKD include slow decline in kidney function, Blood pressure control
 - $\leq 130/80$ mm Hg if there is no proteinuria (KDIGO 2021)
 - $\leq 125/75$ mm Hg if there is proteinuria
- Follow up monitoring of patient closely
- Refer for further management

Session Evaluation

- What is chronic kidney disease (CDK)?
- What are the most common causes of CKD?
- What is the clinical presentation of CKD?
- What is the management of CKD?
- When should you refer the patient to a Nephrologist
- How should you follow up the CKD patient at PHC level?