Chronic kidney disease–mineral and bone disorder (CKD-MBD)

CKD-MBD affects the skeletal and cardiovascular systems, across all CKD stages, resulting in an elevated risk of:

- CKD-associated osteoporosis
- CKD-associated cardiovascular disease

Treatment consists of vitamin D replacement e.g. colecalciferol, often intentionally prescribed with alfacalcidol to control parathyroid hormone. Patients are often asked to restrict dietary phosphate intake and prescribed phosphate binders. Phosphate binders must be taken with meals to work. They may interact with other medication e.g. iron supplements/ciprofloxacin. Choice of phosphate binder is carefully guided after an assessment of the patient's biochemistry and their risk of calcification. Calcium exposure is limited due to the risk of cardiovascular complications. Calcimimetics such as cinacalcet may be prescribed to manage secondary hyperparathyroidism, including after transplant.

Metabolic acidosis

Patients with an eGFR less than 30mL/min/1.73m^2 and serum bicarbonate <22mmol/L may be taking sodium bicarbonate to correct metabolic acidosis and reduce the risk of hyperkalaemia. This usually stops as dialysis starts. Large doses can contribute to high tablet burden and may exacerbate oedema due to sodium content.

Thrombosis risk

Patients with nephrotic syndrome and hypoalbuminemia have an increased risk for arterial and venous thrombosis, so may require anticoagulation.

Frailty

Frailty is common in those with CKD and is associated with adverse outcomes. Recognising frailty should prompt a holistic assessment of the patient to address risk factors that may exacerbate its progression. This includes an assessment of medication.

Symptom control in CKD

People with CKD can experience a progressive high burden of uremic symptoms. These include pain, sleep disorders, restless leg syndrome, uraemic pruritis, depression, poor appetite and anorexia, nausea and vomiting, sexual dysfunction.

The goal of effective symptom management in people with CKD is to assist them to live better with kidney disease, regardless of life expectancy, within a supportive care framework. Unpleasant symptoms, such as CKD-associated pruritis and emotional or psychological distress, often occur within symptom clusters and treating one symptom may potentially alleviate other symptoms.

Before prescribing new medications to address newly reported symptoms, it is important to first assess if the symptoms represent a side effect from an existing medication.

Further reading:

1. Chronic kidney disease: assessment and management. (2021). National Institute for Health and Care Excellence (NICE). *https://www.nice.org.uk/guidance/ng203*
2. KDIGO 2024 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. (2024). Kidney Disease Improving Global Outcomes (KDIGO). *https://kdigo.org/wp-content/uploads/2024/03/KDIGO-2024-CKD-Guideline.pdf*
3. Frailty and chronic kidney disease: current evidence and continuing uncertainties (2018). *Clinical Kidney Journal* https://doi.org/10.1093/ckj/sfx134

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Chronic Kidney Disease (CKD)

Managing complications and controlling symptoms

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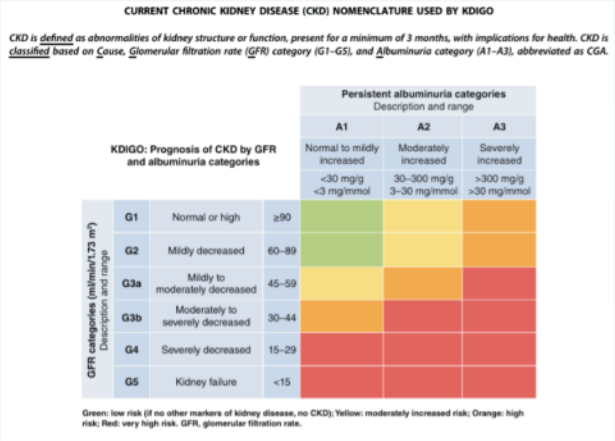
To optimise medication regimes for people with CKD, consider what each medication is for and the clinical context in which it is being used. The cause of CKD, GFR category (G1–G5), and Albuminuria category (A1–A3) must be determined. This allows the tailoring of medication regimes to optimise kidney function and delay deterioration.

CKD is progressive with increasing risk of cardiovascular events as kidney function deteriorates and acute kidney injury (AKI) during another illness. People living with CKD often have co-morbidities which may be a cause of, or because of, their CKD.

Medicines optimisation requires kidney specialist guidance to reduce the risk of medication-induced kidney dysfunction and harm from the adverse effects of medication. Optimising medication to manage complications and control symptoms should be under the supervison of kidney services.

CKD Background

The kidneys are one of the most important systems for clearing medication from the body. Their function is affected by processes before, after and within the kidney. The kidneys maintain acid-base, electrolyte and fluid balance, whilst performing some metabolism, and controlling some hormones, blood pressure and bone health. The kidneys can be affected by congenital abnormalities (e.g. polycystic kidney disease), dysfunction of other organs (e.g. liver or heart failure) or systemic diseases (e.g. diabetes). Most people with CKD die of cardiovascular disease before they reach end-stage kidney disease.



CURRENT CHRONIC KIDNEY DISEASE (CKD) NOMENCLATURE USED BY KDIGO

CKD is defined as abnormalities of kidney structure or function, present for a minimum of 3 months, with implications for health. CKD is classified based on Cause, Glomerular filtration rate (GFR) category (G1–G5), and Albuminuria category (A1–A3), abbreviated as CGA.

KDIGO: Prognosis of CKD by GFR and albuminuria categories

GFR categories (ml/min/1.73 m²) Description and range				Persistent albuminuria categories Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30–300 mg/g 3–30 mg/mmol	>300 mg/g >30 mg/mmol
G1	Normal or high	≥90				
G2	Mildly decreased	60–89				
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. GFR, glomerular filtration rate.

The key aims of CKD management are to:

1. Slow the progression of CKD
2. Reduce the risk of cardiovascular disease
3. Treat and manage complications
4. Prepare for dialysis or transplantation

For this to happen, people must be identified and appropriately referred to specialist kidney services.

Medication choices and monitoring for safety

- Susceptible to the nephrotoxic effects of medications. When prescribing medications to people with CKD, always consider the benefits versus potential harms.
- Monitor eGFR, electrolytes, and therapeutic medication levels, when indicated, in people with CKD receiving medications with narrow therapeutic windows, potential adverse effects, or nephrotoxicity, both in primary and secondary care settings.
- All medication may not be listed on Summary Care Record. Many patients will be receiving medication through homecare services or directly from their kidney centre. This includes immunosuppressive regimes.
- Review and limit the use of over-the-counter medicines and dietary or herbal remedies that may be harmful for people with CKD.

Review medication periodically and at transitions of care

- to assess adherence, continued indication, potential drug interactions
- If medications have been discontinued during an acute illness, ensure the affected person and their healthcare provider know when they will restart. Failure to restart these medications after the event/procedure may lead to unintentional harm.

Establish collaborative relationships with your kidney team, especially your renal pharmacist, to enhance management of the complex medication regimens offered to people with CKD.

CKD treatments

Immunosuppression

Many patients with CKD will be receiving immunosuppression. This may be for their underlying kidney disease or because they have received a kidney/kidney and pancreas transplant. This regime will be closely monitored and adjusted by the specialist kidney team. It may consist of oral and/or parenteral medication. Patients who have received a transplant are always considered to have CKD. Patients should be offered appropriate vaccination to reduce risks of infections. Care with choice of antibiotics or antifungals due to the risk of interactions. Patients may be receiving other treatments to reduce the risk of progression to end-stage kidney disease e.g. tolvaptan for autosomal dominant polycystic kidney disease. This is monitored and supplied via NHS-commissioned secondary care services.

Gout

People with CKD stage G3 or below have a higher prevalence of gout. Therefore, people with CKD and symptomatic hyperuricemia should be offered uric acid–lowering medication. This is to reduce the incidence of acute gout and preventing long-term complications of recurrent gout. Check the patient is NOT receiving azathioprine BEFORE initiating a xanthine-oxidase inhibitor e.g. allopurinol.

Anaemia

Patients with CKD may develop renal anaemia once eGFR falls below 60ml/min/1.73m^2. This is diagnosed after all other causes of anaemia have been excluded. The incidence increases as kidney function declines. A FBC will be requested and assessed. Patients may require folic acid, vitamin B12 and/or iron replacement. Any IV iron, erythropoietin or hypoxia-inducible factor prolyl hydroxylase inhibitors will be provided and monitored by the specialist local renal anaemia team.