CKD-Mineral & Bone Disorder (CKD-MBD)

Biochemical and bone monitoring, vascular calcification assessment, phosphate/calcium and PTH management, bone-targeted therapy, and kidney transplant bone disease.

2017 KDIGO Clinical Practice Guideline Update
Diagnosis, Evaluation, Prevention, and Treatment of CKD-MBD
Ketteler, Block, Evenepoel et al. · Kidney Int Suppl 2017;7(1):1-59

GRADE — 1 · We Recommend | 2 · We Suggest | NG · Not Graded

1 3.1 — Biochemical Monitoring

1C	Monitor serum **calcium, phosphate, PTH, and ALP** beginning CKD G3a (children: G2).
NG	Base monitoring frequency on abnormality severity/progression — Ca/phosphate q6–12mo (G3a-b) to q1–3mo (G5D); PTH q6–12mo to q3–6mo; ALP annually (G4–G5D).
2C	**25(OH)D** may be measured, repeated per baseline/intervention; correct deficiency as in general population.
1C	Base therapeutic decisions on **trends** rather than a single lab value.
2D	Use individual calcium and phosphate values together rather than the **Ca × P product**.
1B	Labs should report assay method/changes and specimen source to aid interpretation.

2 3.2 — Diagnosis: Bone

2B	Consider **BMD testing** if evidence of CKD-MBD/osteoporosis risk factors AND result will impact treatment.
NG	**Bone biopsy** reasonable if knowledge of renal osteodystrophy type will impact treatment.
2B	Serum PTH or bone-specific ALP can evaluate bone disease — markedly high/low values predict turnover.
2C	Do **not** routinely measure bone-derived collagen turnover markers (e.g., P1NP, CTX).
1B	Measure **length** quarterly in infants (G2–G5D); assess linear growth annually in children.

3 3.3 — Diagnosis: Vascular Calcification

2C	Lateral abdominal radiograph (vascular) or echocardiogram (valvular) are reasonable alternatives to CT-based imaging.
2A	Known vascular or valvular calcification = **highest cardiovascular risk category** — use to guide CKD-MBD management.

4 4.1 — Phosphate & Calcium Treatment

NG	Base treatment on serial phosphate, calcium, and PTH assessed together; base phosphate-lowering treatment on progressive or persistent elevation.
2C	**Lower** elevated phosphate toward the normal range.
2C	**Avoid hypercalcemia** in adults; age-appropriate normal calcium in children. Dialysate calcium 1.25–1.50 mmol/L (2.5–3.0 mEq/L).
2B	Restrict **calcium-based binder** dose in adults; base pediatric choice on serum calcium.
1C	**Avoid long-term aluminum-containing binders**; avoid dialysate aluminum contamination.
2D	Limit dietary phosphate intake alone or combined with other treatments; consider phosphate source (animal/vegetable/additive).
2C	Increase **dialytic phosphate removal** for persistent hyperphosphatemia.

5 4.2 — PTH Management

2C	Evaluate progressively rising/persistently elevated iPTH for modifiable factors — hyperphosphatemia, hypocalcemia, high phosphate intake, vitamin D deficiency.
2C	Don't routinely use **calcitriol/vitamin D analogs** in non-dialysis G3a–G5 adults; reserve for severe/progressive HPT in G4–G5.
2C	Maintain G5D iPTH ~2–9× ULN; treat marked within-range shifts to avoid drifting outside this range.
2B	G5D PTH-lowering therapy: **calcimimetics, calcitriol, vitamin D analogs**, or a combination.
2B	**Parathyroidectomy** for severe hyperparathyroidism refractory to medical/pharmacologic therapy.

6 4.3 — Bone Treatment

1A	CKD G1–G2 with osteoporosis/high fracture risk: manage **as general population**.
2B	CKD G3a–G3b with normal PTH + osteoporosis/high fracture risk: treat as general population.
2D	CKD G3a–G5D with CKD-MBD abnormalities + low BMD/fragility fracture: **individualize**, consider bone biopsy.
1A	Children/adolescents, CKD G2–G5D + height deficit: **recombinant GH** after addressing malnutrition and CKD-MBD abnormalities.

7 5 — Kidney Transplant Bone Disease

1B	Measure serum calcium/phosphate **≥weekly** in the immediate post-transplant period until stable.
NG	Base post-transplant monitoring frequency on abnormality severity/CKD progression; ALP annually.
2C	25(OH)D may be measured, repeated per baseline values/interventions; correct deficiency as in general population.
2C	**BMD testing** if osteoporosis risk factors AND result will alter therapy.
2D	First 12mo post-transplant, eGFR >~30, low BMD: consider vitamin D/calcitriol/antiresorptive agents; bone biopsy before bisphosphonates.
2C	G4T–G5T with known low BMD: manage as **non-transplant CKD G4–G5**.

Ketteler M, Block GA, Evenepoel P, et al. Executive summary of the 2017 KDIGO Chronic Kidney Disease-Mineral and Bone Disorder (CKD-MBD) Guideline Update. *Kidney Int Suppl.* 2017;7(1):1-59.