

**Maine Medical Center
Maine Transplant Program
Policies and Procedures
Chronic Kidney Disease-Mineral and Bone Disorder (CKD-MBD) Guidelines**

First post transplant year

CKD-MBD persists after transplantation.

Hypophosphatemia, hypercalcemia and hypomagnesemia are more common after than before kidney transplantation.

Protocol

Laboratory Testing Frequency per MTP Lab Schedule noting phos may need to be checked more frequently at physician discretion

Phosphorus

Rx Higher phosphate diet for phos >1.5 and <3

Rx KPhos 500mg BID for phos <1.5

Magnesium

Rx MgOx 400mg BID for Mg<1.5

Avoid PPI

Calcium

Hypercalcemia > Ca 10.5mg/dl

Stop Ca/Vit D/Thiazides

Rx cinacalcet 30mg/d if persists and uptitrate as necessary

Beyond year 1 post transplant

Biochemical diagnosis of CKD-MBD.

1. Recommended serum monitoring intervals+:

25(OH)D	Calcium	Phosphate	PTH	
CKD 3a	12 months	12 months	12 months	12 months
CKD 3b	6 months	6 months	12 months	12 months
CKD 4	3 months	3 months	6 months	12 months
CKD 5	1 to 3 months	1 to 3 months	3 months	12 months

+In patients receiving treatment for CKD-MBD, or with abnormal biochemical parameters, it is reasonable to increase the frequency of measurements.

Treatment of CKD-MBD

- A. Treatment targeted at biochemical parameters. **General principles:**

1. Therapies should be based on serial assessments of serum parameters, considered together.
2. *Goal* is to lower elevated phosphate levels toward the normal range.
3. Hypercalcemia is an unacceptable side effect of any CKD-MBD treatment strategy.
4. In general, if phosphate binders are used, *non-calcium binders should be employed instead of calcium-based binders* (as feasible).
5. Patients with secondary hyperparathyroidism should be evaluated for modifiable factors such as hyperphosphatemia, hypocalcemia, high phosphate intake, and vitamin D deficiency.
6. If employed, efforts at limiting dietary phosphate intake should focus on processed and animal based foods rather than on plant based foods.

7. *Calcitriol and other 'active' vitamin D analogs should not be routinely used.* It is reasonable to reserve the use of calcitriol for patients with hypocalcemia or severe and progressive hyperparathyroidism.

- B. Vitamin D deficiency and insufficiency in CKD should be corrected using treatment strategies recommended for the general population.

Recommended Initial Vitamin D Replacement Strategy:

Vitamin D 25(OH) level	Recommended replacement dose+	Repeat 25(OH)D level
<10 ng/ml	5000 IU D3 daily	@3mo
10-14 ng/ml	4000 IU D3 daily	@3mo
15-19 ng/ml	3000 IU D3 daily	@3mo
20-29 ng/ml	2000 IU D3 daily	@3mo

+Daily vitamin D3 is preferred to weekly vitamin D2 therapy for patient adherence reasons. Higher initial doses of vitamin D3, or the use of high dose weekly vitamin D2, is reasonable in certain cases (e.g., patients with intestinal malabsorption or high grade proteinuria).

In general, 1000 IU of D3 is the recommended daily maintenance dose after initial repletion.

- C. Treatment targeted at bone (including bisphosphonates and other osteoporosis medications).

General principles:

1. In patients with CKD 3 with PTH in the normal range and osteoporosis, management is similar as in the general population (though doses of medications may need renal adjustment).
2. In patients with CKD 3, 4, and 5 with biochemical abnormalities of CKD-MBD and low bone mineral density, treatment choices should take into account the magnitude and reversibility of the biochemical abnormalities, CKD progression, and the availability of bone biopsy.

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