CKM Calcium/Phosphorous Guideline for Healthcare Professionals

Guiding Principles:

- **We recommend promoting quality of life through liberalizing the diet and maintaining adequate nutrition rather than normalizing biochemisty.**
- Kidney failure leads to changes in the metabolism of calcium, phosphorus, and active Vitamin D. CKD guidelines aim to normalize these factors to prevent bone abnormalities and vascular calcification. However, it's not clear that there are benefits to normalizing in patients being cared for conservatively in the last few years of life. Rather, there is the possibility of harm in promoting lower protein intake in patients already at high risk for protein malnutrition.
- Hyperphosphatemia may contribute to **Restless Legs Syndrome**. Decreased active Vitamin D may lead to **weakness**, **fatigue**, and **muscle loss**. Calcium and phosphorus depositions can lead to **myalgias**, **arthralgias**, and **pseudogout**.
- Interventions to partially normalize biochemistry such as a phosphorus-restricted diet, the use of phosphate binders and the administration of active Vitamin D should only be considered to **minimize these symptoms**.
- If the patient desires treatment for hyperphosphatemia, it would be reasonable to check calcium and phosphorus levels every 3 months.

GFR 15 - 5 | Slow Decline/Deteriorating | Last 0-5 years of life

Although the interventions aimed at managing calcium and phosphorous may contribute to a significant number of pills for patients, the **symptom management benefits are worth discussion**. We have recommended reducing and simplifying the number and combinations of medications as much as possible.

Patients should **liberalize their diet if they desire;** they should also be made aware of the possible link between high phosphorous.

- See: AHS Phosphorus Foods Brochure
- See: Restless Legs Syndrome Guideline
- See: Fatigue Guideline
- See: Vitamin D Statement

GFR 5 - 0 | Intensive/Near Death | Last 0-2 months of life

When the patient is bedbound and nearing the end of life, it is appropriate to stop interventions and bloodwork aimed at managing calcium and phosphorous levels. Related supplements and medications should be stopped.

Objectives: To guide calcium and phosphorus management in conservative kidney care. **Note that interventional guidelines do not replace individualized care and clinical expertise.**

When evaluating calcium and phosphorous management using the clinical algorithms:

a. If phosphate (PO4) is higher than the target range, review diet, phosphate binder timing and adherence and provide education as appropriate.

Note: Binder therapy is generally not increased if phosphate is accounted for by a modifiable dietary source.

b. Always ensure correct binder **timing and adherence** before changing the dose. Binders should be taken during meals.

c. **Patient preference** for different forms of calcium carbonate should be accommodated (e.g., change from pill to chewable form).

Brand of Phosphorous Binder*±	mg elemental/tablet
Calcium Carbonate 500 mg chewable (e.g.: TUMS Regular)	200 mg
Calcium Carbonate 625 mg (various manufacturers)	250 mg
Calcium Carbonate 750 mg chewable (e.g.: TUMS Extra)	300 mg
Calcium Carbonate 1000 mg chewable (e.g.: TUMS Ultra)	400 mg
Calcium Carbonate 1250 mg (various manufacturers)	500 mg
Calcium Carbonate 1500 mg (various manufacturers)	600 mg

*To determine the elemental calcium content of a calcium carbonate pill, multiply the total calcium carbonate content (size of pill) by 0.4

±Adapted from AHS Mineral Bone Management Guideline (June 2015), Alberta Kidney Care (AKC), Chronic Kidney Disease Clinics.

Reminder: Always ensure correct binder timing and adherence before changing the dose. If dose adjustment is required, consider appropriate dose adjustment to minimize pill burden.

Binders should be taken during meals.

Dose Adjustment Guideline for Phosphate Binders – Recommended Initial Calcium Dosing

If calcium is higher than the target range, check for exogenous sources of calcium (e.g., Tums®) prior to adjusting binders.

Corrected calcium (mmol/L)	Phosphorous >1.48 mmol/L
<2.10 - 2.54	elemental calcium 200 – 600 mg (once to up to three times/day with meals)
>2.54	Use non-calcium based binders

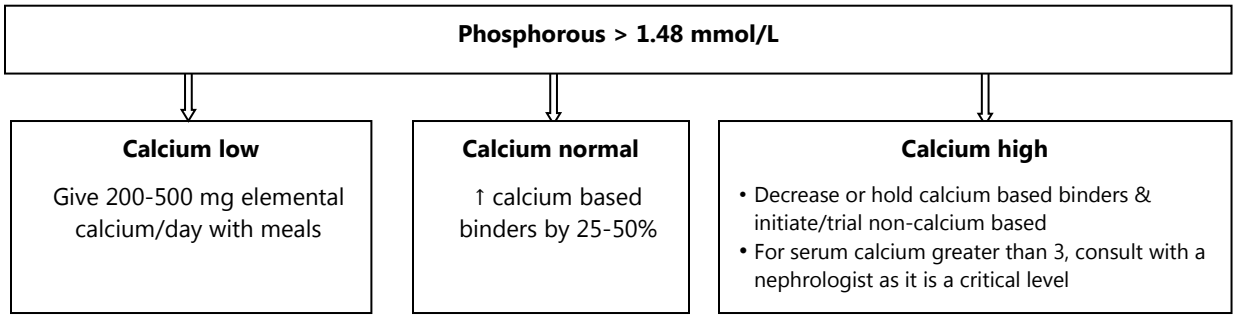
***Corrected calcium is an adjustment made when albumin is <35 g/L. Formula: [(40 – serum albumin) x 0.2] + serum calcium.**

Dose Adjustment Guideline for Non-Calcium Based Phosphate Binders (may be used alone or as an adjuvant therapy)

Binder	Dosing	Considerations
magnesium hydroxide $Mg(OH)_2$	• Initial Dosing: 1 tablet/5 mL with largest meal 1 tablet = 311 mg $Mg(OH)_2$ = 129 mg elemental magnesium • Maximum dose of 6 tablets a day (maximum tolerance is usually 2 tablets a day due to loose bowel movements)	• Monitor serum magnesium every three months if patient is still having regular bloodwork done • Monitor for gastrointestinal concerns • Review for exogenous sources of magnesium (e.g. Rolaids®) before starting magnesium hydroxide as a binder

***Magnesium-based binders and liquid calcium binders can be considered.**

Maintenance Calcium Dosing Guidelines



▶ High Calcium Clinical Guidelines (See Dose Adjustment Schedule for Phosphate Binders)

Low or Normal Phosphorous	High Phosphorous
• Decrease or discontinue calcium based binders as per dosing guideline • Decrease or discontinue Vitamin D	• Decrease or discontinue calcium based binders as per dosing guideline • Decrease or discontinue Vitamin D • Initiate non-calcium based phosphate binder

Conservative Kidney Management Acronym Legend

Acronym:	Intended Meaning:
ATC	Around the Clock
BID	Twice Daily
CKD	Chronic Kidney Disease
CKM	Conservative Kidney Management
COPD	Chronic Obstructive Pulmonary Disease
CO2	Carbon Dioxide
EOL	End of Life
ESA	Erythropoietin Stimulating Agent
ESKD	End Stage Kidney Disease
GFR	Glomerular Filtration Rate
GI	Gastrointestinal
g/L	Grams per litre
HgB	Hemoglobin
IN	Intranasal
IU	International Units
IV	Intravenous
kg	Kilogram
mcg	Microgram
mg	Milligram
mL	Millilitre

Acronym:	Intended Meaning:
mmol/L	Millimoles per Litre
OTC	Over the Counter
PO	By Mouth
PRN	As Needed
NSAID	Non-steroidal Anti-inflammatory Drugs
q(1-8)d	Every (Time Eg, 2) Days
q(1-8)h	Every (Time Eg, 4) Hours
q(1-8)weeks	Every (Time Eg. 2) Weeks
QHS	At Bedtime
RLS	Restless Leg Syndrome
SC	Subcutaneous
SL	Sublingual
SNRI	Serotonin and Norepinephrine Reuptake Inhibitors
SSRI	Selective Serotonin Reuptake Inhibitors
TCA	Tricyclic Antidepressant
TID	Three Times a Day
>	Greater Than
≥	Greater Than or Equal To
<	Less Than
≤	Less Than or Equal To