

Bon Secours Richmond
Pharmacy and Therapeutics Committee
Treatment of Hypophosphatemia with Sodium or Potassium Phosphate in Adults
10/2005 Update

Recommendations:

- Pharmacy will stock the following oral products: Neutra-Phos Powder, and K-Phos Neutral Tablets (see content comparisons below). It is important to note the differences in potassium content. Despite the name, K-Phos Neutral tablets do not have as much potassium content as Neutra-Phos packets. These tablets may be useful for patients with renal dysfunction and/or hyperkalemia.

Protocol below approved by P&T/MEC approved 2001 at MRMC, SMH, & RCH

- IV phosphate repletion should be limited to treatment of moderate to severe hypophosphatemia.
- Mild to moderate serum phosphate levels may be treated with oral products.
- When serum phosphate is ≥ 1.5 -2 mg/dl IV treatment may be switched to the oral route.
- If serum potassium is ≥ 3.5 meq/L sodium phosphate is recommended for IV treatment.
- The use of *lean body weight* is recommended when calculating the dose.
- Monitor serum phosphorus, calcium, magnesium, and potassium every six hours, along with blood pressure.

Treatment of Hypophosphatemia in Adults (Normal Phosphorus Range 2.5-4.5)			
Serum Phosphorus	Oral	Peripheral Line	Central Line
Mild (2.1-2.5 mg/dl)	250-500 mg elemental phosphorus (8-16 mmol) tid-qid	Not Indicated	Not Indicated
Moderate (1-2 mg/dl)	250-500 mg elemental phosphorus (8-16 mmol) tid-qid	0.08-0.16 * mmol/kg of Sodium phosphate or <i>if serum potassium < 3.5 meq/l <u>potassium</u> phosphate over 6-12 hours in Normal Saline.</i> Repeat as indicated by serum phosphorus level.	0.08-0.16* mmol/kg of Sodium phosphate or <i>if serum potassium < 3.5 meq/l <u>potassium</u> phosphate over 6-12 hours in Normal Saline.</i> Repeat as indicated by serum phosphorus level.
Severe (< 1 mg/dl)	Not recommended.	0.16-0.25 mmol/kg of Sodium phosphate or <i>if serum potassium < 3.5 meq/l <u>potassium</u> phosphate over 6-12 hours in Normal Saline.</i> Repeat as indicated by serum phosphorus level.	15 mmol <u>Sodium</u> Phosphate in 100-250 ml of Normal Saline over 3 hours or <i>if serum potassium < 3.5 meq/l: 15 mmol of <u>Potassium</u> Phosphate in 100-250 ml of Normal Saline over 3 hours.</i> May repeat q6h for a total of 3 doses in 24 hours.

Lean body weight is recommended for dosage calculations.

All doses in mmol are for phosphate.

*Increase by 25-50% if the patient is symptomatic and lower by 25-50% if hypercalcemic.

Slow infusion rate if hypotension occurs.

Content of Various Phosphate Preparations			
Intravenous	Phosphate	Potassium	Sodium
Potassium Phosphate	3 mM/ml	4.4 meq/ml	
Sodium Phosphate	3 mM/ml		4 meq/ml
Oral			
Fleets Phospho-Soda per ml	150 mg (4.8 mM)		4.8 meq
K-Phos Neutral tablet	250 mg (8.1 mM)	1.1 meq	13 meq
Neutra-Phos Powder	250 mg (8.1 mM)	7.1 meq	7.1 meq
Neutra-Phos K Powder	250 mg (8.1 mM)	14.25 meq	

	RCH	MRMC	SMH
K Phos Neutral Tablet		300	100
Neutra Phos Powder	100		1100
Neutra Phos K Powder			100
K Phos Original		200	400

Findings:

- Estimation of total body phosphorus deficit is extremely difficult because phosphorus is an intracellular element (1% in blood).
- Phosphorus is well absorbed orally (70-90%). The dose limiting adverse effect is osmotic diarrhea.
- Normal oral phosphorus intake is 15 -30 mM (450-900 mg) per day.
- Serum phosphorus levels increase by as much as 1.5 mg/dl within 1-2 hours after ingestion of 1000 mg of oral elemental phosphorus.
- Treatment side effects: hypotension, hypocalcemia, hypomagnesemia, hyperphosphatemia, metastatic calcification, hyperkalemia with potassium salts, dehydration (secondary osmotic diuresis), and hyponatremia.
- Conversion units: 31 mg of elemental phosphorus = 1 mM phosphate, (1 mg elemental Phosphorus = 0.0323 mM)
- Clinical manifestations of severe hypophosphatemia include: proximal myopathy, osteomalacia, bone pain, rhabdomyolysis, cardiomyopathy, arrhythmias, respiratory failure, delirium, paraesthesias, seizures, confusion, coma, encephalopathy, hallucinations, metabolic acidosis, glucose intolerance.
- Oral Phosphate supplements are used in treatment of hypercalciuria, and hypercalcemia. In the last 2 settings, phosphate can form insoluble calcium phosphate complexes in the gut, thereby limiting intestinal calcium absorption, and in the plasma, thereby mildly lowering the plasma calcium concentration.
- The dose of phosphorus given varies with the underlying disorder. Oral therapy is given in divided doses to minimize diarrhea.
 - Phosphate depletion — 2.5 to 3.5 g (80 to 110 mmol) per day in 3 to 4 divided doses.
 - Severe, symptomatic hypophosphatemia (plasma phosphate concentration less than 1 mg/dL or 0.32 mmol/L) in the patient requiring parenteral therapy — 10 mg (320 μ mol)/kg per day until the plasma phosphate concentration reaches 2 mg/dL (0.64 mmol/L).
 - Hypercalciuria and recurrent calcium stones — 2.0 to 2.5 g (64 to 80 mmol) per day in 3 to 4 divided doses. In addition to decreasing calcium absorption, phosphate supplementation also enhances the urinary excretion of pyrophosphate, an inhibitor of calcium precipitation.
 - Hypercalcemia — 1 to 3 g (32 to 96 mmol) per day in divided doses.
 - Hypophosphatemic rickets — 1 to 4 g (32 to 128 mmol) per day in divided doses

References:

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