

TREATMENT OF HYPOPHOSPHATEMIA

Hypophosphatemia is a frequently encountered metabolic complication in hospitalized patients, particularly those with critical illness. The normal range for serum phosphate at S&W is 0.87-1.52 mmol/L. Moderate hypophosphatemia is usually defined as a serum phosphate in the range of 0.4-0.8 mmol/L and severe hypophosphatemia as a level below 0.4 mmol/L.

Patients with moderate hypophosphatemia who are asymptomatic may be considered for oral phosphate supplementation, if the enteral route is feasible. Oral treatment can be provided using Phosphate Novartis® at the usual dose of 500 mg BID (each 500 mg effervescent tablet dissolved in water provides the equivalent of 16 mmol of phosphate, 3 mmol of potassium and 20 mmol of sodium).

Intravenous phosphate supplementation is necessary in patients with severe hypophosphatemia, symptomatic patients with moderate hypophosphatemia, and patients for whom the enteral route is not feasible. Either potassium phosphate or sodium phosphate injection may be used for IV phosphate replacement. The electrolyte content of each of these products is outlined below.

<p>Potassium Phosphate Injection 10 mL vial Each mL supplies: 4.4 mmol of potassium 3 mmol of phosphorus</p>

<p>Sodium Phosphate Injection 10 mL vial Each mL supplies: 4 mmol of sodium 3 mmol of phosphorus</p>

The terms phosphate and phosphorus are used interchangeably. Phosphorus is the elemental form and phosphate exists in various ionic forms. However, for practical purposes, the mmol content of phosphate is virtually identical to phosphorus and they can be considered equivalent.

Potassium phosphate injection provides a highly concentrated form of potassium (4.4 mmol/mL). If inadequately diluted or administered too rapidly, it may cause serious adverse consequences. Both the Institute for Safe Medication Practices (ISMP) and the Canadian Council on Health Services Accreditation (CCHSA) recommend that concentrated potassium phosphate injection be removed from patient care areas. In order to comply with these recommendations, new protocols have been developed for IV phosphate replacement in the treatment of hypophosphatemia.

New Protocols for the Parenteral Treatment of Hypophosphatemia

A. Critical Care Areas (Sunnybrook Campus: CrCU, CVICU, RTBC, B5-ICU, D4-ICU)

Potassium phosphate injection has traditionally been stocked in all critical care areas at Sunnybrook campus. As well, in CrCU, potassium phosphate infusion is part of the fluid and electrolyte protocol of the pre-printed admission orders (potassium phosphate 15 mmol in 100 mL NS over 4 hrs PRN for serum phosphate < 0.8mmol/L).

Sodium phosphate injection provides the same phosphate content as potassium phosphate injection and represents a potentially safer alternative (i.e., sodium does not pose the same risks as potassium). Therefore, in order to minimize the risk associated with IV phosphate replacement, the following changes will be implemented:

- Potassium phosphate injection will be removed from ward stock in all critical care areas.
- Sodium phosphate injection will be stocked in all critical care areas.
- **Orders for potassium phosphate infusion will automatically be converted to sodium phosphate infusion.** As well, pre-printed order sets that include orders for IV phosphate supplementation will be revised to specify sodium phosphate infusion.*
- **Orders for sodium phosphate infusion will be written using a standard dose and concentration – sodium phosphate 15 mmol in 100 mL D5W IV infused over 4 hours (each bag provides 20 mmol or 460 mg of sodium).**
- Nurses in critical/intensive care areas will be responsible for preparing sodium phosphate infusion according to the standard protocol outlined in the revised IV Drug Monograph for Sodium Phosphate.

* If, based on the patient's clinical condition, potassium phosphate infusion is absolutely required, the physician will indicate "No substitution" on the order and pharmacy (or the pharmacist-on-call after hours) will be contacted to prepare the potassium phosphate infusion solution.

B. Medical and Surgical Wards

Potassium phosphate injection will not be available in any night-cupboard or ward stock. When potassium phosphate infusion is ordered for a ward patient, the pharmacy (or the pharmacist-on-call after hours) is responsible for preparing the infusion solution.

Although sodium phosphate represents a potentially safer alternative, the sodium content may be problematic for some medical or oncology patients. Accordingly, there will be no automatic conversion from potassium to sodium phosphate infusion for ward patients.[†] The current practice whereby Pharmacy prepares patient-specific bags of potassium phosphate infusion will continue. However, to reduce confusion around the prescribing, preparation and administration of potassium phosphate infusion, the following changes are being implemented:

- **Orders for potassium phosphate infusion will be written using a standard dose and concentration – potassium phosphate 15 mmol in 500 mL of D5W or NS infused IV over 6 hours (each bag provides 22 mmol of potassium).** If orders are written for different doses or volumes, the pharmacist will contact the prescriber and request that the order be changed to the standard protocol.
- The IV Drug Monograph for potassium phosphate has been revised to reflect the use of a standard dosing protocol.

[†] On the rare occasion that sodium phosphate infusion is ordered for a ward patient (for example, in a hyperkalemic patient with hypophosphatemia), the orders will be written according to the standard protocol – sodium phosphate 15 mmol in 500 mL IV infused over 6 hours (each bag provides 20 mmol of sodium). During pharmacy hours, pharmacy will be responsible for preparing the infusion bags. If needed after hours, sodium phosphate injection will be available in one night-cupboard (C3) for preparation by nurses according to the instructions in the IV Drug Monograph.