
PROVINCIAL STANDARDS & GUIDELINES

BCRenal
Provincial Health Services Authority

# Phosphate Management Guideline for Patients Receiving Extending Duration Dialysis

March 2019
Approved by the BC Renal Home Hemodialysis Committee

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Printed copies of Clinical Practice Standards and Procedures may not be the most recent version. The most current version is located on BCPRA website:
Health Professionals ▶ Home Hemodialysis ▶ Guidelines

Direct link: http://www.bcrenalagency.ca/resource-gallery/Documents/Phosphate%20Management%20Guideline%20for%20Patients%20Receiving%20Extended%20Duration%20Hemodialysis.pdf

**IMPORTANT INFORMATION**

This BC Renal guideline/resource was developed to support equitable, best practice care for patients with chronic kidney disease living in BC. The guideline/resource promotes standardized practices and is intended to assist renal programs in providing care that is reflected in quality patient outcome measurements. Based on the best information available at the time of publication, this guideline/resource relies on evidence and avoids opinion-based statements where possible; refer to www.bcrenalagency.ca for the most recent version.

**For information about the use and referencing of BC Renal guidelines/resources, refer to http://bit.ly/28SFr4n.**

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## 1.0 Practice Standard

To provide guidelines to the health care providers as to when and how to supplement the nightly nocturnal hemodialysis prescription with additional phosphate.

The health care providers will review patients blood work and under the direction of the nephrologist will determine the appropriate management of phosphate metabolism.

The registered nurse educators will have the necessary knowledge and skills to perform and teach the procedure competently.

The patient will demonstrate an understanding of the procedure, and have documentation included on the chronic dialysis clinic chart confirming successful certification in this procedure.

Note- clarify the certification process in training.

## 2.0 Definitions and Abbreviations

Extended Duration Hemodialysis is defined as equal to or greater than 24 hours of hemodialysis treatment time per week irrespective of frequency of treatment and/or duration of each treatment time.

Calcium – Ca; [Ca++] ionized calcium formula

Calcium Chloride – $CaCl_2$

Phosphate – $PO_4$

Parathyroid – PTH

## 3.0 Equipment

- Sodium phosphate enema aqueous solution
- Each 15cc of sodium phosphate enema aqueous solution contains 20.7 mmol of $PO_4$, and will therefore raise phosphate concentration to 4.6mmol/L when added to 4.5 L jug of acid dialysate solution.
- Calibrated measuring cup

## 4.0 Procedure and Rationale

| PROCEDURE | RATIONALE |
|---|---|
| 1. Sequentially eliminate phosphate binders when pre-dialysis phosphate levels fall below 1.4 mmol/L | Efficiency of nightly nocturnal hemodialysis is associated with substantially increase phosphate clearance, thereby reducing total body phosphate load. |
| 2. Liberalize dietary phosphate intake, in consultation with a renal dietitian, when pre-dialysis phosphate levels fall below 1.4 mmol/L. | Efficiency of nightly nocturnal hemodialysis is associated with substantially increase phosphate clearance, allowing less restricted phosphate diet. |
| 3. Routine laboratory testing should include only pre dialysis phosphate levels. Post dialysis phosphate should be measured periodically only if there are signs or symptoms of clinically significant hypophosphatemia. | Post-hemodialysis levels are subject to significant 'rebound' redistribution of phosphate. Management of isolated and asymptomatic post-dialysis hypophosphatemia may result in 'over supplementation' of phosphate.<br><br>Signs of significant hypophosphatemia include: unexplained muscle weakness; muscle pain (rhaddomylosis); altered level of consciousness. |
| 4. Calcium, Phosphate, and Albumin levels should be drawn simultaneously. | Simultaneous measurements allow adjustments to be made accounting for both calcium and phosphate variables. |
| 5. Initiate phosphate supplementation if, despite implementation of (1) and (2) pre-dialysis phosphate levels remain at or below 1.2 mmol/L. | Chronic hypophosphatemia is associated with significant risks, including muscle cramping and bone disease. |
| 6. Start phosphate supplementation by adding 15 mL (=20.7 mmols) of sodium phosphate enema aqueous solution to a full 4.5 litre dialysate acid concentrate jug, to raise concentration in dialysate jug to 4.6mmol/L. | Target phosphate level may not be achievable or maintained by dietary modification alone. Addition of phosphate into the dialysate is the preferred method to achieve phosphate targets, as this ensures systemic absorption of phosphate. Oral supplementation is unpredictable with respect to phosphate absorption. |

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| PROCEDURE | RATIONALE |
|---|---|
| 7. Target levels for phosphate are a follows: Pre-dialysis: 1.2-1.6 mmol/L. | To maintain phosphate levels within safe and physiological ranges. |
| 8. Measure pre-dialysis phosphate levels 1 week following initiation of supplementation. May need to do blood levels sooner if any symptoms of hypophosphatemia appear. | To assess levels and monitor for phosphate levels outside of target range (above or below target limits). |
| 9. If measurement in #8 is below target range, increase sodium phosphate enema aqueous solution by 15 mL (=20.7 mmol) to full 4.5 litre dialysate acid concentrate jug, and repeat pre-dialysis blood work 1 week later. | To assess levels and monitor for phosphate levels outside of target range. |
| 10. Continue to titrate phosphate supplementation in same manner-addition of another 15mL (=20.7_ of Sodium Phosphate enema aqueous solution to a full 4.5 litre dialysate acid concentrate jug, and repeat pre-dialysis bloodwork 1 week later until target levels are achieved. | To assess levels and monitor for phosphate levels outside of target range (above or below target limits)<br><br>While no upper limit f phosphate additive is recommended, caution should be used for patients receiving more than 60mL. |
| 11. When target range is achieved, continue with same volume of sodium phosphate enema aqueous solution with every dialysis treatment. **Exception** is for first run after day without dialysis as pre-dialysis phosphate may have accumulated. | To assess levels and monitor for phosphate levels outside of target range (above or below target limits)<br><br>Due to enhanced dietary phosphate, and elimination of phosphate binders, phosphate may re-accumulate if dialysis treatment missed. |
| 12. Chronic monitoring of pre-hemodialysis calcium, phosphate and albumin levels should be performed with monthly blood testing. | To assess levels and monitor for phosphate levels outside of target range (above or below target limits), and avoid consequences of unrecognized hyper – or hypophosphatemia. |

## 5.0 Document Considerations

1. Document "Certification of Competence" for the patient in the permanent training record.
2. Document "Independent Hemodialysis Phosphate Addition Guideline" changes in Doctor's Orders sheet on the permanent hemodialysis record.
3. Process, as per other medication orders. Ensure the correct amount is recorded on the patient's Kardex and in the HD treatment field in PROMIS
4. Document patient's response to treatment as reported by the patient.
5. Document communications with nephrologist.
6. Notify equipment vendor of additives to concentrates, to allow for adjustment of machine conductivity limits, if required.

## 6.0 Special Considerations

In the treatment of patients with chronic hemodialysis, there is a tendency to retain phosphate, despite aggressive dietary counseling (and adherence). Control of hyperphosphatemia is important for a variety of reasons, including bone mineral disease and normalization of parathyroid gland activity. Additionally, it is being recognized that hyperphosphatemia, as well as some of the interventions used to control phosphate levels may contribute to the accelerated vascular disease which is prevalent amongst patients on dialysis.

With conventional (thrice weekly) hemodialysis, the weekly clearance of phosphate by the dialysis circuit is inadequate to a neutral phosphate balance. As such, measures that restrict the food choices (to minimize phosphate intake), and the use of phosphate binders (to bind with free phosphate in the GI tract to inhibit absorption) are often required.

With extended duration hemodialysis protocols, phosphate removal by the dialysis procedure may be significantly increased. In many patients, the degree of phosphate clearance is such that dietary restrictions and phosphate binding medications are reduced or eliminated. Despite these maneuvers, there remains the risk of phosphate depletion with these treatments, which can contribute to musculoskeletal symptoms (cramping, weakness), and potentially over time contribute to CKD-MBD syndrome. To avoid hypophosphatemia, supplemental phosphate may need to be considered for patients receiving nocturnal hemodialysis.

Oral supplementation with phosphate is challenging, and results in an unpredictable absorption of the phosphate. It may also be associated with side effects, including abdominal complains such as diarrhea. Intravenous supplementation is complicated, and can only be done in a supervised setting.

Given this, phosphate supplementation through the dialysate fluid (in the form of sodium phosphate enema aqueous solution) will be added in the setting of hypophosphatermia, defined as level >1.2 mmol/L pre-dialysis treatment, after the following conditions have been met:

1. Sequential discontinuation of phosphate binders
2. Nutritional counseling about options to enhance phosphate intake via liberalization of dietary choices
3. Documentation indicating that the liberalized diet has been attempted by patient.

The phosphate supplementation will be gradually titrated to achieve pre-dialysis phosphate targets. The recommended target range for phosphate level in extended duration protocol hemodialysis patients is as follows:

- Pre-dialysis: Phosphate levels 1.2-1.6 mmol/L

Once phosphate levels are within target range, monthly blood work monitoring (pre- dialysis) is recommended.

Post-dialysis phosphate measurements is not recommended as part of the routine laboratory parameters. A post-dialysis phosphate should be measured if there is clinical suspicion of significant and symptomatic hypophosphatemia 9I.e> unexplained muscle weakness, unexplained muscle injury ( rhabdomyolysis), or altered level of consciousness.

## 7.0 References


Daugirdas, J., Blake, P., & Ing, T., (Eds.). (2014) Handbook of Dialysis. Lippincott, Williams & Wilkins, NY.

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