Copland M, Komenda P, Weinhandl ED, McCullough PA, Morfin JA. Intensive Hemodialysis, Mineral and Bone Disorder, and Phosphate Binder Use. *American Journal of Kidney Diseases, Volume 68, Issue 5, S24 - S32.*

Intensive hemodialysis has reduced serum phosphorus and phosphate binder use

Mineral and bone disease is a common complication of kidney failure.[1] There is a significant gap between phosphorus absorption and clearance in conventional hemodialysis.[2,3] In 2015, over 36% of hemodialysis patients had serum phosphorus persistently above the target range.[4] Hyperphosphatemia is associated with higher risk of cardiovascular mortality and morbidity, but treating hyperphosphatemia with phosphate binders is burdensome to both patients and payers.[1,5,6,7]

Topics discussed in this summary include:

- Serum phosphorus
- Phosphate binder dose
- Phosphate binder discontinuation

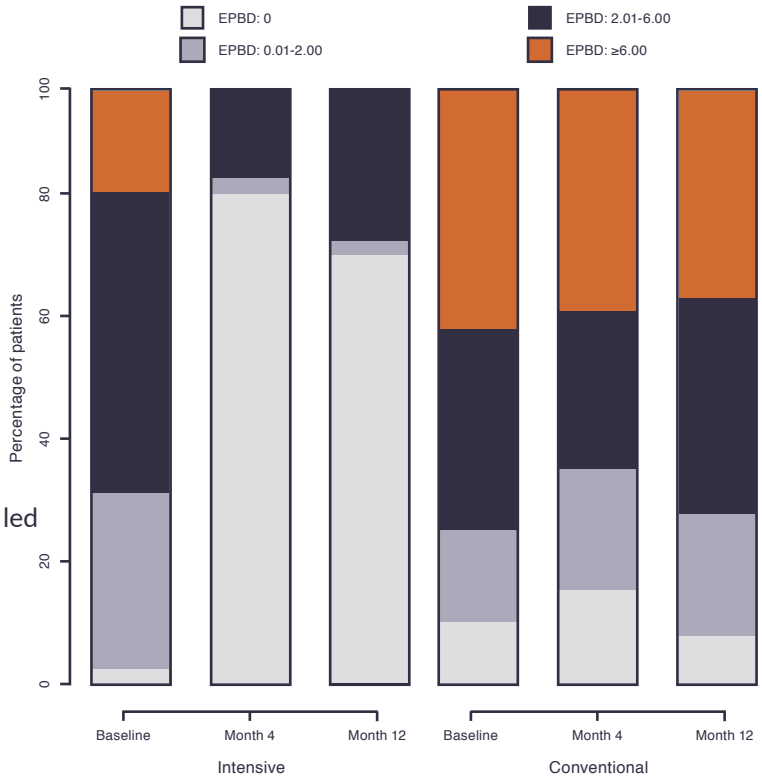
Trials show intensive hemodialysis reduced serum phosphorus and the need for phosphate binders

Multiple randomized clinical trials show that intensive hemodialysis reduced serum phosphorus:

- In the Frequent Hemodialysis Network trials, short daily and nocturnal schedules, each for six sessions per week, reduced serum phosphorus by 0.6 and 1.6 mg/dL, respectively, relative to three sessions per week.[8]
- A similar effect of nocturnal hemodialysis was observed in an earlier Canadian trial[9]
- In the Frequent Hemodialysis Network daily trial, intensive hemodialysis significantly lowered Estimated Phosphate Binder Dose (EPBD) per day.[8]
- In the Canadian nocturnal trial, intensive hemodialysis led to binder discontinuation in 73% of patients.[9]

CHAPTER 3, FIGURE 5:[10]

Distribution of equivalent phosphorus binding dose for intensive versus conventional hemodialysis in the Frequent Hemodialysis Network nocturnal trial.[8]



Conclusion

Intensive hemodialysis effectively lowers serum phosphorus and markedly reduces the use of phosphate binders. Frequent nocturnal hemodialysis may positively address hyperphosphatemia to the extent that supplementation with dialysate phosphorus may be necessary to avoid development of hypophosphatemia. The effect of intensive hemodialysis on phosphorus concentration suggests that the progression of vascular calcification may be slowed, thereby leading to cardiovascular risk reduction.

Reduction in the use of phosphate binders not only decreases pill burden, but also contains a rapidly growing source of health care costs in the dialysis patient population, an especially important consideration in the setting of capitated reimbursement.

All forms of hemodialysis, including treatments performed in-center and at home, involve some risks. In addition, there are certain risks unique to treatment in the home environment. Patients differ and not everyone will experience the reported benefits of more frequent hemodialysis.

Certain risks associated with hemodialysis treatment are increased when performing nocturnal therapy due to the length of treatment time and because therapy is performed while the patient and care partner are sleeping.

About this review

This summary is from a six-part series on intensive hemodialysis, covering the impact of intensive hemodialysis on cardiovascular disease, hypertension, mineral and bone disease, health-related quality of life, treatment tolerability, and potential risks. It was originally published as a supplement in the November 2016 issue of the *American Journal of Kidney Disease*.

For details, methodology, and full references for this summary—as well as the other topics in the series—visit **AdvancingDialysis.org**.

AdvancingDialysis.org is dedicated to providing clinicians and patients with better access to and more awareness of the reported clinical benefits and improved quality of life made possible with home dialysis, including more frequent, more intensive, and nocturnal therapy schedules.

AdvancingDialysis.org is a project of NxStage Medical, Inc.

References

[1]Moe SM, Drüeke T, Lameire N, Eknoyan G. Chronic kidney disease-mineral-bone disorder: a new paradigm. *Adv Chronic Kidney Dis.* 2007;14(1):3-12. doi:10.1053/j.ackd.2006.10.005.

[2]Noori N, Kalantar-Zadeh K, Kovesdy CP, et al. Dietary potassium intake and mortality in long-term hemodialysis patients. *Am J Kidney Dis.* 2010;56(2):338-347.

[3]Hou, S.H., Zhao, J., Ellman, C.F. et al, Calcium and phosphorus fluxes during hemodialysis with low calcium dialysate. *Am J Kidney Dis.* 1991;18:217-224. doi:10.1053/j.ackd.2006.10.005.

[4]The DOPPS Practice Monitor. http://www.dopps.org/DPM/. Accessed November 8, 2016.

[5]Tentori F, Blayney MJ, Albert JM, et al. Mortality risk for dialysis patients with different levels of serum calcium, phosphorus, and PTH: the Dialysis Outcomes and Practice Patterns Study (DOPPS). *Am J Kidney Dis.* 2008;52(3):519-530. doi:10.1053/j.ajkd.2008.03.020.

[6]Navaneethan, S.D., Palmer, S.C., Craig, J.C., Elder, G.J., Strippoli, G.F.M. Benefits and harms of phosphate binders in CKD: a systematic review of randomized controlled trials. *Am J Kidney Dis.* 2009;54:619–637. doi:10.1053/j.ajkd.2009.06.004.

[7]Sekercioglu, N., Busse, J.W., Mustafa, R.A., Guyatt, G.H., Thabane, L. Cinacalcet versus standard treatment for chronic kidney disease: a protocol for a systematic review and meta-analysis. *Syst Rev.* 2016;5:2. doi:10.1053/j.ackd.2006.10.005.

[8]Daugirdas, J.T., Chertow, G.M., Larive, B. et al, Effects of frequent hemodialysis on measures of CKD mineral and bone disorder. *J Am Soc Nephrol.* 2012;23:727–738. doi:10.1681/ASN.2011070688.

[9]Culleton, B.F., Walsh, M., Klarenbach, S.W. et al, Effect of frequent nocturnal hemodialysis vs conventional hemodialysis on left ventricular mass and quality of life: a randomized controlled trial. *JAMA*. 2007;298:1291–1299. doi:10.1001/jama.298.11.1291.

[10]Copland, M., Komenda, P., Weinhandl, E.D., McCullough, P.A., Morfin, J.A. Intensive hemodialysis, mineral and bone disorder, and phosphate binder use. *Am J Kidney Dis.* 2016;68:S24–S32. doi:10.1053/j.ajkd.2016.05.024