

1 Introduction

Hyperphosphatemia in patients with chronic kidney disease (CKD) on dialysis has been associated with poor patient outcomes and cardiovascular mortality.^{1,2} In addition to dietary modifications, most patients require phosphate binders, the only class of medication currently available to treat elevated phosphorus levels. Despite diet modification, use of phosphate binders, and adequate dialysis, consistently achieving target phosphorous levels can be challenging.

This study sought to understand the continuing education needs of clinicians related to managing hyperphosphatemia in patients with CKD on dialysis.

2 Methodology

The study was conducted using a survey instrument including 2 patient case vignettes provided prior to questions to assess clinical practice decisions of US clinicians in managing hyperphosphatemia in patients with CKD on dialysis.

The survey was distributed via email to 3,502 US-practicing clinicians; responses were obtained from 125 US-practicing nephrologists, 52 nephrology nurses, and 50 dietitians, representing a 6.5% response rate. Respondents who reported seeing fewer than 1 patient with CKD on dialysis per week and spending less than 4 hours per week seeing patients in an outpatient dialysis center were screened out.

3 Respondent demographics

	Nephrologists (n = 125)	Nephrology nurses (n = 52)	Dietitians* (n = 50)
Patients with CKD who are on dialysis seen in typical week (mean)	57 patients	53 patients	66 patients
Hours per week seeing patients in an outpatient dialysis center (mean)	14 hours	36 hours	27 hours
% academic affiliation	55%	37%	10%
Number of years in practice (mean)	19	14	18

*38% of dietitians certified in renal nutrition.

What type of dialysis facility do you work in?

Facility Type	Nephrologists	Nephrology nurses	Dietitians
Hospital-based center	25%	56%	68%
Dialysis organization (eg, DaVita, Fresenius)	6%	31%	13%
Independently owned dialysis facility	6%	13%	17%

What size dialysis facility do you work in?

Station Count	Nephrologists	Nephrology nurses	Dietitians
1 to 9 stations	6%	31%	46%
10 to 20 stations	46%	52%	49%
More than 20 stations	49%	17%	5%

Percentage of dialysis patients in each type of dialysis

Clinician Type	In-center hemodialysis	Home hemodialysis	Peritoneal dialysis	Other
Nephrologists	80%	15%	5%	1%
Nephrology nurses	66%	21%	11%	1%
Dietitians	81%	11%	6%	2%

4 Treatment goals

Goals of treating hyperphosphatemia in end-stage renal disease patients on dialysis

Goal	Nephrologists	Nephrology nurses	Dietitians
1. Prevent cardiovascular complications	92%	78%	78%
2. Prevent tissue calcification	46%	46%	46%
3. Reduce mortality	78%	78%	78%

Frequency of checking serum phosphate levels in dialysis patients

Frequency	Nephrologists	Nephrology nurses	Dietitians
Each dialysis session	0%	35%	6%
Weekly	2%	19%	14%
Monthly	92%	46%	78%
Other	5%	0%	2%

Upper limit of target phosphate range (mean)

5.3 mg/dL

5.0 mg/dL

5.2 mg/dL

Significance of factors in deciding to recommend an alternative to in-center hemodialysis to your patients with CKD

Factor	Mean Rating (1-5)
Safety and home environment	4.0
Reliability	4.0
Patient preference	4.2
Medical comorbidities	3.5
Control of hyperphosphatemia	2.5

Although clinicians see value in treating hyperphosphatemia—primarily to prevent cardiovascular complications and reduce mortality—they are significantly less likely to consider potential improvements in hyperphosphatemia than other factors when recommending a change in dialysis type.

5 Barriers to optimal patient management

Significance of barriers to optimally managing hyperphosphatemia in dialysis patients

Barrier	Mean Rating (1-5)
Lack of clear guidelines on how to manage	2.3
Uncertainty regarding long-term outcomes	2.9
Lack of second-line treatments for refractory hyperphosphatemia	3.2

Clinicians perceive the lack of second-line treatments for refractory hyperphosphatemia to be significant in optimally managing hyperphosphatemia in dialysis patients. Nurses perceive a lack of clear guidelines to be more of a barrier than dietitians and physicians.

6 Patient education and communication

Educational topics provided by clinicians to dialysis patients with hyperphosphatemia

Topic	Nephrologists	Nephrology nurses	Dietitians
Consequences of hyperphosphatemia	80%	75%	90%
Amount of phosphorus in different foods	90%	90%	82%
Use of phosphate binder according to phosphorus ingestion at meals	78%	67%	86%
Avoidance of processed foods	82%	83%	94%
Advice regarding adherence	72%	65%	68%
Mechanism of action of phosphate lowering medications	48%	42%	56%
Absorption and metabolism of phosphate	29%	46%	38%
Hidden phosphate additives on food labels	72%	73%	90%
Types of proteins to avoid	31%	46%	26%
Bioavailability and absorbability of phosphorus sources	43%	46%	60%

Most clinicians are educating patients on many topics related to taking a phosphorous binder and dietary aspects related to amount of phosphorous and avoidance of specific foods.

7 Treatment guidelines

Clinical practice guidelines referred to in managing dialysis patients with hyperphosphatemia

Guideline	Nephrologists	Nephrology nurses	Dietitians
Kidney Disease: Improving Global Outcomes (KDIGO)	90%	42%	66%
National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI)	54%	73%	84%
Centers for Medicare & Medicaid Services	19%	44%	36%
International Society of Nephrology	15%	35%	10%
International Society of Renal Nutrition and Metabolism	3%	29%	12%
Renal Dietitians Practice Group	7%	19%	58%
Guidelines developed by my center or organization	22%	46%	50%

Nephrologists are most likely to refer to KDIGO guidelines, while nephrology nurses and dietitians are most likely to refer to KDOQI guidelines. Physicians are less likely than other clinicians to refer to Centers for Medicare & Medicaid Services (CMS) guidelines and guidelines from their organization.

8 CE/CME preferences

Likelihood in a typical year (not impacted by COVID-19) to engage in formats to receive CME/CE

Format	Mean Rating (1-5)
Local meetings (within 1 hour of your practice)	3.1
National or international conferences	2.9
Print monographs and newsletters	3.0
Online CME	3.2

"When I consider participating in CME/CE programs for managing patients on dialysis, I most prefer..."

Format	Nephrologists	Nephrology nurses	Dietitians
Learning on my own	72%	28%	46%
Small groups (less than 50)	46%	50%	100%
Large groups (more than 50)	86%	14%	23%
An interactive or case-based format	60%	40%	56%
A didactic lecture format	30%	44%	70%

Topics related to hyperphosphatemia in patients on dialysis that are of most interest for future CME/CE activities:

1. New/emerging treatments
2. Dietary counseling
3. Clinical outcomes/Does treatment improve outcomes?

9 Conclusions and implications

Control of phosphate levels in patients with CKD on dialysis requires specific knowledge and tailoring individual recommendations and management strategies to the individual patient. Moreover, it typically requires a combination of pharmacologic treatment, dietary therapy, and close monitoring, thereby requiring multidisciplinary management. This study identifies differences in practice patterns between clinician types, areas of education need, and learning preferences that can inform future educational programs for dialysis teams.

Future education should include updates on clinical data relating to hyperphosphatemia treatments and updates on guidelines that address hyperphosphatemia managements. As non-physicians are heavily involved in patient education and certain other aspects of hyperphosphatemia management, educational programs should aim to ensure that clinicians have up-to-date knowledge about treatment options and approaches for this patient population.

Finally, as CMS continues to recommend alternatives to in-center hemodialysis, how this shift influences the optimal treatment of hyperphosphatemia must be considered.