Comparison of the Nutritional Markers of a Home Hemodialysis Population to KDOQI and Traditional Guidelines for Maintenance Hemodialysis

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Key Words: home hemodialysis, KDOQI, nutritional markers, dialysis, nocturnal dialysis, daily hemodialysis

Abstract
The purpose of this study was to describe the nutritional status of home hemodialysis (HHD) patients who dialyze more frequently, and compare the results to traditional nutrition guidelines for maintenance hemodialysis (MHD). This prospective, descriptive study included 28 HHD patients who dialyzed > 20 hours/week. Anthropometrics, serum blood values and dietary intakes were collected and compared to recommendations for MHD from the Kidney Disease Outcome Quality Initiative (KDOQI) published national guidelines and research. The majority of patients were well-nourished with subjective global assessment (SGA) scores ≥ 6. Two-thirds of patients had normal serum albumin (Alb) and over half had a body mass index (BMI) ≥ 23.6. All subjects had elevated serum urea (Ur); however, 67.9% remained below MHD acceptable levels. Although half of the subjects consumed > 3000 mg sodium and the majority had fluid intakes > 1 liter daily, only 11.1% had elevated total body water. One quarter of subjects had

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FROM THE EDITOR

Clarina Kennedy, RD
Editor

I hope you are all enjoying the Spring season so far! Our team has once again put together a Forum filled with valuable resources and continuing education opportunities; this issue of the Forum brings you 3.0 CPEUs. Our feature article offers a new perspective on a somewhat less common form of renal replacement therapy—home hemodialysis. In “Comparison of the Nutritional Markers of a Home Hemodialysis Population to Kidney Disease Outcome Quality Initiative (KDOQI) and Traditional Guidelines for Maintenance Hemodialysis”, Karla Dawdy, HBSc, RD, et al. study whether or not following traditional nutrition guidelines like KDOQI are appropriate in the nutrition management of this patient population.

To keep you current on phosphate binding options, a must-read is “Association of Niacin on Phosphate Control in Advanced-Stage Chronic Kidney Disease Patients within a VA Population”. The authors study the efficacy of using niacin to treat hyperphosphatemia in patients with advanced stages of CKD.

In our advances in practice article “A Multidisciplinary and Peer Mentor Approach to Educating CKD Patients Along the Continuum,” Terrie Holewinski, MS, RD, Therese Adamowski, MSN, RD and Karen Crampton, MSW, break down the format of the CKD education classes they created to empower kidney patients.

Be sure to check out our new app (Wholesome) highlighted this month. Wholesome stores healthy recipes and provides users with nutritional information. Lastly, don’t miss a chance to read up on our review of recently published articles and our up-to-date calendar of events. There are many ways to advance your knowledge through networking opportunities and continuing education events.

I still can’t believe that this issue brings my tenure as Forum Editor to a close. It has been such a rewarding experience. I am so grateful to the RPG Executive Committee for the opportunity.

I’d like to close this Forum by saying thank you to my co-editor Julie Colvin, MBA, RD, CDN and assistant editors Desiree de Waal, MS, RD, CD, FAND and Hannah Sobol, RDN, CSR, with an extra thanks to Stacey Phillips, MS, RD, managing editor, who has been an extraordinary leader during my journey on this team. And of course, as always, thanks also to our insightful peer reviewers and our test question writer, Amy Hess-Fischl, MS, RD, LDN, BC-ADM, CDE.

Thank You

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 FEATURE ARTICLE

potassium intakes above recommendations but none exceeded serum potassium (K+) laboratory targets. Over half of subjects had phosphorus intakes above recommendations with only 7.1% exceeding serum phosphate (PO4) targets. Traditional nutrition guidelines such as KDOQI may not be applicable to HHD patients. Further research is needed to develop evidence-based nutrition guidelines for the HHD population using a larger sample size.

Introduction

Maintenance hemodialysis (MHD) is presently the most common form of renal replacement therapy (RRT) for end stage renal disease (ESRD) (1). Dietary guidelines were originally developed for this population and included recommendations for protein, potassium, phosphorus, sodium, fluid intake, and monthly serum blood work targets for urea, potassium and phosphate (2-10). Currently there is a movement towards more patients performing home hemodialysis (HHD) because of the benefits of increased frequency of dialysis including improved quality of life, fertility, mineral metabolism, reduced health care costs and overall survival (1,11). However, no formalized nutritional guidelines have been established for the HHD population. Clinicians currently rely on traditional guidelines such as KDOQI and evidenced-based practice to direct the care of patients who have more frequent and extended periods of dialysis.

HHD patients at University Health Network (UHN) are often advised to liberalize their intake once dialysis frequency has been increased. Minimal research has documented the dietary intake of HHD patients in relation to nutritional status and clinical outcomes. Since HHD patients typically dialyze more frequently, they have superior waste clearance relative to MHD patients and may have different nutritional requirements. This study describes the nutritional status of a small population of HHD patients and compares outcomes to traditional guidelines for MHD.

Methods

This prospective, descriptive study included HHD patients ≥ 18 years of age and dialyzing ≥ 20 hours/week. Data was collected between January 2009 and September 2010. Subjects were excluded if they were pregnant or breastfeeding, had an active malignancy, had been hospitalized within 30 days or were receiving total parenteral nutrition (TPN). Patients were recruited by a Registered Dietitian (RD) or dietetic intern, via telephone or in person at their HHD clinic. Written informed consent was obtained from all study participants and ethics approval was obtained through the UHN ethics review board. Demographic data including age, sex, weekly hours of dialysis and weights were obtained from medical charts. Actual weights were obtained on the day of clinic appointments for bioelectrical impedance analysis (BIA). Patients directly reported weekly hours of dialysis if it was less than the prescription ordered.

Protein and nutritional status was assessed using body mass index (BMI), subjective global assessment (SGA), serum albumin (Alb) and pre-dialysis urea (Ur). BMI results were categorized in a combination of Canadian guidelines for body weight classification and MHD recommendations with an ideal BMI approximately 23.6 and 24.0 kg/m² for men and women respectively (2,12). SGA was performed using the 7-point scale developed by the Canada-USA (CANUSA) Peritoneal Dialysis Study group and validated within the hemodialysis population (13-16). On the 7-point SGA scale, scores of one to two represent a severely malnourished patient; three to five, mild to moderately malnourished; and six to seven, well-nourished.

Dietary intake data from at least two complete days was obtained through 24-hour recalls or food records and compared to a range of recommendations for MHD from KDOQI, published national guidelines, and research (2-5). A food record was excluded if data appeared incomplete. Dietary intake was analyzed using ESHA Food Processor Nutrition Analysis Software and Database version 10.9 (ESHA Research, Salem, OR). Fluid status was measured using BIA and UF. BIA was completed using the Hydra 4200 device (XiTron Technologies, San Diego, CA). Actual weights were used for BIA testing. Normal ranges for mean body cell mass (BCM), intracellular fluid (ICF), extracellular fluid (ECF) and total body water (TBW) (dependent on sex, age and height) were obtained for each patient from the Cyprus 2.0 database (RJL Systems, Clinton, MI) and utilized for comparison. The post-dialysis dry weights collected from patient charts were used for all other calculations.

Pre-dialysis serum K+ and PO4, Ur and Alb were collected from patient charts for comparison with laboratory targets for MHD (3-10) and with normal targets for the general population using UHN laboratory reference ranges from monthly blood work records (17).

Statistical Analysis

All variables were analyzed using descriptive statistics. Means and standard deviations are reported. Statistical analysis was performed using SPSS version 23 2016 (SPSS Inc., Chicago, IL).

Results

Demographics

Patient characteristics are shown in Table 1. Twenty-eight patients were included in the study with 20 males and 8 females with a mean age of 45.6 ± 13.7 years. Subjects had been dialyzing for 4.7 ± 3.6 years in the HHD program with an ESRD vintage of ≥ 5 years in 53.6%. The main cause of ESRD was glomerulonephritis in 35.7% of subjects and 39.3% had received at least one kidney transplant. The mean hours of dialysis participants received was 32.5 ± 6.9 hours per week. Binders were prescribed to 10.7% of subjects with 35.7% receiving a phosphate additive to maintain serum PO4 during hemodialysis.

Nutritional Status and Anthropometrics

Based on SGA results, 89.3% of patients were considered well-nourished with a SGA score ≥ 6 and the remaining were mildly malnourished with a SGA score of 5 (Figure 1). The mean serum Alb was 40.1 ± 4.0, while 57.1% had an Alb ≥ 40 mmol/L and 67.9% were within or above the normal range for Alb (Table 2). Only 3.6% were underweight with a BMI less than 18.5 and BMI was ≥ 23.6 in 57.1% of patients (Figure 2). Serum Ur had a mean value of 13.0 ± 4.3 mmol/L with 67.9% below MHD targets.
for Ur and 100% above the normal range for Ur levels (Table 2). BIA results are found in Table 3 with BCM within or above normal reference ranges in 77.7% and TBW was below or within the normal range in 88.9% of subjects. The ICF was below or within range in 92.5% of participants and the ECF was below or within range in 77.8%.

**Dietary Intakes**

The mean daily intake and nutritional results compared to recommendations for MHD are found in Table 4. Based on food records and diet history patients consumed 30.6 ± 11.9 kcal/kg with 57.1% below recommendations for energy. Protein intake was 1.3 ± 0.5 g/kg with 50% of patients meeting or exceeding protein recommendations. Participants consumed 2701 ± 734 mg of potassium daily and 25% of participants exceeded restrictions based on the 2000 to 3000 mg guideline and 46.4% using the 39 mg/kg recommendation. The intake of phosphorus was 1380 ± 442 mg and was greater than 1000 mg per day in 67.9% of patients. Fluid intake was 1969 ± 728 ml, with 89.3% of subjects consuming more than 1.0 L of fluid per day. Sodium intake was 3222 ± 1059 mg and guidelines were exceeded by 46.4% of participants.

**Other Clinical Measures**

Mean laboratory results and the comparison of serum values to MHD and normal serum ranges are found in Table 2. The mean serum K+ value was 4.5 ± 0.5 mmol/L. None of the subjects exceeded potassium targets for MHD and 14.3% exceeded normal serum K+ ranges. Participants had a mean phosphate value of 1.2 ± 0.4 mmol/L with 7.1% above serum phosphate targets for MHD and 35.7% above normal ranges for phosphate.

**Discussion**

This study sample was reflective of the typical HHD population for male gender and mean age (18). Based on previous studies on patients receiving more frequent dialysis, the mean protein of 1.3 g/kg and caloric intake of 30.6 kcal/kg was comparable to the literature (19-25).

The majority of patients dialyzed nocturnally with a K+ bath of 2.0 mmol/L and Calcium bath 1.5 mmol/L on the Bellco dialysis system. On average, dialysate and blood flow rates of 300 ml/min were targeted. Mean weekly hours of dialysis were approximately three times that of a typical MHD patient. Nutritional parameters suggest a well-nourished population except serum urea. Typically a higher serum urea in MHD patients indicates a higher protein intake. The urea values are likely a result of increased waste clearance and not related to malnutrition. Therefore, a lower clinical target range for serum urea may be more appropriate for HHD.

A combination of nutritional guidelines was used to establish MHD targets for clinical labs and nutritional status. The background and collection of data for the study was completed between 2008 and 2010 when these guidelines were still prevalent. Although some guidelines were older, these are still targets taken into consideration within practice for patients within Canadian institutions.

It was expected that dietary intake would significantly exceed guidelines while serum values were maintained within normal levels for these patients. However, approximately 50% of subjects...
had energy and protein intakes below recommendations for MHD. Since the majority of patients were well-nourished with higher BMI and SGA scores, it is suspected that they underreported their intakes, which is reflective of 24-hour recall and food record results in the literature (26-27). This may have also impacted the results for the daily intake of electrolytes and fluid or whether participants exceeded restrictions.

Patients who belong to HHD programs have reported an improved quality of life, sleeping patterns and exercise tolerance as part of the benefits of the increased frequency of dialysis and the convenience of a home modality (11). They also can be considered a younger population with a mean age of 45 years in this sample. Energy expenditure and protein requirements may differ based on their lifestyle and physical activity compared to MHD patients.

A large proportion of subjects reported intakes exceeding the recommendations for fluid intake at 89.3%, while 71.4% had UF > 2.0 L/dialysis and almost half surpassed sodium guidelines. However, the majority of patients remained euvolemic based on BIA results. This suggests HHD patients may not require standard sodium and fluid restrictions. However, a limitation was the availability of recent 24-hour urine collections to determine accurate urine outputs for fluid recommendations. Therefore, all participants were treated as anuric within the study.

Although one quarter of patients exceeded 3000 mg of potassium daily, 46.4% exceeded potassium restrictions using the 39 mg/kg guideline, 67.9% exceeded phosphorus recommendations and 35.7% of participants required phosphate additive during dialysis. Nearly all patients had normal serum potassium and phosphate levels. One consideration, is over half of subjects in the study had an ESRD vintage for ≥ 5 years. Although patients are advised to liberalize their diets, some may continue to follow restrictions out of habit, previous counseling and/or fear of hyperkalemia (28). In addition, entire medication lists were not collected and any medications that may impact serum levels were not identified which is a limitation for the study. The results suggest rigorous restriction of potassium and phosphorus may not be necessary, but exact recommendations remain unclear.

The weekly hours of dialysis were self-reported and based on their prescription. Patients with higher serum K or PO4 levels or requiring binders may have completed fewer dialysis hours than prescribed rather than requiring diet restrictions. Furthermore, since the exact intradialytic and interdialytic times were not recorded, calculations such as protein catabolic rate (PCR) and Kt/Vurea were not completed. Monthly blood work was taken on the longest period during the week between dialysis sessions. When patients do not dialyze for two days or longer, this may contribute to higher serum levels. The serum levels may be lower if collected on alternate days during their regular dialysis regimens. This may indicate patients may require counseling for dietary restrictions during days off or interruption in dialysis schedules.

Collaboration with existing programs with patients dialyzing for longer periods is fundamental to advancing the nutrition practice for this unique population and the development of evidence-based guidelines.

### Table 2. Comparison of serum values to hemodialysis and normal range targets

<table>
<thead>
<tr>
<th>Serum Blood Value and Range</th>
<th>Mean Value</th>
<th>Below normal (%)</th>
<th>Within normal (%)</th>
<th>Above normal (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HD Targets for Serum Values (n = 28)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HD Serum Potassium (3.5 - 5.5 mmol/L)</td>
<td>4.5 ± 0.5</td>
<td>0 (0)</td>
<td>28 (100)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>HD Serum Phosphorus (1.13 - 1.78 mmol/L)</td>
<td>1.2 ± 0.4</td>
<td>2 (7.1)</td>
<td>24 (85.7)</td>
<td>2 (7.1)</td>
</tr>
<tr>
<td>HD Serum Urea (15 - 30 mmol/L)</td>
<td>13.0 ± 4.3</td>
<td>19 (67.9)</td>
<td>9 (32.1)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>HD Serum Albumin (40-50 g/L)</td>
<td>40.1 ± 4.0</td>
<td>12 (42.8)</td>
<td>4 (14.3)</td>
<td>12 (42.8)</td>
</tr>
<tr>
<td><strong>Normal Range Serum Values (n = 28)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal Range Serum Potassium (3.2 - 5.0 mmol/L)</td>
<td>4.5 ± 0.5</td>
<td>0 (0)</td>
<td>24 (85.7)</td>
<td>4 (14.3)</td>
</tr>
<tr>
<td>Normal Range Serum Phosphorus (0.8 - 1.4 mmol/L)</td>
<td>1.2 ± 0.4</td>
<td>2 (7.1)</td>
<td>16 (57.1)</td>
<td>10 (35.7)</td>
</tr>
<tr>
<td>Normal Range Serum Urea (3.0 - 7.0 mmol/L)</td>
<td>13.0 ± 4.3</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>28 (100)</td>
</tr>
<tr>
<td>Normal Range Serum Albumin (38 - 50 g/L)</td>
<td>40.1 ± 4.0</td>
<td>9 (32.1)</td>
<td>19 (67.9)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

### Table 3. Comparison of bioelectrical impedance analysis to normal ranges (n = 27)

<table>
<thead>
<tr>
<th>BIA measure</th>
<th>Below normal (%)</th>
<th>Within normal (%)</th>
<th>Above normal (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Cell Mass (kg)</td>
<td>6 (22.2)</td>
<td>9 (33.3)</td>
<td>12 (44.4)</td>
</tr>
<tr>
<td>Total Body Water (L)</td>
<td>9 (33.3)</td>
<td>15 (55.6)</td>
<td>3 (11.1)</td>
</tr>
<tr>
<td>Intracellular Fluid (L)</td>
<td>13 (48.1)</td>
<td>12 (44.4)</td>
<td>2 (7.4)</td>
</tr>
<tr>
<td>Extracellular Fluid (L)</td>
<td>2 (7.4)</td>
<td>19 (70.4)</td>
<td>6 (22.2)</td>
</tr>
</tbody>
</table>
Until more formalized guidelines are published, the traditional guidelines for MHD remain the foundation for recommendations. It is essential to monitor clinical labs, adjust nutrition care plans and liberalize diets with HHD patients on a regular basis to promote optimal serum levels and nutritional status.

Table 4. Comparison of dietary intake to traditional guidelines

<table>
<thead>
<tr>
<th>Guideline</th>
<th>Mean Value</th>
<th>Below normal (%)</th>
<th>Within normal (%)</th>
<th>Above normal (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (30-35 kcal/day)</td>
<td>30.6 ± 11.9</td>
<td>16 (57.1)</td>
<td>2 (7.1)</td>
<td>10 (35.7)</td>
</tr>
<tr>
<td>Protein (1.1-1.2g/day)</td>
<td>1.30 ± 0.5</td>
<td>14 (50.0)</td>
<td>2 (7.1)</td>
<td>12 (42.9)</td>
</tr>
<tr>
<td>Potassium (2000-3000mg)</td>
<td>2701 ± 734</td>
<td>6 (21.4)</td>
<td>15 (53.6)</td>
<td>7 (25.0)</td>
</tr>
<tr>
<td>Phosphorus (800-1000mg/day)</td>
<td>1380 ± 442</td>
<td>0 (0)</td>
<td>9 (32.1)</td>
<td>19 (67.9)</td>
</tr>
<tr>
<td>Sodium (2000-3000mg/day)</td>
<td>3222 ± 1059</td>
<td>2 (7.1)</td>
<td>13 (46.4)</td>
<td>13 (46.4)</td>
</tr>
<tr>
<td>Fluid (1000ml + urine output/day)</td>
<td>1969 ± 728</td>
<td>3 (10.7)</td>
<td>0 (0)</td>
<td>25 (89.3)</td>
</tr>
</tbody>
</table>

Conclusion

Traditional dietary and nutritional guidelines such as KDOQI may not be applicable to HHD patients. Further research is needed to develop evidence-based guidelines for the HHD population using a larger sample size.

Acknowledgments

We would like to give a special acknowledgement to our home hemodialysis patients, especially the ones who participated in the study. They often work full-time, are caregivers for others and still find the time to contribute to multiple research studies that are ongoing at UHN. Their eagerness and support to improve their care inspires us regularly to advance the practice for this unique population.

References


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**APP REVIEW**

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**Wholesome App**

Reviewed by: Mariana Carranza  
SFSU Dietetic Intern  
Email: carranzam90@gmail.com

**Rating:** 3.5 Stars ★★★★

**Compatibility:** Compatible with iPhone, iPad, and iPod touch requires iOS 8.0 or greater  
http://www.wholesomeapp.com/  
Available for Android through Google Play

**Languages:** English, French, and Portuguese

**Synopsis**

The Wholesome app stores healthy recipes in one place and provides users with their nutritional information. The app also allows users to track their daily intake using a food tracker that includes pictures.

**Pros**

- Can add foods to daily food tracker through the search button or through colors and pictures, making it easy to use.
- Once users find the food they seek, they can select specifications (i.e. whole wheat or corn tortilla).
- Provides detailed nutritional information including macro and micronutrients, making it easier for individuals to track their intake of nutrients including phosphorus and potassium.
- Nutrient goals may be modified in the settings, which helps individuals on restricted or specialized diets to adhere to their regimens.
- Users are able to add foods that are currently not in the database.
- Provides a report with nutrient averages- nutritional information in the past week or in the last two weeks.

**Cons**

- Within the food diary, users are unable to separate one meal from another making times of meals confusing.
- When entering amounts of food eaten, many are only available through weight, making it challenging for users to know exact amounts.

**Bottom Line**

Wholesome is a very useful app for people who are trying to track the nutrients they are consuming and who are willing to spend time each day to enter their intake. However, the user must be “tech-savvy” to modify target goals. In addition, entering foods would be much easier for many users through volume measurements including teaspoons and cups rather than ounces and grams.
Association of Niacin on Phosphate Control in Advanced-Stage Chronic Kidney Disease Patients within a VA Population

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Key Words: Niacin, Chronic Kidney Disease, Hyperphosphatemia

Abstract

Current options for lowering phosphate levels have many limitations. A novel approach for treating hyperphosphatemia is the use of niacin therapy, which has been shown to decrease serum phosphorus by inhibiting type IIb sodium-phosphate cotransporter in the gastrointestinal tract. The primary objective of this study was to compare phosphorus control in patients with advanced stages of CKD who received or did not receive niacin.

Male patients aged 18 years or older at the Edward Hines, Jr. VA Hospital with CKD stage 4 or 5 or ESRD between January 1, 2011 to December 31, 2014 who were actively followed within the Hines VA renal clinic and had at least three phosphorus levels within six months were included in the study. The primary endpoint was median phosphorus control between patients receiving or not receiving niacin with pill burden from phosphate binders being the secondary endpoint.

Niacin therapy was associated with a clinically and statistically significant difference in phosphate level. There was a trend suggesting niacin may reduce the pill burden of phosphate binders, however this was not statistically significant. In light of these results, further examination with longer data collection windows or with different VA facilities is being considered.

Introduction

Hyperphosphatemia is highly prevalent in CKD and has been reported to occur in up to 25% of patients with CKD stage 4 and 50% of patients with CKD stage 5 (1,2). As kidney function declines, phosphorus excretion and vitamin D activation are reduced. This decreases calcium absorption from the gastrointestinal (GI) tract and disturbs the balance of calcium and phosphorus (3). In response, the parathyroid glands release parathyroid hormone (PTH). The actions of PTH include the following: increasing calcium resorption from the bone, increasing calcium reabsorption and decreasing phosphorus reabsorption from the proximal tubules in the kidneys, and stimulating the activation of vitamin D to calcitriol. Calcitriol promotes calcium absorption in the GI tract, increases calcium mobilization from bone, and decreases PTH levels through negative feedback. The net result is elevated serum calcium and reduced phosphorus levels. However, as kidney function continues to decline to CKD stage 3 and beyond, the regulatory processes, such as phosphorus excretion and vitamin D activation, do as well. Increased serum phosphorus binds to calcium, which, at high enough levels, can cause vascular calcification. These changes, if left untreated, have been shown to lead to secondary hyperparathyroidism, tissue calcification, and higher cardiovascular (CV) mortality (4,5). It has been reported that the risk of CV mortality can increase up to 18% with every 1 mg/dL increase in serum phosphorus above the normal range of 2.5-4.5 mg/dL in healthy adults (6).

Current options for lowering phosphate levels have many limitations. First, not every patient with CKD requires dialysis, and dialysis is insufficient on its own to maintain serum phosphorus levels (4). Second, rigid dietary restriction of phosphorus is often not feasible given that the phosphate content in food can be difficult to determine, and many phosphate additives are highly bioavailable. Additionally, many foods that contain a high content of phosphorus are also rich in protein. Although protein restriction is recommended for individuals with non-dialysis CKD in order to delay progression of kidney disease, protein needs for those with dialysis-dependent CKD stage 5 are increased. As a result, a potential risk of dietary phosphate restriction is malnutrition (4,7). Third, the main pharmacological treatment option is phosphate binders, which bind to ingested phosphate in the GI tract. This results in decreased phosphate absorption through the formation of insoluble complexes that are excreted in the feces. Due to this mechanism of action, typical dosing involves multiple tablets taken with each meal and snack throughout the day. Phosphate binders are often associated with GI side effects and a large pill burden (3). In one study, the median daily pill burden was 19 in chronic dialysis patients (8). The daily pill burden exceeded 10 in 91% of subjects, was more than 20 in 47% of subjects, and surpassed 30 in 17% of subjects. This study concluded that phosphate binders are the largest...
contributors to pill burden, accounting for approximately 50% of total medications. In addition, it found that this high pill burden was associated with significantly lower adherence and higher phosphorus levels. Adherence to phosphate binders can also be adversely affected by the requirement for dosing with meals and the cost of non-calcium containing binders. Although calcium-containing binders currently provide a more cost-effective alternative and are generally used as first-line agents, they impose the risk for high calcium load, which could contribute to vascular calcification and premature morbidity or mortality (2,7).

A novel approach for treating hyperphosphatemia in CKD is the use of niacin therapy. Niacin, a water-soluble vitamin, is bioconverted to nicotinamide adenine dinucleotide (NAD+) and the hydride equivalent (NADH) which are coenzymes necessary for tissue metabolism, lipid metabolism, and glycogenolysis (9). Approximately 50% of the net phosphate absorption occurs in the duodenum and jejunum through active transport involving type IIb sodium-phosphate cotransporters. Animal studies have shown that nicotinamide inhibits the expression of these transporters, which decreases phosphate absorption and prevents the progressive increase in phosphate levels associated with renal failure (4,6,10). According to the package insert, Niaspan® (extended release niacin) has been associated with small but statistically significant reductions in phosphorus levels (mean of -13% with 2000 mg daily) (11). Niacin is typically administered once or twice daily without regards to meals because it does not work by merely trapping food-bound phosphorus in the gut. Consequently, it offers a more convenient and flexible dosing regimen, which may increase patient adherence (4,6). Another potential benefit of niacin therapy is the availability of generic formulations, which provides a cost savings benefit compared to the cost of non-calcium containing binders. Although calcium-containing binders may increase adherence to phosphate binders. The primary purpose of this study was to analyze phosphorus control in patients treated with niacin for any indication in a VA setting with advanced stages of CKD. According to the package insert, Niaspan® (extended release niacin) has been associated with small but statistically significant reductions in phosphorus levels (mean of -13% with 2000 mg daily) (11). Niacin is typically administered once or twice daily without regards to meals because it does not work by merely trapping food-bound phosphorus in the gut. Consequently, it offers a more convenient and flexible dosing regimen, which may increase patient adherence (4,6). Another potential benefit of niacin therapy is the availability of generic formulations, which provides a cost savings benefit compared to the cost of non-calcium based binders and newer iron-based phosphate binders. Previous studies have demonstrated the effectiveness of immediate-release niacin in lowering serum levels of phosphorus. For instance, one study by Ahmadi and colleagues compared the efficacy of niacin with sevelamer in patients receiving hemodialysis (5). Forty patients with serum phosphorus levels greater than 6 mg/dL underwent a two week wash-out period and then were randomly assigned to either sevelamer (1600 mg in the morning and 1600 mg in the evening) or niacin IR (300 mg in the morning and 200 mg in the evening). After four weeks of treatment, the mean serum level of phosphorus was significantly reduced in both groups. Sevelamer reduced phosphorus from 6.9+/−1.05 mg/dL to 4.7+/−1.1 mg/dL (p < 0.0001) while niacin reduced phosphorus from 7.3+/−1.19 mg/dL to 5.6+/−1.6 mg/dL (p < 0.01). The serum calcium level remained unchanged in both treatment arms. In addition, an eight-week, double-blind, placebo-controlled, randomized clinical trial by Shabbazian, et al. demonstrated a statistically significant reduction in phosphorus with nicotinamide (also known as niacinamide) treatment (12). Forty-eight participants were randomly assigned to either a placebo or nicotinamide, which was given as 500 mg per day for the first four weeks and then 1000 mg per day for the second four weeks. Phosphorus levels significantly decreased from 5.9+/−0.58 mg/dL to 4.77+/−1.43 mg/dL (p < 0.01) after four weeks and then to 4.66+/−1.06 mg/dL (p < 0.001) after eight weeks of nicotinamide treatment. The authors from this study concluded that the effects of nicotinamide can be seen with even low doses if the duration is adequate.

Extended release niacin has also been shown to be effective in reducing serum levels of phosphorus. For example, a prospective study by Muller and colleagues analyzed the effects of prolonged-release niacin in dialysis patients (13). After a two-week washout period, participants were given 375 mg of Niaspan® daily. The dosage was increased every two weeks to 500, 1000, 1500, and 2000 mg daily. After twelve weeks of treatment, phosphate levels were significantly reduced from 7.2+/−0.5 to 5.9+/−0.6 mg/dL (p=0.015). The onset of effect was relatively rapid and seen within 14 days of treatment, presumably due to niacin’s mechanism of action on intestinal cotransporters and possible renal accumulation. Niacin had no effect on calcium levels, but it did increase HDL cholesterol from 40+/−3.2 to 59+/−5.5 mg/dL (p=0.0005). Additionally, a post hoc analysis of a double-blind, randomized, placebo-controlled trial by MacCubbin et al showed that niacin use for 24 weeks resulted in an approximately 11% sustained reduction in serum phosphorus and a 12% reduction in calcium-phosphorus product, which supports the use of niacin in reducing the risk for vascular calcification (14). In patients with an eGFR less than 60 mL/min/1.73m², baseline serum phosphorus (3.41+/−0.49 mg/dL) changed by -0.38 mg/dL (95%CI -0.47 to -0.29) with extended release niacin. In contrast, baseline serum phosphorus (3.46+/−0.45 mg/dL) increased by 0.03 mg/dL (95%CI -0.09 to -0.15) with a placebo.

### Objective

Based on review of the literature, there is evidence supporting the use of niacin in hyperphosphatemia treatment as either monotherapy or as an additive agent to reduce the load of phosphate binders. The primary purpose of this study was to analyze phosphorus control in patients treated with niacin for any indication in a VA setting with advanced stages of CKD.

### Methods

This study was a retrospective chart review of patients at the Edward Hines, Jr. VA Hospital with CKD stage 4 or 5 or ESRD between January 1, 2011 to December 31, 2014. Eligible patients for screening were identified via a fileman search of patients using ICD codes and medication orders for niacin (controlled-released nicotinic acid).
Inclusion criteria for the study included male patients 18 years of age or older, with a diagnosis of CKD stage 4 or 5, who have been followed actively within the renal clinic at Hines and have at least three phosphorus levels within a six month time period. Exclusion criteria included patients who have been using niacin in the treatment group for less than six months in general, or who have experienced either initiation or discontinuation of dialysis treatment during the time frame of data collection. Patients newly consulted to see a renal dietitian were also excluded to avoid confounding of phosphorus control from dietary modifications, but patients that were actively following with a renal dietitian were included. Patients were further excluded if they had been admitted to the hospital or extended care center within the six month time frame.

The primary outcome was phosphorus control, which was reflected as each subject’s average serum phosphorus level over the course of six months. This was used to calculate the median phosphorus level within each treatment group, which was then compared using the paired t-test. The pill burden from phosphate binders was also compared as a secondary endpoint. Sub-group analyses looked at differences in patient outcomes in: those with diabetes, those with concurrent aspirin use, those who had received a consult from the renal dietitian concerning dietary phosphorus restriction before the time frame of data collection, and those who were adherent with niacin therapy. Adherence was measured using the medication possession ratio (MPR), which divides the days’ supply of medication dispensed during a specified follow-up period by the number of days from the first dispensing to the end of the follow up period (15). A subject was considered adherent if greater than 80% of the expected number of pills were taken. Additionally, in subjects whose niacin therapy was started within the data collection period, a change in serum phosphorus was analyzed by recording a phosphorus level within each treatment group, which was then compared using the Friedman test for rank data was used. For the categorical data, the McNemar test was applied, unless there were less than five observations and then the Wilcoxon signed rank sum test was utilized. For the categorical data, the McNemar test was applied, unless there were less than five observations and then the Friedman test for rank data was used.

Data collection targeted the most recent six month time period that did not meet any of the exclusion criteria. It included demographics (age, race), CKD diagnosis, etiology of kidney impairment, duration of dialysis if applicable, average SCr and eGFR, serum phosphorus levels, corrected calcium levels, use of phosphate binders, refill information for niacin, use of vitamin D analogs or calcimimetics, dietitian consult, aspirin use (in the niacin treatment group), serum albumin, glycated hemoglobin (A1C), average PTH, use of other active medications that may decrease phosphorus (i.e. calcium/vitamin D supplements, aluminum hydroxide, magnesium hydroxide, etc.), and documented adverse drug reaction or allergy to niacin. The control group was matched based on the level of kidney impairment; eligible patients were enrolled alphabetically.

Data from previous research studies was used to estimate the detectable difference in phosphorus control between the two groups. A standard deviation between 0.58 and 0.79 with a correlation between 0.1 and 0.5 was used to calculate the number of subject pairs needed to observe a difference in serum phosphorus levels documented in prior studies. With approximately 50 patients in each group, 80% power, and an alpha of 0.05, it was anticipated that a difference of 0.38 mg/dL in the median phosphorus level would be detected. This estimate used the standard deviation from previous clinical studies and therefore offered a conservative estimate of the detectable difference.

Results

A total of 5,430 patients had a diagnosis of CKD (based on the ICD-9 codes) during the data collection period. Of these, 531 either had a history of niacin use or were currently being prescribed niacin. The control group was comprised of the remaining patients (Figure 1). After reviewing the patients in the niacin group, 25 were included in the study based on the inclusion and exclusion criteria. In order to control for the level of kidney impairment as a possible confounding variable affecting phosphorus control, the two treatment groups were matched based on this characteristic. Baseline characteristics, including age, gender, and etiology of kidney impairment, were similar between the two treatment groups (Table 1).

With regards to the primary outcome, the median phosphorus level was statistically lower in the niacin group when compared to the control (3.5 mg/dL vs. 4.2 mg/dL; p < 0.01). There were two patients in the niacin group and 6 patients in the control who had an average serum phosphorus greater than 4.6 mg/dL (p = 0.13). The average daily dose of phosphate binders was not statistically different but favored niacin therapy (3.5 tablets per day in the niacin group vs. 5.8 tablets per day in the control group; p = 0.39). One possible explanation for why a statistical difference was not found with the secondary outcome was due to the small sample size.
level (3.5 mg/dL vs. 4.3 mg/dL; p < 0.01). There were no statistical differences found with regards to the average corrected calcium levels (9.40 mg/dL in the niacin group vs. 9.37 mg/dL in the control; p = 0.84) or the average A1c (7.5% in both groups; p = 0.88). Statistically, yet not clinically, significant differences were found in the average albumin (3.7 g/dL in the niacin group vs. 3.4 g/dL in the control) and the average PTH (152 pg/mL in the niacin group vs. 222 pg/mL in the control; p = 0.02). Ninety-six percent of patients had taken aspirin therapy concurrently with niacin, and only one patient had a documented allergy/adverse drug reaction to niacin. Only 56% of patients were considered adherent to niacin based on the MPR. A statistical difference was still found in favor of niacin therapy when comparing the median phosphorus level between those patients who were considered adherent to niacin and the control (3.4 mg/dL vs. 4.2 mg/dL; p < 0.01). When analyzing patients who had started niacin therapy within the data collection period, the serum phosphorus decreased by 0.9 mg/dL. No correlation was found between the dose of niacin and the median phosphorus level (p = 0.95) (Figure 3).

Discussion

Niacin was associated with a clinically and statistically significant difference in serum phosphorus levels. Similar findings were seen when assessing patients who were adherent with niacin based on the MPR. No correlation was found between the dose of niacin and the phosphorus level, which is similar to the findings from prior studies. Although a statistical difference was not found with the secondary endpoint, niacin may also reduce the load of phosphate binders. This is supported by the fact that a clinically significant decrease in phosphorus control was seen in the analysis of patients who had started niacin therapy within the 6 months of study enrollment. In addition, no difference was noted in A1c control, despite the risk of increased glucose levels with niacin use. However, caution is still warranted in patients with diabetes, gout, or peptic ulcer disease. From our review, nearly all of the patients who were receiving niacin,

Table 1 – Baseline Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Niacin Group n = 25</th>
<th>Control Group n = 25</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Age (years)</td>
<td>72</td>
<td>74</td>
<td>0.38</td>
</tr>
<tr>
<td>Race (% of patients)</td>
<td>White: 84</td>
<td>White: 56</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>Non-white or unknown: 16</td>
<td>Non-white or unknown: 44</td>
<td></td>
</tr>
<tr>
<td>Etiology of Kidney Impairment (% of patients)</td>
<td>Diabetes: 48</td>
<td>Diabetes: 52</td>
<td>0.46</td>
</tr>
<tr>
<td></td>
<td>Hypertension: 8</td>
<td>Hypertension: 12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multifactorial: 40</td>
<td>Multifactorial: 24</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other/unknown: 4</td>
<td>Other/unknown: 12</td>
<td></td>
</tr>
<tr>
<td>Level of Kidney Impairment (% of patients)</td>
<td>CKD stage 4: 72</td>
<td>CKD stage 4: 72</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CKD stage 5: 12</td>
<td>CKD stage 5: 12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ESRD: 16</td>
<td>ESRD: 16</td>
<td></td>
</tr>
<tr>
<td>Average SCr (mg/dL)</td>
<td>3.6</td>
<td>3.6</td>
<td>0.33</td>
</tr>
<tr>
<td>Average eGFR (mL/min/1.73m²)</td>
<td>21</td>
<td>18</td>
<td>0.07</td>
</tr>
<tr>
<td>Average Duration of Dialysis if ESRD (years)</td>
<td>3.75</td>
<td>2.25</td>
<td>0.32</td>
</tr>
</tbody>
</table>
controlled-release nicotinic acid, were on this as part of their lipid management regimen by a non-renal provider. There were a small number of patients who were prescribed niacin specifically for the indication of managing hyperphosphatemia. These patients were those who demonstrated poor tolerance or adherence to phosphate binders, or were already receiving maximum recommended doses.

Conclusion
The strengths of this study include the following: controlling for outliers in phosphorus control by comparing median levels, assessing the use of phosphate binders as a secondary endpoint (which was not seen in prior studies), and evaluating safety (i.e. A1c, allergy to niacin, aspirin use). This study was limited by the fact that it had a retrospective design and did not meet the pre-specified enrollment number. In addition, only 56% of patients were adherent with niacin based on the MPR, and a very limited number of patients had uncontrolled phosphorus levels (based on an average serum phosphorus greater than 4.6 mg/dL). This may have impacted the generalizability of the results.

Niacin may offer an option to limit healthcare costs, minimize side effects, and have an alternative mechanism of action for phosphorus control than standard phosphate binders. Although all niacin orders in this study were from prescriptions, there is the option for extended-release niacin that can be purchased over-the-counter. Further randomized clinical trials are warranted to assess its full effect given the many variables for phosphorus control, including the high pill burden and adherence issues with many CKD patients. Additionally, longer collection data windows with a larger patient population, along with an analysis of the pharmacoeconomic impact of niacin’s use are well warranted.

Acknowledgements
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References

Check out this article in the RNF archives (www.renalnutrition.org):

Niacin: A Method of Control for Hyperphosphatemia in Chronic Kidney Disease Stage 5 Patients
RNF Fall, 2010 Vol. 29 (4)
A Multidisciplinary and Peer Mentor Approach to Educating CKD Patients Along the Continuum

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Key Words: Peer Mentor, Multidisciplinary Team, Patient Education, Dialysis

Introduction
Patients with the skills, ability, and a willingness to manage their own well-being have been shown to have better health outcomes at a lower financial cost (1). This thought led to the development of chronic kidney disease (CKD) education classes at the University of Michigan Health System taught by a multidisciplinary team including a nurse, dietitian, social worker, and peer mentor. The two levels of classes address the educational needs for patients both in early and later stages of CKD.

Class Format
The World Health Organization (WHO) defines empowerment as “a process through which people gain greater control over decisions and actions affecting their health” and should be seen as both an individual and a community process (2).

The classes were designed to empower and educate adult patients about kidney disease and various treatment options, enabling them to be active participants in managing their chronic disease prior to them starting renal replacement therapy (RRT). 1. Class Level One is intended for patients with a glomerular filtration rate (GFR) 30 mL/min or higher. The class summarizes the anatomy of the kidneys and normal function, causes of kidney disease and recommendations to proactively maintain their kidney function for as long as possible. Other topics include nutrition recommendations and adjusting to chronic illness.

• ~90 minutes’ duration. ~20-30 minutes for nurse, ~40 minutes for the dietitian and ~10-15 minutes for the social worker, leaving ~10-15 minutes for questions and answers.

2. Class Level Two is designed for patients who have a GFR in the low 20s. The class summarizes treatment options for kidney failure and nutrition modifications for the various forms of dialysis and kidney transplantation. The class also addresses lifestyle adjustments to having a chronic illness. A peer mentor is also available to share his or her personal journey through CKD and address patients’ questions and concerns.

• ~120 minutes’ duration. ~40-50 minutes for the nurse, ~30-35 minutes for the dietitian, 15-20 minutes for the social worker, leaving ~15 minutes for the peer mentor and questions and answers. For both classes the class room is reserved for 120 minutes. The number of patients and their questions will effect each presenters time.

Classes are offered in two locations within the University of Michigan Health System. They are taught monthly and are approximately two hours in length. The referral sources include internal and community nephrologists. Classes are voluntary and free of charge to participants. Patients are encouraged to attend the class with their partner or family member(s). The average size of each class ranges from 7-12 participants, which includes patients and their support person(s).

Presentations
Nursing / Medical
Chronic disease knowledge is an important prerequisite for patients to implement behavioral changes towards controlling CKD. Patient–level CKD awareness includes both general knowledge of CKD, risk factors and consequences, as well as an understanding of CKD status and individual risk.

Class Level One
Class Level One discusses urinary tract anatomy and basic kidney function. Other class topics covered by the nurse include GFR definition and the five stages of CKD. The course reviews the CKD causes including diabetes, untreated high blood pressure, inflammation, hereditary conditions, chronic infections and accidents or kidney injury caused by medications, drugs, poisons, radiation or trauma. Symptoms and warning signs of CKD are mentioned, such as declining GFR, a low hemoglobin count, and fatigue or shortness of breath. Patients learn about pertinent laboratory results and the importance of understanding these values, so they can monitor their CKD progression and make necessary dietary modifications. Class participants are encouraged to take an active role in their healthcare by knowing current lab values, how to adjust their lifestyle, and monitoring trends of their GFR, blood pressure and blood sugars. Patients are reminded to talk with their healthcare provider before taking any over-the-counter-medication and medical tests requiring contrast dyes, which may further compromise kidney function.
Class Level Two

Class Level Two briefly reviews basic kidney function and stages of CKD based on GFR level. Other topics discussed are the physical and mental signs as well as common symptoms, which may occur as fluids and toxins accumulate with GFR decline causing altered blood chemistries. Since dialysis is often required when GFR is near 10 mL/min, patients are encouraged to learn about the various RRT options and discuss with their nephrologist which form of treatment would be appropriate for them, before the need for dialysis is emergent. Class Session Two is referred to as the “planning class”.

Various treatment options reviewed are: peritoneal dialysis (PD), continuous automated peritoneal dialysis (CAPD), automated peritoneal dialysis (APD), hemodialysis (in center and home), kidney transplantation and choosing not to initiate dialysis. Specific information reviewed for each form of RRT is:

- **Peritoneal dialysis**: discusses how the peritoneum is used to dialyze, placement of a catheter, difference between CAPD and APD, how an exchange is completed and frequency of the exchange.
- **Hemodialysis**: in-center and home hemodialysis: explains how the dialysis process cleans and filters the blood. Reviews the types of hemodialysis access – fistula and graft and how patients properly care for and protect their access. Discusses the treatment schedule for a typical in-center hemodialysis unit as well as training and dialysis scheduling for home hemodialysis.
- **Kidney Transplantation**: reviews what a kidney transplant is and the sources of kidney transplants – living and deceased donors. Discusses the evaluation process the patient must undergo to determine kidney transplant candidacy.

This portion of the class concludes with a comprehensive review of the advantages and disadvantages of each RRT type. This allows the patient to view the benefits and drawbacks of each treatment option and make an educated choice on his or her best option. Choosing not to undergo dialysis is also addressed. Stating on some occasions patients choose not to start dialysis, they understand that they will be unable to survive without RRT. Also, if a patient begins dialysis and finds the burden outweighs the benefits, the patient may choose to stop dialysis at any time and his or her medical team will pursue Hospice care.

**Dietitian / Nutrition**

Managing CKD presents a nutritional challenge, since many individuals with CKD frequently have other co-morbidities requiring dietary attention. This can lead to patients feeling overwhelmed and afraid to eat. Nutrition planning and education in the early stages of CKD can be crucial in preventing CKD progression by helping to alleviate abnormal laboratory values, controlling high blood pressure and managing diabetes.

**Class Level One**

Patients are encouraged to receive nutrition recommendations from a renal dietitian. Since uncontrolled blood pressure and diabetes can enhance the progression of CKD, it becomes a priority for the renal dietitian to assist the patient in improving his or her diet, to slow down the progression of CKD and delay the need for dialysis. Patients are encouraged to learn about their diet, and take an active role in planning their food choices. Examples of laboratory report cards are shown, highlighting specific lab values, patient’s lab results and an explanation of why that lab is being monitored. Individuals are encouraged to understand and monitor trends in their lab results.

**Nutrition topics discussed:**

- Ensuring adequate amounts and types of protein.
- Necessity of monitoring laboratory potassium levels and identifying foods that are high and low in potassium.
- Importance of controlling laboratory phosphorus levels and identifying foods that are high and low in phosphorus.
- Identifying types of phosphorus in foods and reason for the possible need of a phosphate binder.
- Demonstration of how to read and comprehend nutrition food labels.
- Tips for meal planning, grocery shopping and dining out.

Class Level Two

This class addresses the progression of CKD and that it may cause a decrease in patients’ appetite and oral intake. Patients are given tips on eating when they aren’t feeling well and information about changes in their dietary needs as kidney function declines. Since dietary recommendations vary based on the type of RRT the patient chooses, a summary of diet recommendations associated with each type of RRT is reviewed. The point that diet and nutrition are an important part of living well with kidney disease is reiterated. As kidney disease progresses, dietary recommendations for protein, potassium, sodium, phosphorus, and fluids will change. Meal planning and grocery shopping can be a daunting task for many people, but for those with a chronic illness these activities can be purely overwhelming. Meal planning and shopping tips are provided and patients’ feelings are validated. They are reminded that like learning a new skill, time and practice are needed to succeed in managing their dietary needs.

**Social Worker / Adjusting to CKD**

CKD can evoke a magnitude of emotional reactions. It is common for the patient to experience feelings of denial, fear, anger and depression as he or she adjusts to having a chronic illness. Individuals may feel a loss of control over their bodies and environment, and are encouraged to share their feelings with their social worker and nephrologist to determine whether these symptoms stem from kidney disease, depression or both.

**Class Level One**

In Class Level One, the social worker discusses the initial stages of CKD - before dialysis treatment begins. The majority of this portion of the class provides guidelines for adjusting to having a chronic disease. Patients are encouraged to obtain as much education about CKD as possible, with the explanation...
that knowledge conquers fear. Communication is vital to a good attitude and successful adjustment, as well as maintaining friendships and family relationships which are just as important to patients’ mental health as medical treatment is to their physical health. Attitude and a sense of humor helps individuals get over the tough times of their illness. Activity and exercise is encouraged and once patients feel better, it is important for them to return to as many of their previous activities as possible. Getting back into their old routines helps them feel that sense of “normal” again. Positive self-talk is encouraged. It matters what you tell yourself. The acknowledgement of having a “new normal” includes individuals adjusting to their new lifestyle and creating new dreams and goals. The “Readiness Ruler” is introduced and asks participants how ready are they to start making changes in their life. This concept is followed by a “weekly motivator” tool intended to help individuals take care of themselves and follow through on different components of their self-care program – physical activity, fun, eating right, support from others, relaxation, and goal setting.

Class Level Two

Class Level Two briefly reviews typical emotional feelings and behavioral changes. Patients are encouraged to discuss physical and emotional changes with their nephrologist or social worker. Loved ones of patients with CKD are instructed to allow patients independence when appropriate. Caregivers are also encouraged to stay connected with other caregivers who understand what they are experiencing, pay attention to their own physical and mental health, and be open to accepting or asking for help if needed.

Peer Mentor

A Peer Mentor is a CKD patient with a positive outlook on managing his or her disease and who is committed to providing support to others (3). The Peer Mentor has experienced the journey of CKD and may understand CKD patients’ experiences better than their friends, family, and renal team. They can help empower patients to move forward with their lives after being diagnosed with CKD, and act as a bridge for better communication with their renal team. Peer Mentors are a valuable part of Class Level Two, as the mentor can show patients that controlling and managing their health will allow them to live longer, happier lives. This enhances participants’ understanding from a patient perspective. Most importantly, Peer Mentors show patients that life does not end with kidney disease which lessens fear, promotes self-management and improves healthcare outcomes.

Patient Feedback

At the end of each class session, patients and their guests are asked to complete a short class survey. The surveys are reviewed by the multidisciplinary team members to ensure that the needs of the patients are being met and allows for continued improvement of class content and delivery. Below are a few of the comments we have received:

“Great presentation. We are better armed to care for our son.”

“Very helpful to have a peer mentor share his experience.”

“I wish this class had been encouraged earlier in my disease.”

“Very informative. I look forward to Class Level Two.”

“Little did we know the presentation would benefit my daughter as much as it did me. We now realize that we are still of value and to go on with life even though it may be a new normal.”

Conclusion

Patients along the CKD continuum have a wide range of educational needs. The first session addresses the basic CKD education and motivational needs, while the second session emphasizes modality options with peer mentor support and encouragement. Using a multidisciplinary approach empowers patients with the necessary tools to make decisions that will contribute to their wellness and prepare them for a smooth outpatient transition to dialysis.

Resources

The Way It Was—Remembrances of Renal Dietitian Pioneers

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Second Century Liaison
marykayhensleyrd@netscape.net

Connie Schroepfer, MS, RD, is currently working in Pediatric Nephrology in Oakland, CA. She first took care of pediatric patients at Children’s Hospital in Boston in the late 1960s. She remembers “dialysis was not available and we fed the children butter-balls, powdered sugar and butter mixed together, to be eaten like candy.” Connie, a 50 year member of the Academy, reports “I was very naïve in my first position caring for inner-city adults. Once when a patient’s labs were very improved, I reported at a case conference that he had told me that being away from home in a new environment had helped him adhere to his diet. Everyone laughed, as the patient was in jail. I was very shy in the beginning and would almost blush when asking a patient about their urine output. Later, I became a strong advocate for my patients.” Connie also worked with Dr. Frank Gotch and Carol Gee, RD, the pioneers in Urea Kinetic Modeling. Connie has also studied and published about the role of vitamin K, and its relationship to cardiac calcification and bone disease.

Carol Bergen, MS, RDN, LDN, a 50 year member of the Academy, did her dietetic internship at Duke University in North Carolina in 1964. Duke began its chronic dialysis program the same year. “While at Duke, I worked with patients on the rice diet (created by Walter Kempner) developed for volume sensitive hypertension. The diet was fruit and rice only. It provided 2,000 calories and 20 grams of protein. Sixty-five percent of patients who had primary kidney disease were said to have improved on the diet. Needless to say adherence was a problem.” Carol worked on the HEMO Study (1995-2002) and enjoyed learning from and sharing with many experts. She feels the RD was recognized and respected within this community.

Dr. Linda Snetselaar, PhD, RDN, LD, FAND, joined the Academy in 1973 and practiced as a nephrology dietitian. She writes “I remember being so proud to be a part of the MDRD study, where RDs wrote major sections of the MDRD protocol. The visits with study participants were driven by biological and dietary data (weighed food records). One nephrologist working with us said, “RDs are a major part of the research team for MDRD. They drive the work we do on a daily basis.” “This was one of my favorite NIH funded nutrition studies. It showed the extreme importance of our profession and the science that was evident in forming our focus for clinical practice.”

Lois Hill, MS, RD, CSR, LD, took care of her first renal patient in 1972 in Lexington, KY. She remembers working at the first outpatient unit that provided treatment for half of her state with some patients traveling more than four hours to three times per week treatments. She recalls, “Patients suffered from anorexia, nausea and vomiting. This was the era of 20 gram protein, low sodium, low potassium, low phosphorus, and 500 ml plus the previous day’s output fluid restriction. We provided low protein bread, pasta and cookies, rice, sourballs, peppermint candies and about 2 ounces of meat or meat substitutes daily.” Lois writes, “I have been active in promoting the RDN, including the renal dietitian via policy and certification. I was a lobbyist and was appointed by the Governor of Kentucky to be the first Licensure Chair in the state. I continue to serve in policy positions in my state and nationally as the Policy Advocacy Leader for the Renal Practice Group.

Dr. Judith Beto, PhD, RDN, LD, FAND, began her practice at Loyola University Medical Center in Maywood, IL. She writes, “I was recruited in 1973 during my dietetic internship. I had married into a large Italian family. ‘Uncle Jerry’ was my first renal patient, the brother of my father-in-law. He found me on the second day of my internship during an orientation tour at the VA Hospital where he was a patient. He proclaimed me his renal dietitian (totally untrained and naïve) and that he would only deal with me going forward. He is my most non-compliant patient to date. I would see him consume plates of sausage, spaghetti sauce (red gravy) and gramma’s meatballs on Sunday and see the damage on Monday! He never responded to anything I ever said or did.” Judy stated “My experience with ‘Uncle Jerry’, despite being completely negative in many ways, also stimulated my interest in the cause and effect of medical nutritional therapy. I was instantly hooked by the scientific relationship of patient behavior to fluid overload and hyperkalemia. I was stunned by the dialysis treatment procedure and how it only put a band aid on the real problems. Remember this was the 1970s with dialysis boards and limited coverage. I was encouraged I could make a difference in patient quality of life.

Judy continues her story, stating “I have been fortunate to be recognized for my age and wisdom. I was appointed as the founding editor of the Journal of Renal Nutrition. I have received the Monsen Award from the Academy for my publication record. I am grateful for the leadership opportunities in RPG and CRN and their respective awards recognizing my work. Wisdom only comes with service.”
Jean Stover, RD, LD, like many other dietitians, was designated as the “renal dietitian” in 1976 at the hospital where she worked in Philadelphia, after the passage of the Medicare Act in 1972. She also notes “there was very little literature about renal nutrition to provide direction at that time.” Jean has spent much of her career filling that gap as co-editor of the various editions of “A Clinical Guide to Nutrition Care in Kidney Disease” and authoring articles about nutrition care of CKD patients during pregnancy.

Theresa (Terrie) Rydzon, RD, LDN, a renal dietitian in the Chicago area since 1976, chose her field because “I loved the diet plan and the counseling challenges of the renal diet.” She was the chairperson for a patient cookbook project in Illinois and since she “loves teaching,” has developed an orientation program for newly hired renal dietitians.

Ann Hayes, MS, RD, CSR, LD, started taking care of renal patients in Chicago in 1977 and later moved to the Tampa Bay area in Florida. She chose the renal specialty due to a family history of Polycystic Kidney Disease. She remembers, “having to develop my own education materials from scratch” as her biggest challenge at the beginning of her career.

Rita Solomon-Dimmitt, RD, CSR, LDN, began her career in Nashville, TN in 1977. “I worked with some wonderful mentors and enjoyed the variety of research and progress that was evident in the renal field. Early on, I recognized through our participation in the National Cooperative Dialysis Study (NCDS) that patients benefit from longer dialysis. There was not a plethora of renal friendly foods, like wheat starch bread and butterballs, all of which, thankfully, have gone by the wayside. One of my hardest tasks was trying to make wheat starch bread seem palatable and look enticing while maintaining its low protein content.” Rita also commented on acetate dialysate which caused nausea and vomiting, the poor volume control afforded by the machines of the era that caused excessive hypotension and cramping, and the low clearance dialyzers that were available at the time. She goes on to say “Kt/V was a new term and PCR provided more of an opportunity to enhance the care of our patients nutritionally. Common Channel Interoffice Technology was developed in 1976, so in 1977 we transferred data from our ancient computers to the NCDS study by way of a modem using a rotary dial telephone, then attached the handset to a modem cradle to transfer the data on a dedicated land line. We should never complain that our current computers are not fast enough”’

Kristine David, RD, writes renal nutrition “chose me” in 1977. “I accepted a job at a hospital in New Hartford, NY. The hospital had a dialysis unit and that was my assignment. It was my first exposure to dialysis and renal diets. Finding recipes suitable for my patients, so that they could have tasty food to eat was my hardest task. I did cooking classes to demonstrate how to prepare the recipes.” Kristine states that as “Chair of the National Kidney Foundation’s Spring Clinical Meetings, I was allowed a fantastic opportunity to work with very dedicated renal dietitians. We collaborated to create wonderful, interesting and unique educational sessions which reached a large audience of renal dietitians.”

Carol Liftman, MS, RD, LDN, from Philadelphia, began her renal practice when she returned from a maternity leave and faced a new assignment in 1983. “Needless to say, I found the field fascinating.” She also relates, “I have some old instructional material saved. Interestingly, our original in-house renal diet and nutrition guide was illustrated by cartoons from the Garfield comic strip. The mother of the person who managed the account for the Garfield character was on hemodialysis. We were given permission to use the graphics as long as we only used them at our facility and never sold the booklet.”

Fay Moore, RD, CSR, who began her career in Chicago, but now lives and works in Phoenix, remembers the following: “When I was in school in the 70’s, the renal ward was a death ward. Twenty gram protein diets with butterballs and bacon fat made me proclaim I would never work in renal because it was too depressing. When reentering the workforce in 1988, after my babies, I learned that renal was a more hopeful place. I have appreciated being able to share that hope with my patients”. Fay now trains and mentors more than fifty renal dietitians every day to be hopeful.

Maureen McCarthy, MPH, RD, CSR, LD, began her renal dietetic practice in Lewiston, Maine. in 1986, at a clinic that was part of Lowrie and Lew’s research study. She remembers, “My first renal patients were hard-working people. They would come to the clinic no matter what the wintery weather was in Maine. I had a lobsterman, many lumber workers, and housewives. I remember one very distinguished looking older man who had dialysis dementia due to aluminum toxicity. I was struck by the devoted support of spouses and other family members.” Maureen moved to Oregon in 1991 and is known for her dedication to patients and colleagues. She has devoted her time to developing the Standards of Care for Nephrology Practice and Standardized Language for renal practitioners.

HAPPY ANNIVERSARY!

As the Academy celebrates its 100th anniversary and RPG celebrates its 40th anniversary, we must not just look back but also look to the future of our renal practice.

Consider the following question:

Using your crystal ball, what do you see for the future of renal dietetic practice/renal dietitians?

Send your response to Mary Kay Hensley, Second Century Liaison, at marykayhensleyrd@netscape.net. Responses may be used in a future article.
Insufficient time to check out recently published articles in nephrology nutrition? In an effort to help keep our RPG members current, we reviewed the following articles from a variety of publications. We hope you find this list helpful and, as always, would appreciate your feedback and suggestions!

**Xu X, Xinhui Q, Youbao L.** Efficacy of folic acid therapy on the progression of Chronic Kidney Disease: The Renal Substudy of the China Stroke Primary Prevention Trial. *JAMA Intern Med.* 2016;176(10):1443-1450. This study reviewed treatment with enalapril and folic acid versus enalapril alone for slowing renal function decline. Results concluded that the enalapril-folic acid therapy was more effective than enalapril alone for significantly delaying the progression of chronic kidney disease among patients with mild-to-moderate CKD and hypertension.

**Liu Y, Kuczmarski M, Miller E, et al.** Dietary habits and risk of kidney function decline in an urban population. *J Ren Nutr.* 2016; http://dx.doi.org/10.1053/j.jrn.2016.08.007. This prospective cohort study explored the association between following a Dietary Approaches to Stop Hypertension (DASH) diet and markers of kidney function decline in a high-risk population (urban adults). While low adherence to a DASH-type diet was not associated with incident CKD, it was associated with higher risk of rapid glomerular filtration rate decline in those with hypertension.

**Fornasari M, Sens Y.** Replacing phosphorus-containing food additives with foods without additives reduces phosphatemia in end-stage renal disease patients: A randomized clinical trial. *J Ren Nutr.* 2016; http://dx.doi.org/10.1053/j.jrn.2016.08.009. The purpose of this randomized clinical trial was to verify the effects of replacing phosphorus-containing food additives with foods free of additives on phosphatemia in end-stage renal disease patients. Nutritional status, energy intake, protein intake, and normalized protein nitrogen (nPNA) did not differ between the two groups at the end of the study. However, 3 months later a decline in phosphorus levels was noted in the investigational group.

**Rimsevicius L, Gincaitė A, Vicka V, et al.** Malnutrition assessment in hemodialysis patients: Role of bioelectrical impedance analysis phase angle. *J Ren Nutr.* 2016;26(6):391-395. This observational study of 99 patients aimed to determine the most potent bioelectrical impedance analysis (BIA) marker of malnutrition as applied to hemodialysis (HD) patients. The nutritional state of the study participants was examined before and after HD using Subjective Global Assessment Scale (SGA), serum albumin, body mass index and BIA-derived fat-free mass index, reactance, resistance, and phase angle (PA). Results showed BIA-provided PA was the most impressive predictor of malnutrition.

**Bolasco P, Cupisti A, Locatelli F, et al.** Dietary management of incremental transition to dialysis therapy: Once-weekly hemodialysis combined with low-protein diet. *J Ren Nutr.* 2016;26(6):352-359. This paper examined an alternative approach for preserving residual kidney function (RKF). Previous case studies and reports were reviewed. This alternative approach suggests that an incremental transition with less frequent hemodialysis sessions at the beginning with gradual increase in hemodialysis frequency over months combined with low-protein diet may elicit more desirable outcomes like better preserved RKF, lower β2-microglobulin levels, improved phosphorus control, and lower doses of erythropoiesis-stimulating agents.
What’s New and Available on the Website
www.renalnutrition.org

The Renal Dietitians Practice Group offers great resources for its members on the website www.renalnutrition.org. Popular resources include the Professional Resource Library, Patient Education Handouts, webinars, and current or archived Renal Nutrition Forum issues. You are just a click away from these great resources!

Website Highlight:
Are you studying for the upcoming CSR exam? Need to review an area in CKD practice? RPG has a great resource available for you!

What is the Professional Resource Center (PRC)?
The PRC offers members current and updated resources; resources are purchased regularly. These resources include both professional and patient-oriented resources to be used for continuing education purposes, presentations and/or development of patient education materials.

Topics include:
• alternative medicine
• cookbooks
• dialysis
• fitness
• medical nutrition therapy
• renal nutrition
• stone management

How does the PRC work?
The only requirement is a $20 deposit/ per resource that is returned upon the receipt of the borrowed material/s. The PRC check out & deposit payment process is available online. Go online and see what’s available!

Looking for a resource? Suggestions or ideas?
We want to hear from you!
Melissa Prest, MS, RD, CSR, LDN
RPG Electronic Media Manager
mediamgr@renalnutrition.org
Judy Kirk, MS, RD, CDN, CSR
NKF/CRN Chairperson

Thank you for the opportunity to serve as Council on Renal Nutrition (CRN) Chair for the past two years. My term will come to an end April 2017. It has been an amazing experience meeting so many Academy and National Kidney Foundation (NKF) members. Our organizations have a wealth of knowledge to share, and I cherish the new friends and colleagues I have met working on projects and through conference networking.

The incoming Chair for the NKF/CRN is Laura Holden, MBA, RD, CSR, and FNKF. Laura resides in Arizona and is a Nephrology Dietitian at US Renal Care in South Phoenix and Tempe, Arizona. She is an enthusiastic and energetic leader. I am proud to be serving on the Executive Committee with Laura who has held the position of Secretary for several years and Chair-Elect this past year. I look forward to supporting Laura as I transition to Immediate Past Chair. For the full 2017/2018 Executive Committee listings, please visit the NKF website; go to professional/dietitian/CRN executive committee.

But the EC only makes up half of the team. Each RPG member is an important part of the team and I send a sincere thank you to each one of you for your membership! Our members are our greatest resource and the inspiration behind every decision and vote by the EC. I was awed on several occasions throughout the year with the overwhelming immediate response by our members to volunteer for projects on the RPG’s behalf within the Academy, as well as on projects with the RPG itself.

I would also like to extend a genuine thank you to Susan DuPraw and the rest of the Academy staff for their support and guidance, without which my job would have been impossible.

As the office of Chair moves into the capable hands of AnnaMarie Rodriguez, I encourage all RPG members to get involved, stay involved, and take advantage of the many fabulous benefits RPG offers. Continue to make your voices heard by answering Action Alerts, voting, and letting your leaders and the EC be aware of your professional needs.

JoAnn Randazzo, MS, RD, CDN
RPG, Chairperson

“Individually, we are one drop. Together, we are an ocean.”
– Ryunosuke Satoro

Just like when I am reading a fantastic book or watching a captivating movie, as much as I don’t want it to end, I also can’t wait to see how it turns out. It is with these same mixed emotions that I sit to write my last message as the Chair of the Renal Practice Group (RPG).

It has been such a pleasure working with each member of this dynamic Executive Committee (EC). I would like to send a heartfelt thank you to each one for their dedication and support throughout the year. Together we accomplished much, including: an update to our Strategic Plan, the creation of a RPG Facebook page and Twitter account, a well-received Spotlight Session at FNCE, continued publishing of a robust quarterly Renal Nutrition Forum that includes updated nutrition handouts in every issue, and establishing new relationships and collaborations with other professional groups.

This year, NKF/CRN will be seeking nominations for Executive Committee positions for representative and alternate representatives in Regions I, III, V, as well as for Chair Elect. The representative and alternate positions are two year terms; the Chair-Elect is a three-year commitment including Chair Elect for one year, Chair for one year, and then Immediate Past Chair for one year. My busy schedule included working full time as a Nephrology Dietitian in a home dialysis program as well as raising two toddlers, but I would not have traded this experience and am thankful that I took the leap of faith to pursue this leadership role. Visit the NKF website for details of these positions and consider a leadership role for yourself in our national CRN.

A new and exciting educational piece will be available on the NKF website this spring: it is “Low Cost Meal Planning”. In the upcoming summer issue of Renalink, the lead article will be a CRN article regarding “Renal Professionals: What Does the Future Hold?” I look forward to an interesting look at future projections for Chronic Kidney Disease and dialysis therapies! Watch for this Renalink issue this summer.

As this is the last Chair message for my term, I am humbled by your accomplishments and support of our professional organizations. I will value all the friends and contacts I have made through these years. Thank you!
INDICATION
Velphoro® (sucroferric oxyhydroxide) is a phosphate binder indicated for the control of serum phosphorus levels in patients with chronic kidney disease on dialysis.

IMPORTANT SAFETY INFORMATION
• Velphoro must be administered with meals. Velphoro tablets must be chewed and not swallowed whole. To aid with chewing and swallowing, the tablets may be crushed.
• Patients with peritonitis during peritoneal dialysis, significant gastric or hepatic disorders, following major gastrointestinal (GI) surgery, or with a history of hemochromatosis or other diseases with iron accumulation have not been included in clinical studies with Velphoro. Monitor effect and iron homeostasis in such patients.
• In a parallel design, fixed-dose study of 6 weeks duration, the most common adverse drug reactions to Velphoro chewable tablets in hemodialysis patients included discolored feces (12%) and diarrhea (6%).
• Velphoro can be administered concomitantly with oral calcitriol, ciprofloxacin, digoxin, enalapril, furosemide, HMG CoA reductase inhibitors, hydrochlorothiazide, losartan, metoprolol, nifedipine, omeprazole, quinidine and warfarin. Take doxycycline at least 1 hour before Velphoro. Velphoro should not be prescribed with oral levothyroxine.

Please see Brief Summary on adjacent page or visit www.Velphoro.com for full Prescribing Information.

† A 52-week, open-label, active-controlled, phase 3 study evaluated the safety and efficacy of Velphoro in lowering serum phosphorus levels in patients (N=1,054) with chronic kidney disease on hemodialysis or peritoneal dialysis. 1


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**VELPHORO**
(sucroferric oxyhydroxide)
chewable tablets

**INDICATIONS AND USAGE**
Velphoro (sucroferric oxyhydroxide) is a phosphate binder indicated for the control of serum phosphorus levels in patients with chronic kidney disease on dialysis.

**DOSAGE AND ADMINISTRATION**
Velphoro tablets must be chewed and not swallowed whole. To aid with chewing and swallowing, tablets may be crushed.

The recommended starting dose of Velphoro is 3 tablets (1,500 mg) per day, administered as 1 tablet (500 mg) 3 times daily with meals. Adjust by 1 tablet per day as needed until an acceptable serum phosphorus level is reached, with regular monitoring afterwards. Titrate as often as weekly.

**DOSAGE FORMS AND STRENGTHS**
Velphoro (sucroferric oxyhydroxide) chewable tablet 500 mg.

**CONTRAINDICATIONS**
None.

**WARNINGS AND PRECAUTIONS**
Patients with peritonitis during peritoneal dialysis, significant gastric or hepatic disorders, following major gastrointestinal surgery, or with a history of hemochromatosis or other diseases with iron accumulation have not been included in clinical studies with Velphoro. Monitor effect and iron homeostasis in such patients.

**ADVERSE REACTIONS**
In a parallel design, fixed-dose study of 6 weeks duration, the most common adverse drug reactions to Velphoro chewable tablets in hemodialysis patients included discolored feces (12%) and diarrhea (6%).

To report SUSPECTED ADVERSE REACTIONS, contact Fresenius Medical Care North America at 1-800-323-5188 or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

**DRUG INTERACTIONS**
Velphoro can be administered concomitantly with oral calcitriol, ciprofloxacin, digoxin, enalapril, furosemide, HMG-CoA reductase inhibitors, hydrochlorothiazide, losartan, metoprolol, nifedipine, omeprazole, quinidine and warfarin.

Take doxycycline at least 1 hour before Velphoro.

Velphoro should not be prescribed with oral levothyrroxine.

**USE IN SPECIFIC POPULATIONS**

**Pregnancy**

Pregnancy Category B: Reproduction studies have been performed in rats and rabbits at doses up to 16 and 4 times, respectively, the human maximum recommended clinical dose on a body weight basis, and have not revealed evidence of impaired fertility or harm to the fetus due to Velphoro. However, Velphoro at a dose up to 16 times the maximum clinical dose was associated with an increase in post-implantation loss in pregnant rats. Animal reproduction studies are not always predictive of human response.

There are no adequate and well-controlled studies in pregnant women.

**Labor and Delivery**

No Velphoro treatment-related effects on labor and delivery were seen in animal studies with doses up to 16 times the maximum recommended clinical dose on a body weight basis. The effects of Velphoro on labor and delivery in humans are not known.

**Nursing Mothers**

Since the absorption of iron from Velphoro is minimal, excretion of Velphoro in breast milk is unlikely.

**Pediatric Use**
The safety and efficacy of Velphoro have not been established in pediatric patients.

**Geriatric Use**

Of the total number of subjects in two active-controlled clinical studies of Velphoro (N=835), 29.7% (n=248) were 65 and over. No overall differences in safety or effectiveness were observed between these subjects and younger subjects.

**OVERDOSAGE**

There are no reports of overdosage with Velphoro in patients. Since the absorption of iron from Velphoro is low, the risk of systemic iron toxicity is low. Hypophosphatemia should be treated by standard clinical practice.

Velphoro has been studied in doses up to 3,000 mg per day.

**HOW SUPPLIED/STORAGE AND HANDLING**

Velphoro are chewable tablets supplied as brown, circular, bi-planar tablets, embossed with “PA 500” on 1 side. Each tablet of Velphoro contains 500 mg iron as sucroferric oxyhydroxide. Velphoro tablets are packaged as follows:

NDC 49230-645-51 Bottle of 90 chewable tablets

**Storage**

Store in the original package and keep the bottle tightly closed in order to protect from moisture.

Store at 25°C (77°F) with excursions permitted to 15 to 30°C (59 to 86°F).

**PATIENT COUNSELING INFORMATION**

Inform patients that Velphoro tablets must be chewed and not swallowed whole. To aid with chewing and swallowing, the tablets may be crushed [see Dosage and Administration].

Velphoro should be taken with meals.

Instruct patients on concomitant medications that should be dosed apart from Velphoro [see Drug Interactions].

Inform patients that Velphoro can cause discolored (black) stool.

**Distributed by:**

Fresenius Medical Care North America
920 Winter Street
Waltham, MA 02451

US Patent Nos. 6174442 and pending, comparable and/or related patents.

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Resources for Eating Well
For Chronic Kidney Disease or Dialysis

Find a Renal Dietitian
www.renalnutrition.org/find-an-expert.php

Videos
Grocery Shopping for Your Kidney Diet
BC Renal Agency, 9 part series
https://youtu.be/Zj6leG8lNEI?list=PLgaBYChIaS-3n32OYl6mOMEJiYE6ruEuN

Mobile Device Apps
Care after Kidney Transplant
Cost: free
Device: iOS & Android

H2Overload: Fluid Control for Heart-Kidney Health
Cost: free
Device: iOS

My Food Coach
Cost: free
Device: iOS & Android

Cookbooks
• AAKP Delicious! Cookbook
https://aakp.org/product/aakp-delicious-cookbook/
(2013)

• Kidney Friendly Cooking,
by the Canadian Association of Nephrology Dietitians,
2015. Order form:

• The Kidney Friendly Diet Cookbook: Recipes For A PreDialysis Kidney Disease Lifestyle, by Mathea Ford (2013)


• Sodium Girl’s Limitless Low-Sodium Cookbook, by Jessica Goldman Foung (2013). For those on a flexible potassium diet.

Delivered Meals
• Mom’s Meals
(dialysis meals)
www.momsmeals.com/independent-at-home/renal-menu/

• Magic Kitchen
(pre-dialysis and dialysis meals)
www.magickitchen.com

• Martha’s Senior Gourmet
(check for availability in your area)
www.marthasseniorgourmet.com/renal

For additional lists of cookbooks, see the National Kidney Foundation’s cookbook list:
https://www.kidney.org/atoz/content/list-cookbooks-kidney-patients
Choose cookbooks published after 2010.

Meal Planning Services
Renal Diet Headquarters
www.renaldiethq.com/order-a-renal-diet-meal-plan/
Recipes

• AAKP
  https://www.aakp.org/kidney-friendly-recipes/

• DaVita
  https://www.davita.com/recipes/

• Fresenius Kidney Care
  https://www.freseniuskidneycare.com/eating-well/recipes/

• Kidney Community Kitchen
  http://www.kidneycommunitykitchen.ca/kkcookbook/

• Northwest Kidney Centers

• NxStage Kidney Care
  www.nxstagekidneycare.com/navigator/recipes

• Sodium Girl, Adventures In A Low-Sodium Life
  (for flexible potassium diets)
  http://www.sodiumgirl.com/recipe-box/

Comprehensive Information

• American Association of Kidney Patients (AAKP)
  Provides renal-specific information on patient education, conventions, kidney friendly recipe cards and newsletters. www.aakp.org

• American Kidney Fund (AKF)
  Source for financial assistance, education, and outreach to kidney patients. www.kidneyfund.org/

• DaVita
  Information, nutrition, and recipes for all stages of kidney disease. www.davita.com

• Fresenius
  Information, nutrition, and recipes for all stages of kidney disease. www.freseniuskidneycare.com/

• Kidney School – Designed to help people understand kidney disease and its treatments.
  www.kidneyschool.org

• Kidney Smart
  Designed to provide a wealth of information on chronic kidney disease. https://kidneysmart.edmeasures.com/welcome.php

• National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)
  Shares science-based information to improve people’s health and quality of life. www.niddk.nih.gov/health-information/diet-nutrition

• National Kidney Disease Education Program (NKDEP)

• National Kidney Foundation (NKF)
  Seeks to prevent kidney and urinary tract diseases, improve the health and well-being of individuals and families affected by these diseases, and increase transplantation. https://www.kidney.org/nutrition

• Nepro Kidney Club
  Helps members learn about the relationship between nutrition and the ability to do the things they want to do every day. www.nepro.com/kidney-club

• Northwest Kidney Centers
  Promotes optimal health, quality of life and independence for people with kidney disease through patient care, education and research. www.nw kidney.org/

• NxStage Kidney Care
  Helps patients discover, achieve, and maintain freedom and flexibility while on a dialysis therapy that meets their needs. www.nxstagekidneycare.com/

• Renal Support Network (RSN)
  Strives to educate and empower patients and their family members to take control of the course and management of kidney disease. www.rsnhope.org/

• Transplant Living
  Provides information for transplant recipients, family members and healthcare professionals. www.TransplantLiving.org

This is not a comprehensive list and inclusion does not represent endorsement by RPG, the Academy of Nutrition and Dietetics, or its Foundation. Additional kidney-related resources can be found at: www.renalnutrition.org.

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## CALENDAR OF EVENTS

### April 2017

**NKF 2017 Spring Clinical Meetings**  
April 18-22, 2017  
Walt Disney World Swan and Dolphin Resort  
Orlando, FL  
https://www.kidney.org/spring-clinical

**ISN World Congress of Nephrology 2017**  
April 21-25, 2017  
Mexico City, Mexico  
https://www.wcn2017.org/

**American Transplant Congress**  
April 29-May 3, 2017  
McCormick Place - Lakeside Center  
Chicago, IL  
http://atcmeeting.org/

### May 2017

**Board Certification as Specialist in Renal Nutrition Examination**  
Exam windows: May 1-19, 2017 and November 1-21, 2017  

**11th European Renal Pathology Course**  
May 16-19, 2017  
Amsterdam, The Netherlands  
http://renalpathologycourse.org/

**Baltic Dialysis School: Advances in Peritoneal Dialysis**  
May 19-20, 2017  
Vilnius, Lithuania  
http://balticdialysis.com/

### June 2017

**54th European Renal Association-European Dialysis and Transplant Association Congress**  
June 3-6, 2017  
Madrid, Spain  
http://www.era-edta2017.org

**Certificate of Training in Adult Weight Management (Level 1 or 2)**  
June 22-24, 2017: Cincinnati, OH  
September 29-October 1, 2017: Phoenix, AZ  
October 19-21, 2017: Pre-FNCE Chicago, IL  
November 15-17, 2017: Orlando, FL  
https://www.cdrnet.org/weight-management-adult-program

### August 2017

**International Congress on Nutrition and Metabolism in Renal Disease 2017**  
August 2-5, 2017  
Bangkok, Thailand  
http://www.ishd2017.org/index/ishd_Welcome.php

**NATCO 42nd Annual Meeting**  
August 2-5, 2017  
St. Louis Union Station Hotel  
St. Louis, MO  
http://www.natco1.org/Education/annual-meeting.asp

### October 2017

**FNCE® 2017 Food & Nutrition Conference & Expo**  
October 21-24, 2017  
McCormick Place West  
Chicago, IL  

**ASN Kidney Week 2017**  
October 31-November 5, 2017  
New Orleans, LA  
https://www.asn-online.org/kidneyweek/

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### Attention

**RPG Members:**  
2017-18 Reviewers Needed for the Renal Nutrition Forum and Handouts

Contact  
rpgforumeditor@renalnutrition.org  
for more information.
Renal Practice Group: Social Media

The Renal Dietitians Practice Group continues to explore the realm of social media and is now on Facebook and Twitter platforms. “Like” our Facebook page (Renal Dietitians-RPG, www.facebook.com/renaldietitians) and “follow” us on Twitter (Renal Dietitians-RPG, @RenalRDNs) for instant access to the most current information and resources in the field of renal nutrition including the following:

- Upcoming Conferences and Meetings
- Recent Findings in Kidney Disease and Nutrition Related Research
- Kidney-Friendly Recipes and Demonstrations
- Continuing Education Opportunities
- Renal Nutrition Topics in Current News
- Volunteer and Career Opportunities
- …and much more!

Suggestions for our social media platforms? E-mail rpgsocialmediachair@renalnutrition.org with your ideas and/or if you would like to volunteer.

Renal Nutrition Forum Submission

RNF Guidelines for Authors

We are always looking for articles about successful programs, research interventions, evaluations and treatment strategies and educational materials. Please forward information to: Managing Editor at rpgforumeditor@renalnutrition.org.

All submissions for publication should be submitted to the editor as an email attachment (MS Word file). Accepted articles from the Renal Nutrition Forum will be posted on the Members Only Section of the RPG website. Thus, please include a brief introduction or abstract plus 2-3 key words with article submissions.

Article Length:
Article length is determined by the Editor for each specific issue. The feature and advances in practice article (including abstract) is approximately 2500 words. Other supportive articles are 1000-1500 words; member highlights and reports are approximately 400-500 words.

Text Format:
Times New Roman font, 12 point, double space.

Tables/Illustrations:
Tables should be self-explanatory. All diagrams, charts and figures should be camera-ready. Each should be accompanied by a title and brief explanatory caption.

References:
References should be cited in the text in consecutive order parenthetically. At the end of the text, each reference should be listed in order of citation. The format should be the same as the Journal of the Academy of Nutrition and Dietetics.

Reference Citation Examples:

- Article in Periodical:

- Book:

- Chapter in a Book:

- Website:

- Author Information:
  List author with first name, middle initial (if any), last name, professional suffix and affiliation below the title of the article. Also include the primary author’s complete contact information including affiliation, city, state and email address.
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Vision: RPG members are a valued source of expertise in nephrology nutrition

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