Implementing an Interactive Educational Intervention to Increase Knowledge on Phosphorus Diet and Binder Adherence in Patients Receiving Hemodialysis

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Abstract

Background: Maintaining low serum phosphorus (PO4) levels is recommended in patients receiving hemodialysis through a low phosphorus diet and binder medication compliance, however this remains a struggle for many patients. The literature shows that educational interventions focused on phosphate management can increase patients' knowledge and improve patient outcomes.

Purpose: To implement an educational intervention focused on low phosphorus diet and adherence to binder regimen to increase patients' knowledge base, receiving hemodialysis at an outpatient unit at a Veterans Affairs (VA) Hospital.

Methods: An interactive educational intervention involving two 30-minute, one-to-one counseling sessions with educational materials including short videos and a take-home pamphlet were given to patients receiving hemodialysis at an outpatient unit in a VA hospital over three weeks. Demographics, pre/post surveys, and a satisfaction survey were collected.

Results: Following the intervention, all participants reported increased knowledge on adherence to a low phosphorus diet and phosphate binder prescription. A paired samples t-test showed a statistically significant increase in the test scores from pre to post results.

Conclusion: Findings from the quality improvement (QI) project show that a focused and interactive educational intervention about phosphorus diet and binder adherence can increase knowledge in patients receiving hemodialysis. One-to-one sessions with interactive videos, discussion, and pamphlets are successful means to engage the patient in learning new material.

*Keywords**:*** hemodialysis education, interventions, compliance, diet, phosphorus

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Thirty-seven million people in the United States (U.S.), making up 15% of the population, are estimated to have Chronic Kidney Disease (CKD) (Centers for Disease Control and Prevention [CDC], 2019). In 2016, approximately 125,000 people in the U.S. started treatment for end stage kidney disease (ESRD) and more than 726,000 people were on dialysis or living with a kidney transplant (CDC, 2019). Dialysis treatments are needed to artificially filter wastes and water from the blood when kidneys stop functioning. In 2017, 62.7% of patients with ESRD were receiving hemodialysis (HD) therapy and 98.0% of those patients used in-center hemodialysis (United States Renal Data System [USRDS], 2019). When patients are started on hemodialysis, many lifestyle modifications need to occur to improve their quality of life. Patients must follow a regimen that includes medications, dietary changes, and fluid restriction to prevent excessive accumulation of wastes, solutes, and fluid (Clark-Cutaia et al., 2019). Non-adherence to therapeutic recommendations can play a role in adverse effects on quality of life and increased morbidity and mortality.

Background

Patients receiving hemodialysis have expressed high stress levels and combat many physical, psychological, and social problems when they initiate treatment because of all the necessary lifestyle changes. One of the most important aspects is for patients to adhere to specific diet recommendations and medication compliance to decrease phosphorus (PO4) in their blood. The dialysis dietary regimen can be one of the most restrictive diets and these limitations can lead to many frustrated patients, which results in suboptimal adherence and compliance (Kalantar-Zadeh et al., 2015). Hemodialysis removes some PO4, but is not as efficient as functional kidneys. If the level of PO4 rises in the blood, it can have multiple harmful effects on the body leading to long-term complications. The goal for patients receiving dialysis is to keep their PO4 level between 3.0-5.5mg/dl. High PO4 levels can lead to hardening of the arteries in the body, serious skin ulcers, and softening of the bones. Phosphate retention has been shown to play a crucial role in the development of chronic kidney disease-mineral bone disorder. Additionally, it also increases the risk of cardiovascular events and mortality in patients with CKD (Mitch & Remuzzi, 2016).

One of the most important aspects of nursing in hemodialysis is to educate the patients, which can positively affect their quality of life (Ebrahimi et al., 2016). Improvement of the patients' nutritional status is an essential component of a nursing intervention to reduce the complications of their disease (Ebrahimi et al., 2016). Focusing on a dual intervention with a low-phosphorous diet and the addition of phosphate binders is more effective than either approach alone to reduce serum phosphorus levels (Mitch & Remuzzi, 2016). Dietary educational interventions can increase patients' knowledge and improve compliance, ultimately leading to better patient outcomes with fewer complications. Patients have many perceived barriers including time, convenience, and financial constraints (Clark-Cutaia et al., 2019). These obstacles should be addressed when implementing dietary educational interventions and patient individualization should be acknowledged.

Problem Statement

The risk of long-term complications of elevated and uncontrolled serum phosphorus levels include skin itching, bone disease, vascular calcification, and increased cardiovascular complications. There is a need for nursing educational interventions geared toward increasing phosphorus diet and binder knowledge/compliance amongst patients receiving hemodialysis to improve patient health outcomes. This DNP QI project focused on implementing an interactive educational video and brochure to patients receiving hemodialysis at an outpatient unit to improve their knowledge about phosphorus diet and medication recommendations.

Organizational "Gap" Analysis

This QI project was conducted at an outpatient hemodialysis unit at a Veterans Affairs Hospital. There was a total of 25 patients in the chronic hemodialysis unit. Nurses, providers, and the dietician at this unit expressed concern with patient non-adherence regarding their phosphorus binders and not following a low-phosphorus diet. To increase their knowledge, staff discussed that an educational intervention to improve phosphorus diet/binder comprehension amongst the patients would be beneficial. This intervention was intended to educate the client and their family members about the importance of maintaining therapeutic phosphorus levels, increasing compliance with phosphorus medications and diet, and improving patient health outcomes. There was no standardized educational tool or video to review with the patients that discussed phosphorus goals and recommendations. The goal was to supply patient education that was tailored to their individual needs and offer suggestions to overcome potential barriers that they may encounter when making lifestyle changes.

Review of the Literature

A comprehensive search of the literature was performed using Cumulative Index of Nursing and Allied Health Literature (CINAHL), PubMed of the National Library of Medicine, and Cochrane Library databases. The search terms used to find relevant literature were: *hemodialysis, education, interventions, compliance, diet, phosphorus, and adherence.* Additionally, further search terms *phosphorus complications and hemodialysis quality of life* were used to gain further information regarding patient complications. The results of these searches were narrowed down by using inclusion criteria of availability of full text, within the past six years starting in 2014 to present, and English text only. Exclusion criteria included articles that were published prior to 2014, articles that were not in English, were not available in full text, and any articles not related to patients receiving hemodialysis, which ensured that the most up-to-date and relevant articles were used in this review of literature. The goal was to find evidence-based interventions that effectively increased patient knowledge about phosphorus diet/binder recommendations and increased compliance.

The initial search resulted in 560 articles in CINAHL and was narrowed down to 36 articles after the exclusion criteria were applied. The same search was conducted in PubMed that resulted in 3187 articles that were reduced to 78 articles after the specific criteria were applied. The Cochrane Library resulted in 17 articles, with only five eligible articles for possible review. A total of 10 articles were chosen to review based on relevance to hemodialysis educational interventions related to dietary and medication compliance. The articles were also narrowed down to the most recent publications.

The studies and articles found in the search identified that phosphorus compliance among patients with chronic kidney disease requiring renal replacement therapy remains a struggle (Alikari et al., 2019). Phosphate control is a treatment goal but poor patient adherence to phosphate binder therapy and low phosphate diets lead to poor health outcomes in patients such as increased mortality rate. Many studies identified educational interventions used to increase patient knowledge and adherence but also identified some potential barriers (Ebrahimi et al., 2016).

Use of Educational Interventions

Evidence in the literature shows that educational interventions have improved patient quality of life and adherence to dietary restrictions and medication compliance. In one study, a one-time personalized (face-to-face), nurse-led educational intervention with a booklet was conducted in an outpatient hemodialysis unit with 50 patients (Alikari et al., 2019). This quasi-experimental study results showed that after the intervention was implemented, there was a significant increase in knowledge level. A patient-centered approach strengthened the patient's role in their own clinical decision-making through information and determining their educational needs (Alikari et al., 2019).

A nutritional education intervention was performed at a hemodialysis unit in Iran that consisted of face-to-face educational sessions lasting 30-40 minutes. The educational material used was a pamphlet that including information regarding the importance of adherence to a healthy diet, avoiding harmful consequences of poison accumulation in blood and tissues, and a list of food restriction and limitations in fluid intake (Ebrahimi et al., 2016). A post-test evaluation regarding patient's knowledge on dietary instructions and their quality of life (QOL) was done. Results showed that the patient's mean score of knowledge about their dietary needs significantly increased and their QOL score also improved (Ebrahimi et al., 2016). These results were compared with a control group that received no educational intervention which showed no significant differences.

In another randomized control trial, 48 patients receiving hemodialysis were enrolled into an education group where they received education about phosphate control in a 30-minute face-to-face education session with leaflets (Lim et al., 2018). The education provided did not affect the calcium-phosphate product, but proper timing of binder intake and dietary phosphate to protein ratio showed improvements (Lim et al., 2018).

Short-term one-to-one individualized pharmacist-led education and counseling on phosphate binders was conducted on a total of 69 chronic patients receiving hemodialysis in Norway (Hjemas et al., 2019). The researchers found that although the intervention did not decrease serum phosphate levels, the patients reported increased knowledge about phosphate binders and understanding of adherence (Hjemas et al., 2019). The educational intervention consisted of a 30-minute single session with personalized counseling and an educational leaflet about phosphate binders. Information included the role phosphate functions in the body, foods containing phosphate, and how one gets too much phosphate and its consequence on the body. Phosphate binder effects, importance, practical information regarding intake, and possible side effects were also included in the education (Hjemas et al., 2019).

Another quasi-experimental study conducted in Turkey found that the nurse’s education had a positive effect on the knowledge and behavior of patients receiving hemodialysis in regard to dietary and fluid restrictions (Duzalan & Pakyuz, 2018). The authors found that after a 30-45 minute educational session was given regarding dietary and fluid restrictions, the intervention group showed significant increase in knowledge about dietary restrictions and showed improved behaviors through a reduction in achieved serum levels (Duzalan & Pakyuz, 2018).

A systematic review by Milazi et al. (2017) assessed the effectiveness of educational or behavioral interventions on adherence to phosphate control in adults receiving hemodialysis. A total of 18 studies were included in the review, and 16 of the studies showed significant improvements in phosphate levels. Eight randomized clinical trials favored educational or behavioral interventions over standard care to improve phosphate control. Overall, the review showed that educational interventions led to improved serum phosphate levels, patient knowledge, and adherence to phosphate control methods (Milazi et al., 2017).

A nutritional education program that consisted of eight, one-hour sessions in four weeks were given to an intervention group of 45 patients receiving hemodialysis in Iran (Nooriani et al., 2019). This randomized control trial with a control group found that using the Health Belief Model (HBM) in an educational intervention significantly increased the nutritional knowledge for the intervention group. There was no effect on dietary intake, but findings indicated that making a long-term change in the patient’s behavior should involve continuous monitoring and comprehensive programs. This program’s education material consisted of in person training done individually and in groups of five to six people using lecture, group discussion, role-playing, pamphlets, and booklets (Nooriani et al., 2019).

Intervention Focus

A systematic review discovered that effective patient education should include specific recommendations of foods with minimal inorganic phosphorus content, foods without phosphorus additives, low phosphorus to protein ratios, and adequate protein content (Umeukeje et al., 2018). Education should also include cooking methods, such as boiling, to promote the low-phosphorus diet. Sources of phosphate are often overlooked and mainly come from processed foods and medications. Patients should be informed that to preserve their color and shelf life, almost all processed foods contain phosphate additives such as disodium phosphate, monosodium phosphate, and potassium triphosphate (Barreto et al., 2019). Successful nutrition programs that increased knowledge, reviewed content on perceived susceptibility of patients to their illness and the importance of a proper diet for hemodialysis, including food groups and a substitution list for renal patients. Other topics included were perceived severity of complications, perceived benefits, barriers, and self-efficacy (Nooriani et al., 2019)

Potential Barriers and Determinants

Phosphate binder adherence was measured in a study of 135 patients receiving hemodialysis, revealing that adherence was increased in patients living with a partner, had greater social support, and higher physical quality of life (Van Camp et al., 2014). Results suggested interventions to aim at including social support. In an observational study of 60 patients, 60-68.3% had good adherence to dietary restrictions and 20-30% with fair adherence (Beerappa & Chandrababu, 2019). Younger male patients and smokers were at the highest risk for non-adherence. To address this concern, it is recommended that non-adherence behaviors be addressed with constant monitoring and motivation/counseling sessions should be arranged.

Chronic kidney disease self-management behavior and perceived self-efficacy for CKD have been related to phosphate control (Milazi et al., 2017). A lack of data on how the studies implemented their interventions was found while conducting the review. Psychosocial factors are the most influential determinants of adherence because they can be modified through incorporating interventions that focus on enhancing their self-regulation behaviors (Umeukeje et al., 2018). Large pill burdens and forgetfulness amongst patients receiving hemodialysis have been shown to decrease phosphate binder adherence (Lim et al., 2018).

Summary of Literature Review

Interactive educational interventions that have been tailored to the needs of patients receiving dialysis, have been effective in increasing the knowledge of phosphorus dietary and binder recommendations (Alikari et al., 2019; Duzalan & Pakyuz, 2018; Ebrahimi et al., 2016). A lack of behavior change in dietary and binder intake continues to be a result that could be related to other factors including lack of social support, pill burden, socioeconomic status, and forgetfulness (Beerappa & Chandrababu, 2019; Lim et al., 2018; Van Camp et al., 2014).

Interventions should be focused on including the patient in their care and encouraging them to make their own behavior changes (Umeukeje et al., 2018). Each educational intervention included face-to-face personable interactions with sessions ranging from 30-60 minutes in duration and provided other educational materials such as brochures and pamphlets to keep as a reference. This DNP project used this evidence to guide the development of two interactive, 30-minute educational sessions that used short videos and a pamphlet to discuss dietary phosphorus restrictions, phosphorus binder compliance, possible complications, and how to make practicable changes. The information given focused on improving patient health outcomes and encouraging self-management behaviors.

Evidence Based Practice: Verification of Chosen Option

Research has shown that an educational intervention can improve the knowledge of patients receiving hemodialysis regarding their treatment recommendations. Many patients receiving hemodialysis struggle with complying with the strict phosphorus diet restrictions and phosphorus binder prescription. This DNP QI project focused on increasing phosphorus diet and binder knowledge of patients receiving hemodialysis through two interactive educational sessions. As a result, patient awareness can increase and lead to behavior changes that improve the patient's quality of life.

Theoretical Framework/Evidence-Based Practice Model

The Health Belief Model (HBM) is a theoretical framework used for this DNP project (Appendix A). The HBM is a framework in nursing that is utilized for education in health promotion and has been used to explain/predict individual changes in health behaviors. The HBM has six components: perceived susceptibility to illness or condition, perceived severity of the disease or condition, perceived benefits of predictive action, perceived barriers that prevent action, cause to action that affect individual to take action, and self-efficacy (Nooriani et al., 2019). Understanding these components helps to identify motivating factors for the patient to make health behavior changes.

This DNP project looked at demographic variables to assess possible influencing factors. The demographic variables that were incorporated into the questionnaire included education, marital status, age, gender, race/ethnicity, employment status, living situation, and the amount of years on dialysis. These questions were guided by the theoretical framework to determine if these factors played a role on the patients' health motivation, perceived susceptibility, severity, and benefits. The educational material provided, focused on how high levels of serum phosphate can affect the patient (susceptibility), long-term health complications such as cardiovascular risk/mortality (severity), reducing risk of complications and better treatment outcomes (benefits), explaining possible barriers such as lack of support/pill burden and how to get around them (barriers), showing how to make behavior changes (cues to action), and promoting self-independence behaviors (self-efficacy) were instructed. Using the HBM to guide a nutritional education intervention for patients receiving hemodialysis has been shown to effectively increase dietary knowledge (Nooriani et al., 2019). Increased knowledge can potentially lead to improved medication and dietary adherence and behavior modifications.

Goals, Objectives, and Projected Outcomes

This DNP project aimed to increase patient knowledge about the recommended phosphorus diet and binder regimen for patients receiving hemodialysis to ultimately increase adherence and improve patient health outcomes. This goal was informed through the HBM by including educational materials that would show the patient susceptibility and severity of complications caused by long-term elevation of serum phosphorus levels. Understanding the six components of the HBM allowed this DNP student to create an educational intervention that would result in the projected outcomes.

Project Goals/Objectives	Projected Outcomes
Implement an educational intervention that focuses on phosphorus diet and phosphorus binder adherence for patients receiving hemodialysis at an outpatient unit	To increase patient knowledge about how to follow a low phosphorus diet and taking binders appropriately through two, 30-minute face-to-face sessions using short videos and an educational pamphlet over three weeks at a VA hospital chronic outpatient hemodialysis unit. Projected participant goal of 75% of total patients.
Increased patient knowledge regarding proper low PO4 diet, PO4 binder adherence, how it affects the patient and how they can make informed choices	Projected outcome to have 100% of patients show increased knowledge through the post intervention survey. Projected goal of 50% score increase in participants post-test.
Assess satisfaction of educational intervention and possible improved patient outcomes	Patient to express satisfaction with one-to-one interaction and report improved behavior changes through the post intervention survey

Methods

This QI project used evidence-based practice of an educational intervention to increase patients receiving hemodialysis knowledge and adherence regarding a low phosphate diet and phosphate binders. The intervention included two 30-minute one-to-one sessions during their hemodialysis treatments over three weeks and included three short videos, an educational pamphlet, and discussion. The Health Belief Model was used to guide the format of the educational intervention to include the six components (Appendix A). The videos, discussion, and pamphlet in the interactive sessions focused on showing the patient susceptibility to increased phosphorus levels, severity of complications as a result, barriers that could occur, benefits of improving PO4 diet/binder adherence, and the actions they would need to take to improve their health. The short videos were from the American Kidney Fund that discussed phosphorus, kidney disease, and tips on dietary choices. The American Kidney Fund provided permission to use any of its online resources and handouts in this QI project. Another short video from DaVita Kidney Care was also shown, that reviewed how phosphorus binders work. The DNP student created the educational pamphlet and included information on foods high and low in PO4, how to take PO4 binders, how to read food labels, long-term complications from elevated serum PO4 levels, and suggestions for the patient to improve compliance (Appendix B). A list of additional resources was also provided for the patients to retrieve additional information about the PO4 diet and binders.

The educational intervention was executed at an outpatient hemodialysis unit at a VA hospital and conducted by this DNP student. Eligible participants included patients on hemodialysis, 18 years of age or older, and able to sign a consent form and fill out surveys. Prior to the pre-knowledge survey, the patients were informed that the surveys would only be used to assess their knowledge about phosphates and dialysis. Pre-knowledge surveys were collected to assess baseline knowledge regarding information about PO4 diet/binders, and demographic data (e.g. sex, gender, race, marital status) was also obtained at baseline. A post-knowledge survey was collected right after the second 30-minute session to assess learned knowledge. The post satisfaction survey included questions regarding satisfaction of the educational intervention and improved patient outcomes (e.g. behavior changes and improved attitude). The DNP student created the questionnaires and included questions and information generated from other effective studies found during the literature review.

Project Site and Population

The site for this QI project was at a chronic outpatient hemodialysis unit at a VA hospital. There were a total of 25 patients on chronic hemodialysis that could be eligible to participate. Approximately 50% of the patients struggled with maintaining serum PO4 levels within the goal of 3.0-5.5 mg/dl. There were two dialysis shifts per day (morning/afternoon), on a Monday, Wednesday, Friday or Tuesday, Thursday, Saturday schedule. The patients in this unit were predominantly African-American and Caucasian, ranging in ages from 50-92 years old. They were recruited to participate based on their ability to partake (cognitive/behavioral capability) in the educational intervention. The patients had to be on hemodialysis for a minimum of three months to be included in the DNP project.

All staff members encouraged the DNP student to implement this project in hopes that the intervention would improve patient compliance and knowledge regarding PO4 issues. Prior to this project, there were no standardized educational tools to provide the patients with phosphorus information. The dietitian would see the patients once a month after monthly labs were drawn and counseling was performed based on their lab results. The responsible provider and nurse also provided patient education on an as-needed basis.

Measurement Instruments

A demographic survey was constructed using eight questions that were obtained from all participants (Appendix C). Demographic data such as age, gender, race, marital status, and education status were asked. A pre and post-knowledge test was created with 22 questions to assess the patients' knowledge about phosphorus information (Appendix D). The survey was administered before and after the education intervention was implemented. The questionnaire included questions about a phosphorus diet and binders, food choices, and complications of nonadherence. The same questions were asked in the post survey to assess increased knowledge after the intervention. A post satisfaction survey with seven questions was administered after the post-test (Appendix E). This survey was qualitative data to assess patient satisfaction and perceived behavior/attitude change. The tools were constructed based on information that was included in successful studies that used education interventions to improve PO4 knowledge amongst patients receiving hemodialysis. Input from the nephrology nurses, provider, and dietitian was also considered when constructing the surveys.

Content included in the educational intervention was from reliable resources such as the National Kidney Foundation, the American Kidney Fund, DaVita Kidney Care and the National Institute of Diabetes, Digestive, and Kidney Diseases. The dietician on the hemodialysis unit was consulted to include proper low phosphorus food choices and diet recommendations for patients receiving hemodialysis. The first educational session included a three and four-minute video from the American Kidney Fund that discussed low phosphorus food options, grocery shopping tips, and how to read food labels to look for added phosphorus. The remaining time in session one then focused on discussion with the patient and pamphlet review about phosphorus diet recommendations and why it is essential to monitor phosphorus levels. The second session included a four-minute video from DaVita Kidney Care about how phosphorus binders work, educational information on different phosphorus binders, how to take them properly, and possible complications of elevated serum phosphate levels.

Data Collection Procedures

The patient participants were recruited by explaining the QI project and how it can positively affect their health outcome. This was guided by the HBM to show the participants susceptibility and benefits of receiving the educational intervention. Sixteen patients were recruited for the project and signed an informed consent agreeing to participate. In the first session, demographic data was obtained, an identification code to link the pre and post survey was created by each patient to maintain confidentiality, and the pre-test knowledge survey was administered. Once completed, the educational intervention began individually on a one-to-one basis over three weeks. The DNP student provided two 30-minute educational sessions three weeks apart including interactive discussions with the patient, short videos to engage the patient, and a pamphlet that was reviewed and remained with the patient as a reinforcement. The patients completed the post-test knowledge survey after the conclusion of the second educational session. All patients participated in both sessions and were all included in the data analysis to assess learned knowledge. After the second session, each participant was given a folder to take home that included other useful handouts, a list of additional resource websites, a VA eKidney pamphlet, and the phosphorus pamphlet created by the DNP student. They were also given a goody bag after completing the last session that included renal-friendly snacks (fig newtons, sugar-free jolly ranchers, animal crackers, low sodium popcorn, and rice crispy treats), a pill holder, and a five-dollar voucher to use at the VA store/café. The entire educational intervention included all six components of the health belief model by teaching the participants how having an increased phosphorus level could affect them (susceptibility), the complications it could cause (severity), and personal health benefits if their phosphorus levels were within goal to prevent future complications. They were given expected barriers, suggestions to overcome them, how to make action changes, and understanding that they were the most important person to control their phosphorus diet/binder adherence.

For patient convenience, the educational sessions were conducted during their dialysis treatments. The DNP student implemented all 30-minute sessions with patients receiving dialysis. This DNP student was a nurse at this hemodialysis unit, and the educational sessions only took place on days the DNP student was not working there. Each patient was assigned a unique identifier code by allowing them to choose the first three letters of their mother's first name and the first three letters of their favorite food to ensure patient privacy. The pre-test was placed in a locked cabinet that was not opened until after all of the sessions were done. The demographic information was aggregate data and was not linked to the patients' identification code.

Data Analysis

Data was analyzed using descriptive statistics collected from the demographic, pre/post, and satisfaction surveys. The Statistical Package for the Social Science (SPSS) was used to complete the analysis. Qualitative feedback from the patients was used to determine satisfaction and usefulness of the educational intervention. Data from the post satisfaction surveys will be used to improve the educational materials' content for future use. The pre/post surveys included questions to test patients' knowledge about high phosphorus foods and how to take their binders to assess what they knew before and after the intervention. A paired samples t-test was used to analyze the data from pre to post-test. Frequency tables were used to describe the demographics of the participants and responses from the satisfaction surveys.

Ethical Considerations/Protection of Human Subjects

The University of Massachusetts, Amherst (UMASS) Internal Review Board (IRB) approval was obtained prior to initiating the DNP project (Appendix F). All participants were protected by the Health Insurance Portability and Accountability Act of 1996 (HIPAA) to ensure privacy of patients' health information. Informed consent was obtained from all patients before participating in the project. Any identifiable information was kept to a minimum. Patient confidentiality was assured by coding the participants using unique identification numbers with the first three letters of their mother's name and the first three letters of their favorite food. All materials were held in a locked cabinet in the project mentor's locked office. Any data collected and analyzed on the computer was password protected and did not contain any identifying data. There was minimal risk to patients, while there were potential benefits of improved health outcomes for participants.

Cost-Benefit Analysis

Time was donated by the project manager (DNP student), the project mentor, and project site staff involved with feedback. Financial costs included money used to print pamphlets, buy folders, bags, pill holders, snacks, and the software The Statistical Package for the Social Science (SPSS). The cost for the materials needed was $200. The educational intervention was conducted in the dialysis unit and no additional costs were needed for the room. The videos from the American Kidney Fund were located on YouTube at no additional cost. The videos were shown on a computer on wheels provided by the site using on-site internet. No financial incentives were offered to the patients prior to the project, but they were given information on how increased knowledge can improve their health outcomes and a five dollar VA store gift card was included in the goody bag after completion of the QI project. No additional costs for transportation were needed due to the intervention being performed during their scheduled dialysis time. The DNP student assumed financial resources for the project. The phosphorus diet and binder educational intervention were beneficial for the patients and VA healthcare system with a hopeful reduction in assumed health care costs related to long-term phosphorus complications such as calciphylaxis and bone disease. Based on the intervention results of improved patient knowledge, the organization will use the educational resources as part of their orientation to new patients initiating hemodialysis. The hemodialysis nurses will be able to use this educational intervention in the future to improve patients' phosphorus diet and binder adherence.

Timeline

The DNP project was approved by the Fall semester of 2020 (October 2020). Recruitment of participants and consent was obtained in January of 2021. The educational intervention session one was implemented on January 8th and 9th, 2021 and the second session on January 25th and 26th, 2021. Once data was collected after the three-week implementation, the data was analyzed in February 2021. Presentation of the project results will be delivered to the staff nurses and providers of the hemodialysis unit during April 2021 (Appendix G).

Results

The DNP project took place at a chronic hemodialysis unit at a VA hospital over three weeks. There were 25 patients receiving care at the unit; one was hospitalized, one was on vacation, and seven patients were unable to participate or unable to consent. A total of 16 patients (n=16) agreed to participate and signed consent. During the first session, each participant created a unique identifier code for their pre and post-tests to maintain confidentiality, completed the demographic and pre-test survey. The first session included two short videos, a review of the created phosphorus pamphlet, and interactive discussions about what PO4 is, expected goals, foods to avoid, better low PO4 choices, and how to read food labels to look for added phosphorus. A second session held 17 days later included a short video about how phosphorus binders work, pamphlet review, discussions about the different types of binders and how they work, possible complications due to elevated serum PO4 levels, and recommendations for the patient to improve compliance with their diet and binder intake. During the session, the participants were shown pictures of calciphylaxis complications. Immediately after the second session, all the participants completed the post-test survey and a satisfaction survey. They were all given a goody bag with renal-friendly snacks, a five dollar VA store gift card, a folder with PO4 resources, handouts, and the pamphlet for further review.

Demographic Survey

Of the 25 patients receiving hemodialysis, there were a total of 16 (64%) eligible participants, and 100% of the patients (n=16) completed the demographic survey. Characteristics examined included age, gender, race/ethnicity, education level, employment status, marital status, living situation, and years on dialysis. Table 1 below presents a characteristic summary of the participants included in the project.

Table 1
Patients Receiving Hemodialysis Demographics (n=16)

Characteristics	n	%
Age		
45-54	2	12.5
55+	14	87.5
Gender		
Male	16	100
Race/Ethnicity		
White	5	31.3
Black	11	68.8
Level of Education		
High school	13	81.3
Bachelor’s degree	1	6.3
Other	2	12.5
Employment status		
Unemployed	2	12.5
Retired	14	87.5

Marital status		
Single	4	25.0
Married	5	31.3
Divorced	6	37.5
Widowed	1	6.3
Currently living with		
Alone	9	56.3
With partner and/or children	5	31.3
With parents or other	2	12.5
Years on dialysis		
3 months-1 year	1	6.3
1-5 years	7	43.8
5-10 years	3	18.8
11+ years	5	31.3

Note. Other answer options not included in the table because they were not reported.

Pre and Post-Test

After the educational intervention was implemented, all participants (100%) had an increase in their post-test compared to their pre-test. A paired samples t-test was performed and determined that there was a statistically significant increase in test scores from pre to post ($p<.001$). See the graph, table 2, and table 3 below.

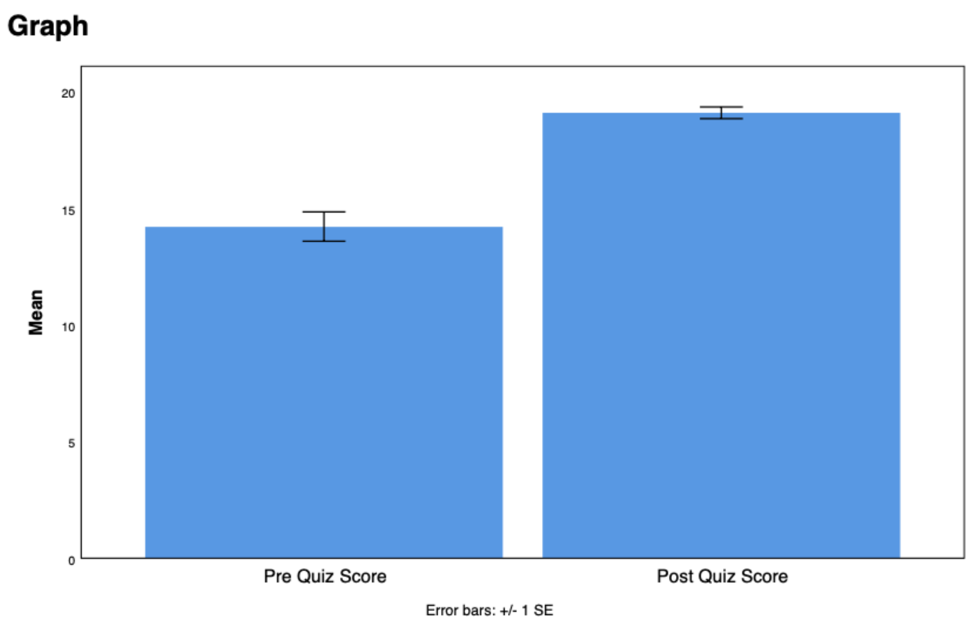

Table 2
Paired Sample Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pre Quiz Score	14.19	16	2.562	.640
Post Quiz Score	19.06	16	.998	.249

Table 3
Paired Samples Test

	Paired Differences		t	df	Sig. (2-tailed)
	Mean	Std. Deviation			
Pre Quiz Score- Post Quiz Score	-4.875	2.500	-7.800	15	.000

Satisfaction Survey

The satisfaction survey showed that 100% of the participants (n=16) felt that the information they learned from the educational intervention would help them make better food choices low in phosphorus. All participants (n=16) also felt that the information they learned would improve their phosphorus binder intake. The satisfaction survey was guided by the HBM by showing results of self-efficacy. All the participants reported that they felt they had the capability to make better food choices and improve their phosphorus binder intake. See table 4 below for a summary of the post satisfaction questions asked and the responses based on percentages.

Table 4
Summary of Post Satisfaction Survey

Question	Responses	Frequency n=16	Percent %
Do you feel that the information you have learned will help you make better food choices low in phosphorus?	Yes	16	100
Do you feel that the information you have learned will improve	Yes	16	100

your phosphorus binder intake?			
Did you learn anything new from the education you received?	Yes	15	93.8
	No	1	6.3
If yes, list three new things you learned from these educational sessions.	Narrative responses: "I am the most important person." "Too much calcium and phosphorus together can cause damage." "Complications with calciphylaxis." "Take binders with meals." "How to read food labels." "Types of foods to avoid." "Good low PO4 snacks." "Complications." "Long-term effects." "PO4 goal level." "How binders work and the importance of taking them." "Ask your providers and nurses for help." "Right foods to eat." "Where PO4 is stored."		
How satisfied were you with this educational teaching?	Satisfied	4	25.0
	Very Satisfied	12	75.0
How could this educational program be improved?	Narrative responses: "Nothing." "Give this education more often." "An app or something to use on my own time."		

	"Nothing, but continue this with other topics as well." "Have more sessions." "Better PO4 binder video." "More about complications."		
The sessions provided were too long.	Disagree	11	68.8
	Strongly Disagree	5	31.3
The videos provided were helpful in learning more about phosphorus.	Strongly agree	7	43.8
	Agree	9	56.3

Note. The satisfaction survey was anonymous with no ID code connected to it.

Discussion

The QI project aimed to create a standardized educational intervention that was interactive with patients receiving hemodialysis to help increase their knowledge regarding phosphorus diet and binder adherence. The findings did show a significant increase in the participant's post-test scores compared to their pre-test scores. Literature has shown that interventions should be focused on including the patient in their care and encouraging them to make behavior changes (Umeukeje et al., 2018). This DNP student made sure to tailor each one-to-one session with the patient to include them in their care and ask them how they could make changes to their habits. Each participant was engaged and wanted to know how they could make changes to improve their health. All participants (n=16) completed the two educational sessions, and each filled out a demographic, pre/post-test, and satisfaction survey. An initial projected participant goal of 75% was set for this QI project. A total of 64% of the patient population at the hemodialysis unit participated in this project. The 36% of patients that did not participate were due to inability to sign consent/partake, hospitalization, and vacation at the time. All of the patients (n=16) expressed satisfaction with the one-to-one interaction and reported improved behavior changes in the future. The participants were engaged and conveyed a desire for future educational sessions to continue.

This project revealed that 56.3% of the participants lived alone. The literature has shown that phosphate binder adherence was increased in patients living with a partner (Van Camp et al., 2014). Future efforts to educate patients receiving hemodialysis about phosphate diet and binder adherence, could focus on ways to provide further social support for those who do not have the support needed at home. All of the participants (n=16) reported satisfaction with the educational intervention with 75% of the participants who were very satisfied and 25% who were satisfied. One of the narrative suggestions provided by the participants was, “Give this information more often.” Research has shown that non-adherence behaviors in patients receiving hemodialysis should be addressed with constant monitoring and consistent motivation/counseling sessions (Beerappa & Chandrababu, 2019). Further goals should include a set plan to implement scheduled educational sessions to reinforce the information learned regarding recommended phosphorus diet and binder intake.

Future Implications

This DNP project aimed to increase patient knowledge and ultimately improve their health outcomes through a decrease in their serum phosphorus levels by making better choices. The plan is for the staff nurses to use the same materials and approach used in this DNP project with future patients receiving hemodialysis. The one-to-one sessions with a structured format were effective in increasing knowledge of the patients receiving hemodialysis. This plan is feasible but time constraints allotted for the nurses to spend with the patients may become an issue when trying to care for other patients during the day.

Setting Facilitators and Barriers

Some expected barriers were the patient's lack of desire to participate and resistance to promote change. Many of the patients were stuck in habit and felt comfortable eating whatever they desired because this was always their mindset. All of the participants showed interest and wanted to learn more. The patients expressed motivation to make behavior changes after understanding the harmful effects on their body with elevated serum phosphorus levels. Fear was perceived as a facilitator because patients wanted to reduce their susceptibility to possible long-term complications. Time constraints with providing the educational intervention was posed as a possible barrier if more time was needed to give information or answer patient questions. The allotted 30-minute time frame for the two sessions was sufficient to teach the participants about the recommended phosphorus diet and binders. There were four providers, one dietitian, one social worker, ten registered nurses, and one patient care technician who managed care for the chronic patients receiving hemodialysis. The renal physician assistant offered to support the implementation of this quality improvement project. Each of these staff members were considered project facilitators and provided their expertise when implementing this project. Staff resistance was posed as a possible barrier if the educational intervention interfered with the allotted patient treatment times, but this was not an issue during this project.

Conclusion

Hemodialysis is a renal replacement therapy that requires many patient lifestyle changes that can be considered a burden. Research shows that patients receiving hemodialysis struggle with adherence to phosphorus dietary restrictions and compliance with phosphorus binder medications. Dietary adherence remains a problem because long-term elevated serum phosphate levels can lead to increased cardiovascular risk and mortality. Evidence demonstrates that educational interventions can improve patient knowledge and help them adhere to their PO4 dietary/medication treatment regimen. This DNP QI project's goal was to implement an interactive educational intervention at an outpatient hemodialysis unit with intent to expand patient knowledge regarding phosphorus management and ultimately lead to improved patient adherence/compliance. The participants expressed struggling with all the required fluid, diet, and medication recommendations due to the lack of knowledge and received support. Continuing to support and educate these patients will help them understand that they can control their health and make the necessary changes to improve their outcomes. To resume this care at the project site the nurses must understand that the patients need constant support and implementation of these standardized educational sessions to help them overcome challenges.

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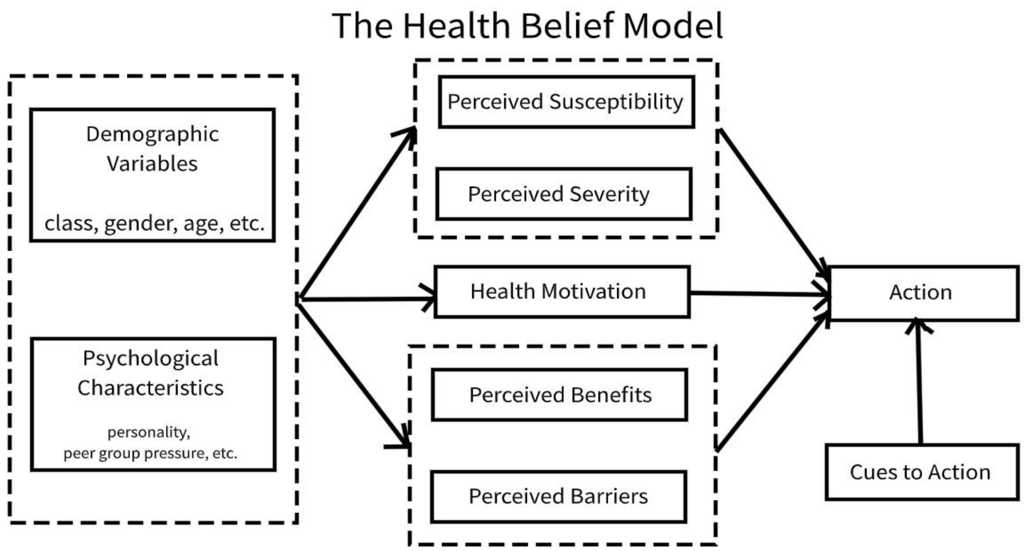
Appendix A

Health Belief Model



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Concept	Definition	Application	Intervention
Perceived Susceptibility	One's opinion of chances of getting a condition	Define population(s) at risk, risk levels; personalize risk based on a person's features or behavior; heighten perceived susceptibility if too low.	Educational intervention focused on showing the patients how they could be at risk of complications if adherence to PO4 did not improve
Perceived Severity	One's opinion of how serious a condition is and what its consequences are	Specify consequences of the risk and the condition	All risks and complications described in the education
Perceived Benefits	One's belief in the efficacy of the advised action to reduce risk or seriousness of impact	Define action to take; how, where, when; clarify the positive effects to be expected.	Benefits of avoiding future complications and other health conditions were explained
Perceived Barriers	One's opinion of the tangible and psychological costs of the advised action	Identify and reduce barriers through reassurance, incentives, assistance.	Barriers were acknowledged, patients given resources for support
Cues to Action	Strategies to activate "readiness"	Provide how-to information, promote awareness, reminders.	Pill holders, education pamphlet and resources given for reminders
Self-Efficacy	Confidence in one's ability to take action	Provide training, guidance in performing action.	Discussed ways the patient could make changes/read food labels

Appendix B

Phosphorus Pamphlet

Foods to Avoid (High in Phosphorus)

- Dairy products such as milk, cheese, custard, cottage cheese, yogurt, ice cream, pudding
- Nuts, seeds, peanut butter
- Dried beans and peas such as baked beans, black beans, chick peas, garbanzo beans, kidney beans, lentils, limas, northern beans, pork and beans, split peas and soybeans
- Bran cereals, whole grain products
- Beverages such as cocoa, ale, beer, chocolate drinks, and dark cola drinks

Food Labels

Phosphorus additives in packaged and processed foods/beverages are added for flavor and preservatives

Foods with added PO4 are more harmful than foods with natural PO4

Read all food labels and look for "PHOS" (e.g. phosphoric acid, disodium phosphate)

What Can You Do?

01

You can control your phosphorus level with a low phosphorus diet, adequate dialysis, and phosphate binders to prevent long-term health consequences.

02

Talk with your renal provider, dialysis nurse, or dietician if you have any questions about your phosphate binder prescription, recommended PO4 diet, or any other questions.

03

Remember to read all food labels to look for hidden phosphorus additives and avoid those foods.

04

Consider boiling foods a few nights a week. The boiling process eliminates much of the phosphorus in foods. Soaking meat in water an hour before cooking can help remove some of the natural phosphorus.

05

Set an alarm or reminder to take your PO4 binders will all meals and snacks. Bring extra binder pills with you in a container when out.

Phosphorus Education

PO4 Diet and Binder Information

What is Phosphorus (PO4)?

A mineral found in many different foods that works with calcium/vitamin D in the body to keep bones healthy.

Phosphorus goal

- Your phosphorus level is checked every month
- Healthy range for dialysis patients is 3.0 to 5.5 mg/dL

Too Much Phosphorus

- When you have kidney disease, your kidneys cannot get rid of phosphorus well
- Dialysis removes some phosphorus, but not as much as your healthy kidneys would remove.
- Your phosphorus level rises in your blood, with multiple bad effects on your body

POSSIBLE COMPLICATIONS

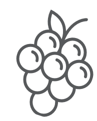
- Extra phosphorus in the blood pulls calcium out of your bones, making them weak and causing bone disease. This can put you at increased risk for broken bones. 85% of PO4 in the body is found in the bones.
- High phosphorus and calcium may settle in your blood vessels and heart, causing calcification.
- Over time this can lead to increased risk of heart attack, stroke or death.
- Calciphylaxis is a disease of the skin that occurs commonly in dialysis patients. Blood vessels in the skin tissue becomes calcified. Areas of dead tissue under the surface of the skin rapidly progress to death of the overlying skin. This can be very painful and has been linked to elevated blood PO4 levels.
- High PO4 levels can also cause extreme itching and bone pain.
- You may not feel the effects of elevated PO4 levels immediately, but long term complications will start to develop

PO4 BINDERS

- PHOSPHORUS BINDERS ARE MEDICATIONS PRESCRIBED BY YOUR RENAL PROVIDER THAT ARE TAKEN WHEN YOU EAT TO PREVENT YOUR BODY FROM ABSORBING THE PO4 IN THE FOOD.
- TWO COMMONLY USED TYPES OF PHOSPHATE BINDERS: CALCIUM CONTAINING BINDERS INCLUDE CALCIUM CARBONATE (SUCH AS TUMS) AND CALCIUM ACETATE (PHOSLO); NON-CALCIUM BINDERS ARE SEVELAMER (RENAGEL) AND LANTHANUM (FOSRENOL).
- IT USUALLY TAKES A COMBINATION OF DIET CONTROL AND PO4 BINDER MEDICATIONS TO KEEP PO4 AT A SAFE LEVEL
- PHOSPHATE BINDERS ARE TAKEN ABOUT 5-10 MINUTES BEFORE YOU EAT A MEAL OR SNACK.
- PHOSPHATE BINDERS WORK BY BINDING PO4 FROM FOODS IN THE STOMACH AND THE GI TRACT. THE PO4 IS THEN PASSED THROUGH THE STOOL OUT OF THE BODY. THEY DO NOT BIND ALL THE PO4 IN FOODS.

BETTER FOOD CHOICES
(LOW IN PHOSPHORUS)

- Almost all foods you eat contain phosphorus
- You can help to control your PO4 by limiting foods that are high in PO4
- Fresh fruits such as apples, apricots, blackberries, grapes, tangerines, pears, peaches, pineapple, plums and strawberries
- Fresh vegetables such as cauliflower, carrots, cucumber, celery, green beans and broccoli
- Popcorn, crackers
- Rice cereal
- Sherbert, sorbet
- Coffee or tea without milk, light-colored sodas (such as ginger ale), fruit juices



Appendix C

Demographic Survey

1. What is your age?
    a.) 18-24 years old
    b.) 25-34 years old
    c.) 35-44 years old
    d.) 45-54 years old
    e.) Over 55 years old
2. What is your gender?
    a.) Female
    b.) Male
3. What is your race/ethnicity?
    a.) White
    b.) Hispanic or Latino
    c.) Black or African American
    d.) Native American or American Indian
    e.) Asian/Pacific Islander
    f.) Other
4. What is the highest degree or level of education you have received?
    a.) Less than a high school diploma
    b.) High school degree or equivalent
    c.) Bachelor’s degree
    d.) Master’s degree
    e.) Doctorate
    f.) Other (please specify)
5. What is your current employment status?
    a.) Employed full time
    b.) Employed part time
    c.) Unemployed/Unable to work
    d.) Retired
6. What is your Marital status?
    a.) Single
    b.) Married
    c.) Divorced
    d.) Widowed
7. Who do you currently live with?
    a.) Alone
    b.) With partner and/or children
    c.) With parents or other
8. How many years have you been on dialysis?
    a.) Three months to one year
    b.) One to five years
    c.) Five to ten years
    d.) More than ten years

Appendix D

Phosphorus Pre and Post Test

The phosphorus pre and post-tests are questions to solely assess your knowledge about phosphorus, dialysis, and binders. You will be presented information about phosphorus diet and binders in two educational sessions. The post-test will assess the knowledge you learned about phosphorus during those sessions.

1. Having too much phosphorus in my body can cause:
    a.) Heartburn
    b.) Low blood pressure
    c.) Diabetes
    d.) Weak and brittle bones
    e.) Not sure
2. When should you take your binders?
    a.) In the morning when I wake up
    b.) 30 minutes before meals
    c.) Take with food when eating snacks/meals
    d.) At night before bed
    e.) Not sure
3. To remove extra phosphorus in my blood I need to:
    a.) Go to dialysis, take my binders, eat a low phosphorus diet
    b.) Exercise
    c.) Drink lots of water
    d.) Become a vegetarian
    e.) Not sure
4. How do phosphorus binders work?
    a.) They do not remove phosphorus from my body
    b.) Phosphorus in the food connects to the binder and is carried through the digestive tract to be removed
    c.) They help remove phosphorus through urine
    d.) They increase the amount of phosphorus in my body
    e.) Not sure
5. What is phosphorus?
    a.) A food
    b.) A mineral element
    c.) A drink
    d.) A snack
    e.) Not sure
6. What is a common side effect related to high phosphorus levels?
    a.) Itching
    b.) Increased energy
    c.) Increased appetite
    d.) Improved strength
    e.) Not sure
7. Which is my phosphorus level goal?

   - a.) 3.0-5.5 mg/dL
   - b.) >6.0 mg/dL
   - c.) 2.0-3.5 mg/dL
   - d.) 1.0-2.5 mg/dL
   - e.) Not sure

8. Which foods are high in phosphorus?
   - a.) Chicken, fish, eggs
   - b.) Cucumbers, grapes, carrots
   - c.) Milk, peanut butter, hot dogs
   - d.) Rice cereal, popcorn, lettuce
   - e.) Not sure
9. Which meat should I eat that is lower in phosphorus?
   - a.) Bologna
   - b.) Hot dogs
   - c.) Bacon
   - d.) Baked chicken breast
   - e.) Not sure
10. I should eat more dairy products because they are low in phosphorus.
   - a.) True
   - b.) False
   - c.) Not sure
11. Where is the majority of phosphorus stored in your body?
   - a.) Liver
   - b.) Kidneys
   - c.) Bones/Teeth
   - d.) Blood
   - e.) Not sure
12. Why is it important to read food labels?
   - a.) There can be hidden phosphorus ingredients included
   - b.) There are some cool pictures
   - c.) I want to know the calories included
   - d.) I enjoy reading
   - e.) Not sure
13. How can you remind yourself to take your binders?
   - a.) Set alarms to go off right before meals
   - b.) Keep a pill box with binders on hand when away from home
   - c.) Do not set an alarm
   - d.) Both A and B
   - e.) Not sure
14. Why should you take your binders?
   - a.) Because I like taking large pills
   - b.) My doctor told me I should
   - c.) To help get rid of extra phosphorus before it gets into my bloodstream
   - d.) They will make me stronger
   - e.) Not sure
15. Will high levels of phosphorus immediately harm me?

a.) No, it will go away on its own
b.) Yes, it will immediately harm you
c.) No, but over time is can cause severe long term damage to your body
d.) No, high levels of phosphorus are not harmful
e.) Not sure

16. What two minerals together can cause hardening of your blood vessels?
    a.) Potassium and Calcium
    b.) Sodium and Potassium
    c.) Phosphorous and Sodium
    d.) Calcium and Phosphorus
    e.) Not sure
17. Which type of soda is better to drink because it is lower in phosphorus?
    a.) Pepsi
    b.) Coca-Cola
    c.) Dr. Pepper
    d.) Gingerale
    e.) Not sure
18. Who is the **MOST** important person to make choices and decisions about my phosphorus diet and binder compliance?
    a.) Myself
    b.) My friend
    c.) My spouse
    d.) My nurse
    e.) Not sure
19. Who can help you with learning more about a low phosphorus diet and phosphorus binders?
    a.) My nurse
    b.) My medical provider
    c.) My dietician
    d.) All of the above
    e.) Not sure
20. What are the benefits of having a phosphorus level within the target goal?
    a.) I can prevent long term complications such as bone disease and hardening of arteries/veins
    b.) My renal team will be happy
    c.) There are no benefits
    d.) I can stop taking my binders
    e.) Not sure
21. I know my phosphorus level from this month:
    a.) Yes
    b.) No
22. I know which medication is my phosphorus binder:
    a.) Yes
    b.) No

Appendix E

Post Satisfaction Survey

1. Do you feel that the information you have learned will help you make better food choices low in phosphorus?
    a.) Yes
    b.) No

2. Do you feel that the information you have learned will improve your phosphorus binder intake?
    a.) Yes
    b.) No

3. Did you learn anything new from the education you received?
    a.) Yes
    b.) No

If yes, list three new things you learned from these educational sessions.

-
-
-

4. How satisfied were you with this educational teaching?
    a.) Satisfied
    b.) Very satisfied
    c.) Neutral
    d.) Dissatisfied
    e.) Very dissatisfied

5. How could this educational program be improved?

---

6. The sessions provided were too long.
    a.) Agree
    b.) Strongly agree
    c.) Neutral
    d.) Disagree
    e.) Strongly disagree

7. The videos provided were helpful in learning more about phosphorus.
    a.) Agree
    b.) Strongly agree
    c.) Neutral
    d.) Disagree
    e.) Strongly disagree

Appendix F

Human Subjects Research Determination

UMassAmherst

Human Research Protection Office

Mass Venture Center
100 Venture Way, Suite 116
Hadley, MA 01035
Telephone: 413-545-3428

Memorandum – Not Human Subjects Research Determination

Date: October 8, 2020

To: Rene Chagnon, College of Nursing

Project Title: *Implementing an Interactive Educational Intervention to Increase Knowledge on Phosphorus Diet and Binder Adherence in Patients Receiving Hemodialysis*

HRPO Determination Number: 20-220

The Human Research Protection Office (HRPO) has evaluated the above named project and has made the following determination based on the information provided to our office:

☐ The proposed project does not involve research that obtains information about living individuals [45 CFR 46.102(f)].

☐ The proposed project does not involve intervention or interaction with individuals OR does not use identifiable private information [45 CFR 46.102(f)(1), (2)].

☒ The proposed project does not meet the definition of human subject research under federal regulations [45 CFR 46.102(d)].

<u>**Submission of an Application to UMass Amherst IRB is not required.**</u>

Note: This determination applies only to the activities described in the submission. If there are changes to the activities described in this submission, please submit a new determination form to the HRPO prior to initiating any changes. ***Researchers should NOT include contact information for the UMass Amherst IRB on any project materials.***

A project determined as "Not Human Subjects Research," must still be conducted ethically. The UMass Amherst HRPO strongly expects project personnel to:

- treat participants with respect at all times
- ensure project participation is voluntary and confidentiality is maintained (when applicable)
- minimize any risks associated with participation in the project
- conduct the project in compliance with all applicable federal, state, and local regulations as well as UMass Amherst Policies and procedures which may include obtaining approval of your activities from other institutions or entities.

Please do not hesitate to call us at 413-545-3428 or email humansubjects@ora.umass.edu if you have any questions.

Iris L. Jenkins

Iris L. Jenkins, Assistant Director
Human Research Protection Office

Appendix G

Timeline

IRB Approval	October 2020
Recruitment of eligible participants and signed consents	January 2021
Demographic/Pre-Survey, Educational Intervention	January 2021
Post Survey, Satisfaction Survey, Analysis of Outcomes	January-February 2021
Final Capstone Paper and Presentation	April-May 2021