

Introduction of the Problem

Chronic kidney disease (CKD) is a prevalent issue that has led to approximately 468,000 individuals needing dialysis (The National Institute of Diabetes and Digestive and Kidney Diseases Health Information Center, 2016). This amounts to an average annual cost of \$28 billion to the Medicare system (University of California San Francisco [UCSF], 2019). Preventing hospitalizations and complication due to CKD is essential to reduce healthcare costs and optimize patient well-being.

One major complication for CKD patients, particularly those on dialysis, is a condition known as mineral bone disease (MBD). Decrease in kidney function causes abnormal levels of electrolytes which, in turn, cause an increase in bone fragility, and an overall increase in patient mortality (Annals of Internal Medicine, 2018). Making dietary changes as needed to bring phosphate and calcium levels close to the recommended limits established by Kidney Disease Improving Global Outcomes (KDIGO) guidelines and the National Kidney Foundation (Burton, Goldsmith, Ruddock, Shroff, & Wan, 2018) help decrease the risk of MBD. Anderson and Nguyen (2018) have shown education can help patients overcome many additional obstacles they may face in the course of their illness by making better dietary choices.

Literature Review

According to Djukanović et al (2016) Phosphorus and PTH levels outside of KDIGO recommendations were associated with higher mortality for patients. Possible increased risks are fractures, calcification of arteries, valves, myocardium, and calciphylaxis. 38.7% of patients who die with ESRD die of an arrhythmia or Cardiac Arrest (NIDDK, 2016). In patients over 70 years old more than 50% of falls could be attributed to mineral bone disease and it was a causative

factor in over two-thirds of fall related deaths (Sanchez-Riera, Wilson, Prieto-Alhambra, Cooper, Halbout, Woolf, & March, 2017).

Patients frequently have high levels of phosphorus, as kidneys are responsible for most of excretion (Copland, Komenda, Weinhandl, McCullough, & Morfin, 2016). To help combat dietary intake of phosphorus, calcium based- phosphate binders are sparingly recommended (Burton, Goldsmith, Ruddock, Shroff, & Wan, 2018).

Secondary hyperparathyroidism can occur from loss of kidney function. This can be controlled by controlling phosphorus and vitamin D intake, by removal of parathyroid gland or medication administration (Burton, Goldsmith, Ruddock, Shroff, & Wan, 2018). Many patients who suffer from ESRD are of low economic status, their ability to afford more nutrient dense foods is more limited, and proper labeling of phosphorus content in food/drinks are limited (Copland, Komenda, Weinhandl, McCullough, & Morfin, 2016).

Project Methods

The purpose of this project was to establish a patient-centered, low-cost method of decreasing occurrence and complications from Mineral Bone Disease (MBD). The goals included: (1) Increasing patient education with an easy-to-read, patient friendly informational binder on cost-friendly food choices; (2) providing patients with an attenuated informational card that can be taken with them on shopping trips; (3) increasing healthy food choices by patients; (4) assessing the impact of the education on patients.

The project was a quality project implemented in two busy outpatient dialysis centers in a metro-east suburban area that see approximately 105 total patients per week. The need for the education was discussed and agreed upon with the providers, dietician, and nurses at the two centers. Seventy-nine individuals voluntarily participated in the education and received the

educational packet produced by the researchers. The men and women all answered five Likert scale questions to assess their knowledge both pre and post education, and one open-ended question to further address any specific information that could be individualized.

The project was told it was exempt from the Institutional Review Board at Southern Illinois University Edwardsville, due to its classification as a quality improvement project. There were minimal risks to participants who received education and partook in pre and post surveys. Proper infection protocols were followed and resulted in minimal infection risk for patients. Participation in the survey was completely voluntary. The main risk to the participants was the interruption of their normal routine.

All education, pre and post surveys were conducted individually with the patient by Melanie Johnson, experienced outpatient dialysis nurse, who had rapport with many of the participants. The surveyor was able to answer questions and provide information to the patient, while also listening or addressing some emotional needs as well. The surveyor also recorder all answers as the patient stated, with only the prompting of the preset options. This allowed limited infection risk for the patient, as the surveyor wore appropriate PPE and performed hand hygiene in between patient visits, and was the only person using a pen to collect data. This also allowed for a more individualized session with each patient.

Evaluation

The survey consisted of five Likert scale questions using the scale: strongly agree, agree, disagree, strongly disagree. The data was anonymized, with no patient identifiers. Excel was used for data entry and 2 sample T-tests were performed on each question's pre and post responses to ascertain if the education provided lead to any statistically significant increase in

patient knowledge. There was one open ended question at the end of the survey asking participants what other topics they would like to learn more about regarding nutrition and/or preventing mineral bone disease?

Of the original 105 people that were asked to participate, 79 agreed. Originally there were more volunteers but due to issues with hospitalizations, missed treatments, and other concerns, those participants were excluded if they did not take part in the post survey. Of those who agreed to participate 35 were female and 44 were male. Prior to the education 80% of patients either strongly agreed or agreed with the question “I pay attention to labels”, while 12% disagreed, and 8% strongly disagreed. For the question “I try to eat health” 96% either agreed or strongly agreed, 4% did not agree, and no participants strongly disagreed. For the question “I know what is MBD” 94% of patients answered strongly agree or agree, while 4% stated they disagreed, and 3% strongly disagreed. Ninety four percent of patients either agreed or strongly agreed that they “know what foods to avoid for kidney healthy” and “know what foods are good for my kidney health”. Only 3% of patients disagreed or strongly disagreed that they knew what was good for their health in general, while 5% and 1% respectively disagreed or strongly disagreed they knew what was good for their kidney health specifically.

After the education the percentage of patients who either strongly agreed or agreed with the question “I pay attention to labels” remained at 80%, while the number who disagreed increased to 19%, and 1% strongly disagreed. For the question “I try to eat healthy” the percentage of participants who answered either agree or strongly agree increased to 96%, the percentage of participants who did not agree stayed at 4%, and no participants strongly disagreed. The percentage of participants who answered strongly agree or agree to the question “I know what is MBD” increased to 96% after education, 4% still said they disagreed, but no participant stated they strongly disagreed. Unexpectedly the percentage of participants who

either agreed or strongly agreed that they “know what foods to avoid for kidney health” decreased to 91%, but the percentage who strongly agreed or agreed that they “know what foods are good for my kidney health” increased to 95%. The percentage of participants who disagreed that they knew what was good for their health in general increased to 9% but the amount who strongly disagreed dropped to 0%. The amount who disagreed that they “know what foods are good for my kidney health” remained steady at 5%, but 0% of participants strongly disagreed.

After doing 2 sample T-tests on each questions’ before and after answers, it was determined that only two questions held statistical significance. Question two which asked if they try to eat healthy, their responses worsened, with the mean trending down from 1.94 to 1.61 with a statistical significance of $p=.008$. However, when asked the question if they knew the definition of mineral bone disease, the mean increased from 2.0 to 2.39 with a statistical significance of $p<0.05$. The open-ended question asking volunteers “What topics would you like to learn more about nutrition and/or preventing mineral bone disease?”, the patient stated generic answers such I’d like to learn more about nutrition, but nothing too specific, but many stated no or n/a.

Patients were very receptive to the educational materials. Many of them asked questions, seemed appreciative, and generally willing to look at the material or accept the education provided to them. Some were happy to be supplied with more specific information regarding food choices as they had been confused or feel not properly instructed on what they should or should not eat. Very few stated that they had already received this information, or they already knew what was being presented. Some even had questions post education when I did the post survey to clarify information. Therefore, regardless of the results, I feel a positive impact was made on several patients.

The limitations affecting the project were sampling bias, sample size, and a limited amount of existing literature surrounding the impact of dietary education and knowledge on food choices, particularly by dialysis and CKD patients. Our sample size was only 79 (n=79) volunteers in a limited geographically area, so it is unlikely that the results are representative of the general population. More male than female patients participated, so there could be a gender bias in the data. The way in which the surveyor conducted the project could have led to bias, as they may have felt they should select certain answers since they were speaking directly with the person in charge. Patient population fluctuates frequently due to hospitalizations, missed treatments, expirations, transplants, and change in modality to peritoneal dialysis, therefore it is impossible to educate all patients on the same day and would require frequent visits to each clinic. Also, the timing between education and post surveys was variable due to logistical issues.

Impact on Practice

The providers at the two dialysis centers were very happy with the educational materials that were handed out and will likely continue to use them as patient education handouts. They were given the handouts prior to administration, providers, and dieticians to allow them to give feedback or provide corrections for it to be their specific guidelines. There will be no structured hands-on education regarding the educational materials provided to the staff besides a basic overview, and it is unclear if the facility will continue to reproduce the materials themselves once they run out. The “pocket card” dietary guide was very well received and while the cards we made may not be reproduced, a similar idea may be implemented based on our initial design. Future implementation should focus on reinforcement of education and may need to be broken into smaller sessions so that patients do not feel overwhelmed or become confused by the amount of information. Continuing education and repetition aids patients to understand the information more clearly and allow them to make better decisions regarding their healthcare.

Conclusions

Education related to both dietary demands and the short- and long-term complications of poor disease management continue to be vitally important. The project showed that 75% of patients were willing to hear education that was given during their dialysis session, showing that convenience may be a contributing factor to their willingness. Further projects should focus on implementing procedures that both patients and staff at these centers find helpful and convenient. Reinforcement of instructions should occur quarterly or bi-annually, especially due to patient population fluctuations.