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Improving the Education Gap for Patients with Chronic Kidney Disease

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Executive Summary

Improving the Education Gap for Patients with Chronic Kidney Disease

Problem

According to the Center for Disease Contol and Prevention, 26 million adults have chronic kidney disease, which is progressive, mostly silent, and unrecognized (CDC, 2009). Education can enhance knowledge and facilitate self-management through better understanding of the disease process, improve clinical outcomes, and assist with decrease overall cost (Costantini, 2006). The PICO question for this project was: Does implementing a structured educational program for adults diagnosed with stages III and IV chronic kidney disease improve the gap in education and perceived knowledge of CKD?

Purpose

The purpose of this evidenced-based practice project was to examine the effects of a structured education program, known as the Kidney Smart Class℠ (DaVita, 2013), in adults diagnosed with stage III and stage IV chronic kidney disease.

Goal

The primary goal of this project was to measure the impact of the Kidney Smart Class℠ (DaVita, 2013) upon the knowledge level of patients diagnosed with chronic kidney disease.

Objectives

The primary objective of this project was to have increased knowledge scores following participation in the Kidney Smart Class℠ (DaVita, 2013).

Plan

This capstone project began in the fall of 2013 with an identified problem followed by the completion of a needs assessment, identification of a theoretical foundation, and an extensive review of literature. Upon approval from the Regis University and St. Luke's University Hospital Health Network Institutional Review Boards, and permission to use the instrument tool, the project was implemented in March of 2015. Data was collected to determine if the educational intervention improved the educational gap and perceived chronic kidney disease knowledge using the Perceived Kidney Knowledge Survey. Results from the Likert scale response options were analyzed.

Outcomes and Results

From March to July of 2015, 50 participants agreed to participate in the study and were non-randomized into the control group (n=25) and the experimental group (n=25). Five withdrew from the control group (n=20) and 21 withdrew from the experimental group (n=4). Although the experimental group was small, the study showed a promising trend with statistical significance for several questions post survey. Out of the nine questions on the Perceived Kidney Knowledge Survey, mean responses for questions 2 (p=.02), 3 (p=.02), and 6 (p=.01) were significantly different between the experimental and control groups. Results of the study suggest that the Kidney Smart Class℠ (DaVita, 2013) made a statistical significant impact on perceived knowledge as evidenced by increased post survey scores. Additional research is needed with a larger sample size to validate findings, draw definitive conclusions and show statistically significant differences that early education will improve the gap in education within the chronic kidney disease population.

Acknowledgement

My deepest gratitude is to my husband, Bruce for his unconditional love and support as I complete this Doctorate of Nursing journey. To my daughter, Emily, my mother, Patricia, thank you for believing, inspiring and encouraging me to never give up on my dreams and life goals. To all my friends, work colleagues and fellow classmates, thank you for all the emotional support and guidance though out this process. I will always be grateful to Dr. Judy Crewell and the DNP faculty of Regis University for their ongoing commitment to excellence and support, for without their guidance, this project would not be possible.

Finally, I would like to dedicate this project to my father, Donald. Despite that he is unable to witness this accomplishment in person, he is with me in spirit, for he always knew if I put my mind to it, I can do anything.

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Problem Recognition and Definition

The World Health Organization (WHO) has recognized chronic kidney disease (CKD) as a significant complication of chronic disease due to its impact on morbidity and mortality (WHO, 2011). Additionally, the substantial cost of CKD has made it a health care priority. According to the Center for Disease Contol and Prevention (CDC) (2009), 26 million adults have CKD, which is progressive, mostly silent, and unrecognized. Chronic kidney disease education is imperative and an essential component to foster patients' empowerment and self-management for overall best outcomes. Patient education can assist in the delay of the progression of CKD to end stage renal disease (ESRD) by decreasing complications associated with advanced disease, decreasing the overall cost and burden, and improving overall health of the patient (Young, Chan, Yevzlin, & Becker, 2011, p. 381).

A problem was noted within a large nephrology clinic located in the Northeast, where patients are referred and seen for the management of hypertension, electrolyte imbalances, fluid management, and CKD. During the treatment of these patients, a perceived knowledge gap was noted concerning patients with the diagnosis of CKD. The principal investigator believed that an evidence-based structured CKD education class, known as the Kidney Smart Class℠ (DaVita, 2013), could improve the gap in education and perceived knowledge of the disease for improved understanding and management.

The definition for CKD used in this study is a condition characterized by the gradual loss of the kidneys' ability to adequately filter toxins and waste products from the blood. Chronic kidney disease is defined as the structure or functional abnormalities of the kidney for greater than or equal to three months. This is manifested by kidney damage with or without decrease in the estimated glomerular filtration rate (eGFR) (National Guideline Clearing House, 2008).

Statement of Purpose

Although early detection and treatment of CKD has gained increased attention, more information continues to be needed to evaluate how early CKD education can improve the perceived knowledge gap which ultimately provides an opportunity to delay the progression, decrease the cost, and improve overall outcomes (Costantini, 2006). The purpose of this evidenced-based practice (EBP) project was to examine the effects of a structured education program, known as the Kidney Smart Class℠(DaVita, 2013), in adults diagnosed with stage III and IV CKD with the intent of improving the gap in education and perceived knowledge of the disease for improved understanding and management.

Problem Statement

Chronic kidney disease is progressive, mostly silent, with many unaware of having the disease or with only limited understanding. Concerning comments stated from numerous patients included: “No one ever told me that I had kidney problems,” “What do you mean I have kidney problems?,” and “I am only here for my blood pressure and swelling of the legs.” In a study reported by Wright, Wallston, Elasy, Ikizler and Cavanaugh (2011), “35 percent of patients reported knowing little or nothing about their own CKD diagnosis and nearly half reported they did not have any knowledge about treatment options if their kidneys failed” (p. 338).

A review of the literature indicated a problem with perceived knowledge associated with CKD and the lack of offered CKD education. Examples included:

- Despite patient education being a significant part of CKD care, it has been reported that "patient's perceived and actual knowledge about CKD care and treatments are less than desirable" (Young et al., 2011, p. 381).
- "Audio recordings between primary care providers and patients at risk for CKD revealed discussion rarely focused on the topic of kidney disease" (Wright-Nunes et al., 2011, p. 1344).
- "Professionals have expressed concerns that disclosing asymptomatic stage III CKD to patients may create anxiety, therefore associated risks are considered difficult for patients to understand" (Blickem et al., 2013, p. 2).

Thus, the following question arose, "Is the lack of awareness and progression of CKD related to suboptimal patient education?" Chronic kidney disease education is imperative and an essential component to foster patients' empowerment and self-management for overall best outcomes.

PICO Statement and Question

This project was an EBP project in which a quality improvement plan was completed. Evidenced–based practice projects utilize the acronym "PICO" rather than stating a formal research hypothesis. The acronym stands for: Population or Disease (P), Intervention or Issue of Interest (I), Comparison group or Current Practice (C), and Outcome (O) and is usually framed as a question (Melnyk & Fineout-Overholt, 2011, p. 31). Therefore, to address the CKD population, based on the needs assessment through observation and literature review, the PICO question for this project was: "Does implementing a structured educational program for adults diagnosed with stages III and IV chronic kidney disease improve the gap in education and perceived knowledge of chronic kidney disease?" The PICO statement was:

- P: Adults, at least 20 years of age, referred to a nephrology practice with the diagnosis of stage III or stage IV chronic kidney disease.
- I: Implementing a two-hour structured educational class on chronic kidney disease through a community service program, sponsored by Davita, a National Dialysis Organization, known as the Kidney Smart Class℠ (DaVita, 2013).
- C: Compare the outcomes between two non-randomized groups. One group received the structured educational program while the other received current, standard CKD education through scheduled appointments.
- O: Improvement in the gap in education and perceived knowledge of chronic kidney disease. The outcome will be evaluated through pre and post surveys scores.

Project Significance, Scope, and Rationale

As discussed earlier, a significant gap in education and perceived knowledge associated with the diagnosis of CKD was identified. Although early detection and treatment of CKD has gained increased attention, limited evidence was noted within the literature associated with opportunities for patient education to improve perceived knowledge at all key stages of the disease, especially stage III and stage IV CKD (Mason, Khunti, Stone, Farooqi, & Carr, 2008). Given the limited evidence, it was the goal of this quasi-experimental, pre and post survey research study to improve patients' educational gaps and perceived knowledge for better understanding and management within the CKD population, especially in stages III and IV. The outcome of this study was hoped to be statistically significant which would help to standardize the educational practice within this large nephrology clinic for better management of all CKD patients for improving patient outcomes.

Theoretical Foundations

Chronic kidney disease is classified as a chronic illness secondary to other chronic diseases, such as diabetes mellitus (DM) and hypertension (HTN). The Roy Adaptation Model (RAM) focuses on the interrelatedness of four adaptive modes that serve as the conceptual framework for assessment, especially with chronic disease. The RAM is a problem solving approach utilized for collecting data, identifying the capacities and needs of humans, and guiding the selection and implementation of nursing care (McEwen & Wills, 2011). These four adaptive systems are physiologic-physical mode, self-concept mode, role function mode, and interdependence mode. According to Whittemore and Roy (2002), within this conceptual framework, health is a process and state of being. Adapting to a chronic disease is encompassing internal and external processes that influence responses and behaviors, good or bad. The goal of nursing is to facilitate this process, which is accomplished through the promotion of adaptation in each of the four adaptive systems. The goal of someone living with a chronic illness, such as CKD, becomes one of recognizing the realities imposed by the illness and restructuring self and the environment amid this new experience (Whittemore & Roy, 2002).

The first step in the nursing process within the RAM is to collect data about the behavior of the person as an adaptive system in each of the four modes. The second step is to identify any internal and external stimuli that are influencing the person's adaptive or maladaptive behaviors. There are three types of stimuli: focal, those most immediate confronting the person; contextual, all other stimuli affecting the situation; and residual, those stimuli that are unclear. The third step involves the formulation of statements that interpret the data about the adaptation status of a person. The fourth step involves clear statements of the behavioral outcomes. The fifth step involves how best to assist the person in attaining goals. The six and final step involves judging the effectiveness of the nursing intervention in relation to the behavior after the nursing intervention.

In the Adaptation to Chronic Illness Model discussed by Whittemore and Roy (2002), the focal stimulus was defined as the type and duration of the chronic illness. Chronic kidney disease is progressive, mostly silent, and lifelong. Most individuals are unaware they have CKD until an adverse illness brings it to the attention of the person. The contextual stimuli of a chronic illness are the ability to tolerate stress, health promotion behaviors, and participation in health education programs. Utilizing the Kidney Smart Class℠ (DaVita, 2013), early education about the disease may assist with decreasing stress levels allowing for positive adaptation to conditions, circumstances, and other influences within the environment. Patient engagement is also important and refers to a patient's knowledge, ability, and willingness to manage his or her own health care, paired with interventions which promote positive patient behaviors (Fishbane, Hazzan, Halinski, & Mathew, 2014, p. 6).

Another theory, providing a foundation for this project, was the Theory of Self-Care Management for Vulnerable Populations (Dorsey & Murdaugh, 2003). Vulnerable populations are defined by the Agency for Health Care Research and Quality (AHRQ) as those who are made vulnerable by their financial circumstances or place of residence, health, age, personal characteristics, functional or developmental status, ability to communicate effectively, and presence of chronic illness or disability (Dorsey & Murdaugh, 2003). This theory focuses on enhancing health status and quality of life in vulnerable populations. The major concepts in this model are contextual factors, which include: vulnerability, intrapersonal factors, self-care management, health status, and quality of life (Dorsey & Murdaugh, 2003). Vulnerable populations are the focus of many health care programs to decrease health disparities and overall cost. The goal of the Kidney Smart Class℠ (DaVita, 2013), was to provide appropriate CKD education to the patient, the family, and even to the caregivers, therefore improving knowledge about CKD. Improved knowledge allows for increased patient engagement in one's own care, which in turn assists in changing modifiable behaviors to delay progression of the disease, improve self- management efforts, and become more compliant with treatment options for best outcomes.

Literature Selection and Scope of Evidence

A literature review is conducted to evaluate multiple studies addressing specific clinical problems and is the focus of EBP initiatives (Houser & Oman, 2011). The purpose for this literature review was to search for research examining the question, "Does implementing a structured educational program for adults diagnosed with stages III and IV CKD improve the gap in education and perceived knowledge of CKD?**"** The literature review involved a search of electronic databases including: MEDLINE, PUB-MED, Cumulative Index to Nursing and Allied Health Literature (CINAHL), EBSCO, OVID and the Cochrane Control Trials. Other research areas included national websites, such as: the CDC, WHO, United States Renal Database (USRD), National Kidney Foundation (NKF), and Healthy People 2020. Searches were completed using the key word CKD in combination with the following words to further distill the topic and to refine the research: education, CKD stage III, CKD stage IV, perceived knowledge, ESRD, health literacy, self-management, self-efficacy, decreased cost of CKD, decrease hospitalizations, multi-disciplinary approach, health improvement, communication, collaboration, prevention, and barriers.

Inclusion criteria included: full text articles, English language, and original research published in peer-reviewed journals and articles published by national and international, professional and government organizations. Exclusion criteria included: articles over 10 years old, articles focused on topics with ESRD, renal transplant, surgical outcomes, pediatrics, maternity, electrolyte abnormalities, bone mineral disease, health disparities, and medications. The initial search resulted in 2,665 articles which were reduced to 70 articles critically appraised for content. The seven tiered level of evidence table was used to critically evaluate the quality of the level of research identified through the systematic review (Houser & Oman, 2011). From the original 70 articles, 37 were found to be pertinent forming the foundation for this capstone project. The final distillation included: eight cohort studies, two meta-analyses, four cross-sectional analyses, four longitudinal studies, two linear regression studies, three randomized control trials, three non-randomized control trials, two qualitative studies, seven systematic reviews, one descriptive study, and one editorial. Appendix A is an example of the critically appraised literature review process.

Review of Evidence

Background of the Problem

As discussed above, various design studies were evaluated for this capstone project. Since CKD affects millions globally, many systematic reviews have come from other countries such as China, Taiwan, Canada, England, and New Zealand. Much of the research on CKD focused on treatment plans, education, and multi-disciplinary clinics to assist with improved outcomes; however, it was unclear if patients had an improved perception of CKD knowledge after education was provided within these programs.

Lack of research was noted pertaining to perceived kidney disease knowledge, especially within nephrology care. In a study by Wright-Nunes et al. (2011), out of 58 percent of participants currently under the care of a nephrologist with three appointments a year, 25 percent of those patients reported that they knew little or nothing about why they were sent to the nephrologist. Consequently, many initiatives have already been developed to assist with improving kidney disease knowledge and overall outcomes. The Kidney Early Evaluation Program (KEEP), developed by the NKF in 2000, is a community-based program that was developed for early detection of CKD and promotion for follow-up evaluations with clinicians to ultimately improve outcomes (Vassalotti & Li, 2010). Between August of 2000 and June of 2013, KEEP reached 185,000 individuals at increased risk for developing kidney disease (NKF, 2013). This screening process enabled these individuals to gain insight about CKD risk factors and to potentially improve awareness and knowledge of CKD.

Additionally, in 2002, the NKF published the Kidney Disease Outcomes Quality Initiative (KDOQI), which is a clinical practice guideline set for chronic kidney disease (Levey, et al., 2003). The goals of the KDOQI practice guidelines are:

- Define chronic kidney disease and classify its stages, regardless of underlying cause.
- Evaluate laboratory measurements for the clinical assessment of kidney disease.
- Associate the level of kidney function with complications of chronic kidney disease.
- Stratify the risk for loss of kidney function and development of CVD.

The KDOQI practice guidelines are recognized internationally and have brought increased attention to the global problem of CKD with the importance of education and early treatment for best outcomes. Recent studies from other countries have researched varying types of education programs, such as self-management programs, face-to-face educational programs, and even CKD clinics, all using the KDOQI guidelines (Choi & Lee, 2012). Despite these practice guidelines with the promotion of early detection, treatment, and education, barriers still exist. These barriers include**:** lack of collaboration with the management of CKD, late referrals to a nephrologist, lack of CKD education and awareness, patients' lack of participation, and healthcare providers not following the recommended KDOQI practice guidelines (Crinson, Gallagher, Thomas, & de Lusignan, 2010).

The KDOQI practice guidelines also prompted action from various national health organizations such as the NKF, CDC, Center for Medicare and Medicaid Services (CMS), and ultimately the National Kidney Disease Education Program (NKDEP), which is an initiative of the National Institutes of health (NIH). These national health organizations encourage the adherence to the clinical practice guidelines for earlier detection, screening, treatment, and education among healthcare providers for best outcomes.

The House and Senate enacted the Medicare Improvement for Patients and Providers Act (MIPPA) on July 15, 2008 (Davis & Zuber, 2013). This act included provisions to improve the care of Medicare patients with stage IV CKD. The MIPPA established six educational sessions for Medicare beneficiaries with stage IV CKD. As discussed by CMS (2009), MIPPA Section 152(b) adds kidney disease patient education services as a Medicare covered benefit for Medicare beneficiaries diagnosed with Stage IV CKD. The services are designed to provide beneficiaries with comprehensive information regarding the management of co-morbidities, the purposes of delaying the need for dialysis, prevention of uremic complications, and renal replacement therapy options. This benefit was also designed to be tailored to individual needs providing the beneficiary with the opportunity to actively participate in his/her choice of therapy. This education program is not available for the younger non-Medicare population or others diagnosed with stage III chronic kidney disease indicating a need for earlier CKD education.

Literature Review

The literature review provided a clear picture of the study question which assisted this investigator with an educational approach to achieve best outcomes. An article by Chen et al. (2011), reviewed self-management programs and CKD clinics and showed not only a reduction of the overall mortality and morbidity of the CKD populations, but also delays the initiation of renal replacement therapy. Self-management programs are based on the framework that healthcare providers coordinate care with other members of the multidisciplinary team to optimize management ensuring the implementation of recommended diagnostic and intervention strategies, information, education and support that is individualized to the patient's degree of kidney disease (Curtis et al., 2005). As discussed, literature suggested there are many benefits to early detection and management of CKD. Diabetes mellitus and HTN are the leading causes of CKD. Identifying and improving the management of DM and HTN can slow or even prevent the advancement of CKD**,** making early education imperative for better outcomes from a progressive disease and from a financial burden standpoint. More information is needed in the area of patient disease-specific knowledge to optimize the outcomes of educational interventions.

One cross-sectional study from New Zealand involved educational interventions with 52 patients from two primary care practices, which identified risk factors causing CKD progression and cardiovascular disease. Through a nurse-led 12-month intervention/education program utilizing nurse practitioners (NP), significant improvements in biomedical markers and self-management domains were revealed (Walker, Marshall, & Polaschek, 2013). The interventions in this study involved an initial assessment, education, and development of a personalized management plan for each patient. All participants were given a booklet created specifically for the study which included: general information on CKD, diabetes, blood pressure management, medication, and extra pages for the patient’s own documentation. Patient self-management was assessed using the Partners In Health (PIH) ® instrument tool at baseline, three months and again at 12 months (Walker et al., 2013). Results from the Likert scale response options were analyzed and revealed overall significant positive change, with a mean difference of 1.11 (95% CI 0.72 – 1.50; $p < 0.0001$). The outcome of this study indicated that a targeted self-management support program was successful in improving patient’s self-management and patient-centered outcomes (Walker et al., 2013).

A randomized-controlled trial from Taiwan suggested that a standardized self-management support program may play a significant role in reducing CKD progression and morbidity (Chen et al., 2011). In this study, 54 participants were randomized into a self-management support group (n=27) and a non-self-management group (n=27). The self-management group was given health information, patient education on CKD, telephone-based support, and the assistance of a support group over 12 months. End-points of this study were absolute estimate glomerular filtration rate (eGFR) and number of hospitalizations. Outcomes revealed significantly higher eGFR in the self-management group compared to the non-self-management group (29.11 ± 20.61 versus 15.72 ± 10.67 mL/min; $p< 0.05$). Further outcomes revealed significantly fewer hospitalizations for the self-management group compared to the non-self-management group [5 (18.50%) versus 12 (44.47%); $p< 0.05$]. There were no significant differences in the outcomes between the groups with secondary endpoints with ESRD requiring renal replacement therapy and all-cause mortality. The results of the study suggested that standardization of a self-management intervention for the daily care of CKD patients should be part of the integrated CKD care to reduce progression and morbidity of CKD patients (Chen et al., 2011).

A non-randomized control study from South Korea revealed a higher level of knowledge about CKD in the experimental group with a face-to-face, individualized consultation self-management program involving education over eight weeks (Choi & Lee, 2012). This was a non-synchronized design study completed at two separate time intervals secondary to patients being sensitive to education. In this study, 61 patients were non-randomized into the control group (n=30) from May, 2011 to August, 2011 and the experimental group (n=31) from September, 2011 to March, 2012. Experts on CKD contributed to the development of the 90-minute education program which included physicians, nurses and nutritionists. The main topics of the face-to-face, individual consultation education program included: understanding and self-management of CKD, diet, types of renal replacement therapy, symptoms, and progression and treatment of CKD. Statistical analysis of pre/post-test Likert scale responses revealed significant improvement in knowledge about CKD in the experimental group compared to the control group (15.41 ± 2.32 versus 11.40 ± 3.82; $p<0.001$). Limitations of this study revealed patients only had connections with physicians, nurses and nutritionists possibly causing a burden with staffing and operational costs. Further opportunities for education may be needed, such as web-based education.

In summary, there are numerous benefits from all types of educational intervention programs for patients with CKD, especially when the education is specific to the disease process. Wright-Nunes et al. (2011), point out that therapies aimed at preventing the progression of kidney disease or decreasing associated complications related to advanced CKD stages rely heavily on patient-centered care, with disease specific education for best outcomes. A review of the literature has demonstrated that studies in many countries have also determined that CKD education and intervention programs are imperative for better patient outcomes.

Project Plan and Evaluation

Market and Risk Analysis

Non-communicable diseases, also known as chronic diseases, are now the leading cause of death worldwide. According to Perico and Remuzzi (2012), there were 57 million deaths globally, of which 63 percent were due to non-communicable diseases. Worldwide, HTN and DM are two of the primary risk factors contributing to CKD. In 2011, at the United Nations Summit on Non-Communicable Disease, global leaders from WHO examined the impact of non-communicable diseases killing nine million people annually under the age of 60 (WHO, 2011). For the first time, CKD was recognized as a significant complication of chronic disease due to its impact on morbidity and mortality. Additionally, the burden of CKD's substantial costs has made it a health care priority.

The disease process of CKD is progressive, mostly silent and unrecognized, complicating its impact globally (WHO, 2011). It has been reported that 26 million adults have CKD (CDC, 2009). In the United States, the prevalence of CKD is 1700 per 100,000 adults with 500,000 diagnosed with ESRD and receiving dialysis (Obrador & Pereira, 2014). The cost to treat each person on dialysis is approximately $75,000 dollars per year (Obrador & Pereira, 2014). The United States has noted the financial burden of the impact of CKD on Medicare, the patient, and family members. The net Medicare Part D costs for the CKD population in 2011 was 5.26 billion dollars, accounting for 18 percent of the total Medicare expenditures. Patients with combined DM and documented CKD account for 29 percent of the Medicare DM expenditures, and patients with CHF as well as documented CKD account for 39 percent of the Medicare CHF expenditure. It has also been reported the 30 day re-admission rate is 33 percent for hemodialysis patients and 24 percent for patients diagnosed with CKD, confirming CKD as a health care priority (USRD, 2013).

Early CKD education is vital to showing improvements in clinical outcomes. Costantini (2006), stated education could enhance knowledge and facilitate self-management through better understanding of the disease process. It is hoped that this knowledge will produce the following benefits:

- Slow the progression of CKD assisting with stabilization of electrolytes and kidney bio-markers (creatinine, eGFR)
- Decrease the amount of proteinuria
- Decrease mortality and morbidity
- Assist blood pressure (BP) control
- Prevent excessive medication use
- Decrease hospitalizations and or decrease length of hospital stay (LOS)
- Increase compliance of recommended treatment
- Decrease overall cost

Strength, Weaknesses, Opportunities, Threats (SWOT) Analysis

To determine the attainability and feasibility of the project, identifying the strengths, weaknesses, opportunities, and threats (SWOT) was imperative to assist in directing a path for success. According to Fortenberry (2010), a SWOT analysis provides vital information that is necessary for monitoring in-progress performance and determining future strategic and tactical pursuits. Following the completion of the SWOT analysis, it was determined that by identifying the internal strengths of this project, identified threats were limited avoiding failure of the project. Also, by taking advantage of the project’s opportunities and strengths, weaknesses of the project could be limited, thus enabling successful completion of the project**.** Appendix B reviews the SWOT analysis.

Driving and Restraining Forces

According to Zaccagnini and White (2014), the purpose of capstone projects are to determine a gap in a system by focusing on practice issues and to promote change based on evidence in the literature. Thus, in moving forward, it was important to identify the driving and restraining forces of this capstone project in order to evaluate the current education practice for optimal patient outcomes. Driving forces identified for this project included: the prevalence of CKD, complications contributing to increased morbidity and mortality, as well as substantial healthcare expenditure. Several restraining forces identified had the potential to limit the success of this project, which included: late referrals to the nephrology clinic for management, lack of interest from patients, non-compliance with education, potential lack of support from physicians, lack of CKD education from primary care providers, or delay of CKD education secondary to concerns about increased anxiety and lack of understanding.

Needs, Resources, and Sustainability

Zaccagnini and White (2014) state that a needs assessment serves to determine the extent to which the mission of the project is consistent with the needs of the target group. The need for this project was identified by patient observations, documented health care costs, and a review of the literature. Patients were observed verbally acknowledging knowing little or nothing about their own CKD diagnosis. The WHO (2011) has made CKD a health care priority based on the burden of substantial costs and the complications associated with the morbidity and mortality of the disease process. Young et al. (2011), states that “patient education can assist in the delay of the progression of CKD to ESRD by decreasing complications associated with advanced disease, decreasing the overall cost and burden, and improving overall health of the patient" (p. 381). Patient-centered care with disease specific education is best. Resources required for sustainability included: ongoing support from Davita with the Kidney Smart Class℠ (DaVita, 2013), classroom space, support from the nephrologists, and patient participation.

Feasibility, Risks, and Unintended Consequences

The Kidney Smart Class℠ (DaVita, 2013), a community service program sponsored by Davita, a national dialysis organization, is publically available, free of charge, and is held at various convenient locations. These factors made the feasibility of this educational program possible. Risks associated with The Kidney Smart Class℠ (DaVita, 2013), were minimal; however, increased stressors such as: the fear of the unknown, time allotment, class room anxiety, and imposing on family members for assistance may have prevented attendance. There were no unintended consequences identified.

Stakeholders and Project Team

According to Zaccagnini and White (2014), stakeholders are key individuals who will be affected by the project one way or another. The primary stakeholders for this project were patients with the diagnosis of CKD, families, and caretakers. The large nephrology clinic located in the Northeast, the associated hospital network, Davita, as well as insurers also potentially benefitted from the outcome of this study and its impact on patient care.

The team developed for this capstone project consisted of the principal investigator, Donna Bobo, DNP (c), MSN, FNP-BC; the Doctor of Nursing Practice (DNP) mentor, Marisa Schwartz, RN, DNP, FNP-BC; the capstone chair, Judy Crewell PhD, RN; the statistician, Jill Stoltzfus, PhD; the Davita educator, Cate Lewis, RN, BSN, CNN; and the Patient Care Manager, Ken Dyer, BS. Additional team members were the office medical assistants and receptionists that assisted with the surveys, scheduling of the Kidney Smart Class℠ (DaVita, 2013), and return appointments. All members provided guidance, advice, and personal expertise at various times, aiding in the completion of this project.

Cost-Benefit Analysis

As previously discussed, the cost to care for patients with CKD is a financial burden to the healthcare system. The review of the literature already supported the findings that suboptimal CKD education leads to progression of the disease causing financial burden on the patient, the family, and the health care system. Kleinpell (2013), stated that the cost effectiveness of health care practices is very important in the delivery of care. Evaluation of the cost/benefit ratio of this education intervention project indicated the value of the outcomes were greater than the cost of the project. Resources required for this project included: members of the project team, office staff, time and money, equipment, space, and training. Appendix C reviews the budget and resources.

Mission, Vision, and Goals

The principal investigator envisions self-efficacy for all CKD patients through successful communication, collaboration, and leadership between the nephrology healthcare team, other healthcare providers, patients, and the stakeholders. The vision of this project was to create a sustainable, standardized educational program for better management and improved outcomes for patients with CKD. The mission of this project was to promote a learning opportunity for the enhancement of knowledge for CKD patients. The primary goal of this project was to measure the impact of the Kidney Smart Class℠ (DaVita, 2013), on knowledge by determining the benefit of a structured education class to elicit a change in the educational process to improve patient outcomes while decreasing overall care cost for the CKD population.

Project Process Objectives

The overall objective of this capstone project was to evaluate the effectiveness of an EBP educational improvement project with patient participation in the Kidney Smart Class℠ (DaVita, 2013), compared to current standard office educational practice. The project was evaluated by administering the Perceived Kidney Knowledge Survey (PIKS) pre and post educational interventions. The primary objective of this project was to have increased scores following participation in the Kidney Smart Class℠ (DaVita, 2013), by the experimental group. Once completed, it was anticipated that this project would produce statistical significance and measurable outcomes related to the PICO question, “Does implementing a structured educational program for adults diagnosed with stage III and IV CKD improve the gap in education and perceived knowledge of CKD?” Long term outcomes of this program will continue to enhance the participant’s knowledge of CKD.

Logic Model

According to W.K. Kellogg Foundation (2004), the intent of a logic model is to present stakeholders with a road map describing the sequence of correlated events connecting the need for the proposed capstone project with the project’s desired results. A logic model was developed for this educational project to assist with obtaining benchmarks and measurable outcomes. Benchmarks are quality management programs that compare a practice’s performance with an external standard in healthcare (AHRQ, 2013). Meeting benchmarks ensures best practice at the best cost.

The logic model brings the project and vision to life and clearly demonstrates the proposed inputs, constraints, activities, outputs, short-term and long-term goals, along with comparison benchmarks (W.K Kellogg Foundation, 2004). The logic model helped to enhance the project's planning, implementation, and dissemination of activities. The Kidney Smart Class℠ (DaVita, 2013), had been supported by various resources and included: DaVita sponsored educators with required material, as well as the nephology clinic providing classroom space, healthcare providers, and office staff. Study participants were actively involved with the completion of pre and post educational surveys and attending the Kidney Smart Class℠ (DaVita, 2013). Expected outcomes of the Kidney Smart Class℠ (DaVita, 2013), were improved understanding of CKD, improved awareness of risk factors causing CKD, improved communications between healthcare providers and patients concerning the diagnosis of CKD, and improved self-management. Short- and long-term outcomes were evaluated during and again at the end of the study, however long-term outcomes will need to be assessed throughout the care of the patient with follow-up appointments. The impact of this study was to improve perceived knowledge of CKD. This study had constraints that limited the outcome effects of the project and included: nephrology late referrals from primary care providers (PCP's), poor discussions about CKD between healthcare providers and patients, patient refusal to attend the class, lack of interest by patients, and class not being endorsed by nephrologists. Appendix D reviews the Logic Model pertaining to this project.

Population and Sampling Parameters

Through convenience sampling, study participants were identified and recruited through their initial diagnosis of stage III and stage IV CKD upon referral to the large nephrology practice located in the Northeast. Inclusion criteria for study participants included: the diagnosis of stage III and stage IV CKD, age 20 and older, alert and oriented without cognitive impairment, and the ability to read and write English. Exclusion criteria for study participants included: non-English speaking, late stage IV CKD with eGFR less than 20, and previous history of kidney transplant.

Two information sheets were used. The first information sheet, designed for the experimental group, explained the study and included clear expectations of the study participants, which was to answer the nine question survey regarding general knowledge about CKD, at two separate times, before and after attending the Kidney Smart Class℠ (DaVita, 2013). Appendix E reviews the information sheet for the experimental group. The second information sheet, designed for the control group, explained the study and included clear expectations of the study participants, which was to answer the nine question survey regarding general knowledge about CKD, at two separate times, before and after the standard educational practices. Appendix F reviews the information sheet for the control group. Contact numbers were available on the information sheets and included: the name and contact information for the principal investigator, Regis University's capstone chair, as well as Regis University's IRB.

Setting

The setting for this EBP educational improvement project took place within a large nephrology clinic located in the northeast corridor of the United States which has four offices throughout the surrounding area. The clinic is a member of a physician group within a nationally recognized network that is non-profit, regional, and fully integrated, providing services at more than 200 sites. Ten nephrologists, four advanced practice providers, including two nurse practitioners and two physician assistants, one practice manager, six medical assistants, and four medical receptionists comprises the nephrology healthcare team. There were 894 new office patients throughout the four offices for the 2014 and 2015 fiscal year. That is an increase of 40 percent compared to last year (Nephrology Physician Administrator, personal communication, August 18, 2015).

The Kidney Smart Class℠ (DaVita, 2013), is a community service, structured educational program sponsored by Davita, a national dialysis organization and is free of charge to all participants, family members, and caretakers (DaVita, 2013). The Kidney Smart Class℠ (DaVita, 2013), is a two-hour class taught by a certified nephrology registered nurse (CNN), who is an educator for Davita through scheduled appointments. The Kidney Smart Class℠ (DaVita, 2013), has full accreditation through the National Committee of Quality Assurance (NCQA). The NCQA is a non-profit organization for disease management accreditation by incorporating standardization measures for improved healthcare outcomes (NCQA, 2013). In 2013, DaVita analyzed its own internal research with the utilization of the Kidney Smart Class℠ (DaVita, 2013). The Senior Manager of Kidney Smart℠ (DaVita, 2013), stated that a patient who attended the Kidney Smart Class℠ (DaVita, 2013), was four times more likely to start dialysis with a home modality, two times more likely to start dialysis with an ideal access in-place, and two more times likely to stay employed in the workforce during dialysis compared to someone not attending the class (Senior Manager, personal communication, March 12, 2015). The Senior Manager of Kidney Smart℠ (DaVita, 2013), also reported that the white paper has not been completed, but will be published in the near future to discuss all results (Senior Manager, personal communication, March 12, 2015).

Methodology

Quantitative analysis defined by Polit (2010), “is the manipulation of numerical data through statistical procedures for the purpose of describing phenomena or assessing the magnitude and reliability of relationships among them” (p.406). A quantitative, pre and post survey, quasi-experimental design study was implemented from March, 2015 to July, 2015 within the four offices of the nephrology clinic. Two of the offices have a similar larger patient population, while the other two offices have a similar smaller patient population. Study participants were recruited and non-randomized from one large patient population office and one small patient population office.

The study participants were secured when the principal investigator was notified by the practice medical receptionist when a patient presented for an initial visit with a nephrologist, with the diagnosis of stage III or stage IV CKD. The principal investigator contacted the potential participant explaining the study. Once the information sheet was read, all questions addressed, and the patient agreed to participate in the study, a serial identification number for either the control or experimental group, was assigned to the patient. The first PIKS survey was completed at that time. If the principal investigator was not available, a medical assistant specifically trained by the principal investigator, provided the patient with an explanation of the study, answering any questions. Study participants completed the survey at the initial referral appointment and again at the patient’s follow-up appointment. At the follow-up appointment, the patient displayed the serial identification number, which distinguished the patient as a study participant and the second PIKS survey was completed.

The experimental group participated in the Kidney Smart Class℠ (DaVita, 2013). The Kidney Smart Class℠ (DaVita, 2013), was provided in a classroom atmosphere over two hours, scheduled at a convenient time for the patient before the follow-up appointment. Education was provided by a CNN educator via visual tools with a power point presentation, a class participation take-home workbook, and a documented action plan for each patient. Information given to the patient included: causes and risk factors of kidney disease, purpose and function of the kidneys, terminology and definition of kidney bio-markers (eGFR, creatinine and proteinuria), stages of kidney disease and possible associated complications, lists of medications to avoid, as well as medications that might be needed. Additionally, information regarding a low protein and low sodium diet, and the importance of blood sugar and blood pressure control were provided. Lastly, each patient was provided with documentation of their current renal status, including a detailed description of the diagnosed stage of CKD.

The control group received standard education practices recommended by the NKF though scheduled appointments (NKF, 2013). Standard education was given to the control group verbally by each nephrologist during the initial referral appointment without any set time limit. The standard information included: causes and risk factors of kidney disease, purpose and function of the kidneys, terminology and definition of kidney bio-markers (eGFR, creatinine, and proteinuria), stages of kidney disease with possible associated complications. Each patient was informed of their diagnosed stage of CKD, medications to avoid, medications that might be needed, information regarding a low protein and low sodium diet, and the importance of blood sugar and blood pressure control.

Participation in this study was voluntary. Study participants could withdraw from this study at any time without penalty, loss of benefits and without affecting the ability to receive medical care. Confidentiality and anonymity were maintained by using a serial numbered system connected to the control and experimental groups. Personal identifiers were not recorded or collected that could link an individual to the collected data. All surveys were placed in a locked file cabinet in the practice manager's office once completed and all data for analysis were locked in a password protected computer, for which the principal investigator was the sole user.

Measurement

Data obtained from this study were analyzed using descriptive statistics and independent samples t-test for dependent means to see if there was a statistical significance with the experimental group after participation in the Kidney Smart Class℠ (DaVita, 2013). The outcomes were measured by entering data from the PIKS instrument into an Excel spreadsheet for organization then inputting this information into the Statistical Package for the Social Sciences, version 23 (SPSS v. 23) for data analysis.

As discussed by Polit (2010**),** to estimate the sample size needed for a study, a power analysis is required to minimize the risk of Type II Error. This study required a minimum of 105 subjects to detect a mean difference of 0.48 for 80 percent power at $\alpha = 0.5$; however this study did not meet power for there were only 50 participants in the study.

Protection of Human Rights

This research project met at least one of the six categories defined by the Department of Health and Human Services Code of Federal Regulations and did not involve members of vulnerable populations. This study addressed the comparison among instructional technique, curricula or classroom management methods within an established accepted educational setting, therefore allowing for exempt status (U.S Department of Health and Human Services, 2009). In addition, the principal investigator successfully completed the Collaborative Institutional Training Initiative (CITI) as required prior to moving forward with this capstone project (CITI at the University of Miami, 2014). Appendix G documents the principal investigator's CITI training certification.

Instrumentation, Reliability, and Validity

The PIKS survey was utilized for this study to assess the perceived knowledge of patients diagnosed with stage III and stage IV CKD. Although the survey is not trademarked or copyrighted, permission to utilize the survey was obtained via email from the creator. Appendix H reviews permission to utilize the survey. The PIKS is a nine-item survey that covered items concerning perceived CKD knowledge in terms of general information, kidney function, symptoms and causes (Wright-Nunes et al., 2011). Appendix I reviews the PIKS survey questions. Each question required a numerical rating for ranked-order:

- (1) I don't know anything
- (2) I know a little amount
- (3) I know a good amount
- (4) I know a lot

This survey was appropriate for this study as the questions correlated to the education covered within the Kidney Smart Class℠ (DaVita, 2013). The validity and reliability of the PIKS had been previously established by Wright-Nunes et al. (2011), in a nephrology clinic at Vanderbilt University Medical Center, Nashville, Tennessee by using the Kuder-Richardson-20 coefficient. Construct validity was established by testing a priori hypotheses of associations between survey results and patient characteristics. Internal consistency using Cronbach's alpha was 0.9, which is considered to be excellent (Wright-Nunes et al., 2011). Cronbach's alpha reveals internal consistency when applied to binary data and produces similar values as the Kuder-Richardson-20 coefficient. Cronbach's alpha was completed on this project's data and revealed an internal consistency of .895, which is in the range of good (Tavakol & Dennick, 2011). Three additional questions were added for background information only and included: education, ethnicity, and primary language. Appendix J reviews the background information.

Potential threats to validity and reliability of this research project would be the possibility of missing data. When data is missing, the accuracy of statistical power is questioned, as is the effectiveness of the intervention, compromising the research study (Polit, 2010). Potential reasons for missing data included: withdrawal of participants, inconsistent or non-response bias, data entry errors, poor instruction from research team, or even construct validity. This study had missing data secondary to a large withdrawal of participants.

Project Findings and Results

Data Analysis and Results

Data analysis uses statistical concepts to interpret and report research findings and is guided by the research question (Zaccagnini & White, 2014). Starting in March, 2015, 62 participants were identified and approached to participate in the study; 12 refused and 50 agreed. The control group consisted of 25 patients but five withdrew from the study, resulting in n=20. The experimental group consisted of 25 patients but 21 withdrew from the study, resulting in n=4. Appendix K reviews the demographics of the initial sample.

The principal investigator utilized SPSS version 23 for statistical data analysis from the Likert scale response options, pre and post-educational interventions with the control and experimental groups. For all statistical analysis, findings with $p \leq 0.05$ are considered statistically significant. Independent samples t-tests for the post-intervention scores were conducted strictly for exploratory purposes since there were so few participants in the experimental group (n = 4) and the use of gain scores (i.e., comparing the difference from pre and post intervention within each group) has its limitations within smaller samples. Results of independent samples t-tests for individual post-intervention revealed that three out of the nine questions on the PIKS were significantly different between the experimental and control groups, as follows:

- (1) Medications that help the kidney
- (2) Medications that hurt the kidney (*p*=.02)
- (3) Foods that should be avoided if a person has low kidney function (*p*=.02)
- (4) Your goal blood pressure
- (5) Understanding treatment options if kidney function gets worse
- (6) Symptoms of chronic kidney disease (*p*=.01)
- (7) How kidney function is checked by a doctor
- (8) The functions of the kidney
- (9) Knowledge about why you have been sent to see a kidney doctor

Appendix L reviews the SPSS output for Independent Samples T-test. It should be noted that a Type I error may increase when comparing individual questions in this manner, given that the more comparisons that are made, the more likely it is that one might see significant differences due to random chance, rather than representing a true difference**.**

Since there was concern with multiple comparisons and the likelihood of an increased Type I error, additional analysis using an independent samples t-test for the mean summary score of questions 1-9 was completed for exploratory purposes only. Summary scores are more reliable since they combine the variance from multiple sources whereas individual items tend to have less reliability by themselves (Director of Research at St. Luke's University Hospital Health Network, personal communication, August 12, 2015). The difference in the mean summary scores between the two groups was statistically significant ($p = 0.04$). The mean ± standard deviation for the experimental group (n=4) was 2.63 ± .37, and for the control group (n=20), was 1.83 ± .72. Appendix M reviews the SPSS output for the group summary scores. The actual mean difference was 0.81 (95% CI .04 – 1.59; $p < 0.05$). Appendix N reviews SPSS Output for Independent Samples T-test summary scores. However, the fact that the confidence interval is fairly wide is further proof that with only four people in the experimental group, these results have poor precision regarding their applicability to the larger CKD population. Results of the study suggest that the Kidney Smart Class℠ (DaVita, 2013), made a statistical significant impact on perceived knowledge as evidenced by increased post-survey scores. Additional research is needed with a larger sample size to validate findings, draw definitive conclusions and show statistically significant differences that early education, specifically with the Kidney Smart Class℠ (DaVita, 2013), will improve the gap in education for adults diagnosed with stages III and IV CKD.

Limitations, Recommendations, and Implications for Change

Limitations

Limitations of the study include the following: 1) very small experimental group sample size (n=4), which prevented the achievement of an adequate power and the application of more complex statistical analysis to better assess pre and post intervention score changes; 2) length of study; and 3) use of a convenience sample that was not randomly assigned, causing potential selection bias and unforeseen confounding variables such as: lack of interest, perception of one’s health or illness, demographics, or even lack of family support.

Recommendations

The results of the study indicates additional research is needed such as a longitudinal study with a larger sample size to detect any significant differences to validate findings and draw definitive conclusions. Two types of statistical methods that would provide additional insight into the true impact of the treatment are a mixed randomized-repeated analysis of variance (ANOVA) to look at whether the magnitude of change in scores from pre and post intervention differed based on whether patients were in the experimental group versus control group, or even an analysis of covariance (ANCOVA), with the pretest scores as the covariate. Moving forward with prospective and retrospective studies would allow for the evaluation of endpoints such as kidney biomarkers, stabilization of electrolytes, control of blood pressure, decreased hospitalizations, and improved CKD knowledge prior to and after the Kidney Smart Class℠ (DaVita, 2013).

Chronic kidney disease is a progressive chronic disease that is a significant contributor to the morbidity and mortality of this nation. There are many educational opportunities throughout the network to assist patients earlier in the disease process to improve the gap in education and perceived knowledge of CKD. The continuation of an intentional, consistent standardized educational program such as the Kidney Smart Class℠ (DaVita, 2013), will benefit all patients within the nephrology clinic from the enhancement of knowledge to facilitate self-management through better understanding of the disease process. Despite the brief timeframe of this study, analysis of outcomes revealed encouraging statistically significant differences between the control group and the four participants in the experimental group. Another recommendation would be to promote the development of a network wide CKD educational policy utilizing the Kidney Smart Class℠ (DaVita, 2013), as part of routine, comprehensive medical care for all patients with the diagnosis of CKD. To improve patient education, this educational policy could be the answer to the lack of awareness and the progression of CKD by:

- Improving the knowledge deficits for better understanding
- Assisting with disease management to improve clinical outcomes
- Providing an opportunity to delay the progression of CKD to ESRD
- Decreasing the overall cost of care

This capstone study also leads the way for future research within the nephology clinic with the addition of a CKD nurse navigator or social worker. These two important additions within the nephology healthcare team could assist with improved treatment compliance, improved communication between patients and nephrologists, and the reduction in patient barriers including: perception of one's own health/illness, missed appointments, medication non-compliance, lack of transportation, emotional support, financial support, and need for ongoing education.

Implications for Change

The morbidity, mortality, and financial burden associated with CKD makes this diagnosis a health care priority. Educational intervention programs, especially when education is specific to the disease process, are imperative for better patient outcomes based upon the literature and the monitoring of specific endpoints as discussed above. Outcomes from this capstone project have implications for nursing practice within the nephrology clinic setting. Understanding the educational, emotional, and social needs of a patients, as well as barriers to non-compliance allows for the development of programs to promote treatment compliance, self-management, and ultimately self-efficacy. The role of the principal investigator is of utmost importance to promote the change in the current CKD educational practice by presenting the outcomes of the study to the nephrologists, the primary care providers, and the stakeholders in a clear, concise process; following the DNP project process model.

Conclusion

The purpose of this study was to improve the gap in education and perceived knowledge of CKD by utilizing a structured education program, known as the Kidney Smart Class℠ (DaVita, 2013), in adults diagnosed with stage III and IV CKD. This study was exploratory only, with only four participants in the experimental group. Although the experimental group was small, the study showed a promising trend with statistical significance for several questions post survey after attending the Kidney Smart Class℠ (DaVita, 2013). Additional research is still needed with a larger sample size. A larger sample over a longer period of time will help to validate findings and draw definitive conclusions. Furthermore, a structured educational class will improve the gap in education and perceived knowledge by improving the awareness of risk factors, assist with the stabilization of kidney biomarkers, and potentially impact the progression of CKD to EDRD. Over time, this will decrease morbidity, mortality, and overall cost to care for a non-communicable disease that is a global issue.

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Appendix A

Example: Critical Review of the Literature

Article/Journal	The Impact of self-management support on the progression of chronic kidney disease-a prospective randomized controlled trial. Nephrology Dialysis Transplant	Patient Perception of Risk Factors Associated with Chronic Kidney Disease Morbidity and Mortality. Ethnicity and Disease
Author/Year	Sue-Hsien, Chen, Yun-Fang Tsai, et all. 2011	Tan, Ainah. Hoffman, Brenda, Rosas, Sylvia. 2010
Database/Keywords	Chronic kidney disease, end-stage renal disease, self-management, self-management support	CKD, Patient Knowledge, Patient Perception, Race Difference, Survey.
Research Design	Open-label, randomized control design.	Anonymous questionnaire/ linear regression
Level of Evidence	Level I	Level IV
Study Aim/Purpose	To examine the impact of self-management support in the outcome of late-stage CKD patients.	The purpose of this study was to assess patient knowledge of risk factors and complications associated with chronic kidney disease.
Population/Sample size Criteria/Power	Pre-dialysis CKD patients who attended an outpatient clinic in the Nephrology Department of Chang Gung Memorial Hospital at Keelung, Taiwan/72 referred/ 54 assigned	Age >=18 who visited renal clinics at Penn-Presbyterian Medical Center or Hospital of the University of Pennsylvania with the diagnosis of stage 3 or 4 CKD. N=229 study participants
Methods/Study Appraisal Synthesis Methods	CKD (III-V) patients were randomized into self-management support n=27 and non-self-management support groups n=27 and followed up for 12 months.	Completed an anonymous questionnaire between October 2007 to April 2008. Evaluated predictors of better knowledge
Primary Outcome Measures/Results	Primary end points were absolute eGFR alteration and number of hospitalization events during the 1 year follow up. Secondary end points were e GFR decreased up to 50%, ESRD with RRT, all-cause mortality.	The majority 89.1% were aware if their diagnosis of CKD. 31.5% were aware of the diagnosis of CKD, but did not know their serum creatinine level compared to only 15.4% with diabetes who did not know their last serum glucose level.
Conclusions/Implications	Suggests that a standardized self-management support program may play a significant role in reducing CKD progression and morbidity or late-stage CKD patients.	Access to CKD education needs to be tailored to the health literacy status of each patient. Educational interventional research studies are needed in early-stage CKD to determine impact on clinical outcomes.
Strengths/Limitations	Limitation was small sample size, 1 year follow up period,	Selection bias in patients will to answer the questionnaires. The ones who answered the questionnaires may have been more health knowledgeable. Only two renal clinics used in this study.
Funding Source	Nursing Department, Chang Gung Memorial Hospital, Keelung, Taiwan; Graduate Institute of Clinical Medical Science	Renal, Electrolyte and Hypertension Division, Department of Medicine, University of Pennsylvania health System, Philadelphia, Pa., and the Philadelphia VA Medical Center
Comments	Well written, It evaluated patients for CKD knowledge base. This can be used for my capstone to help understand their knowledge base.	Very Useful information using a survey Tool for questionnaire. This I can use for my capstone.

Appendix B

SWOT Analysis

	Strengths	**Weaknesses**
INTERNAL	• Convenient location within MD offices • Kidney Smart Class℠ (DaVita, 2013) is a community service Program/free to clients • Education allows for treatment compliance • Standardize educational practices for improved outcomes	• Convenience sample within one practice • Decreased health literacy • Too small of a sample • Late referrals to Nephrology • Time constraints • Anxiety/Depression of patients • Fear and denial of patients
	Opportunities	**Threats**
EXTERNAL	• Increased referrals from PCP • Improved perception of CKD • Improved stability of kidney biomarkers (proteinuria, eGFR, creatinine) • Stabilized electrolytes & blood pressure • Established office patients to participate • Increase in classes/census driven • Decrease hospitalizations and overall cost of ongoing care • Slow the progression of CKD to ESRD	• Participants in both groups could differ with basic knowledge • Ongoing CKD education from other physicians within the healthcare field • Initial survey may prepare participants to self-educate • Participants may drop out of study • Transportation issue • Lack of family support and time

Appendix C

Budget and Resources

Resource	Cost/Hourly wage	Time	Total
Lead study DNP	51.72/hour	50 hours total over 6 months/ approximately 2 hours/week	50 x 51.72 = 2586.00
Office staff (2 per office) check in/out	15.00/hour 13.00/hour	15 minutes/check in 10 minute /check out	0.25hr x 105 pts (**50**)= 26.25 (**12.5**) hours x 15.00 = 393.75 (**187.50**) 0.167hr x 105 pts **(50)** =17.54 **(8.35**) hours x 13.00 = 225.02 (**108.55)** Total: 621.77 (**296.05)***
Statistician	40.00/hour	6 hours/for 3 tables	40.00 x 6 = 240.00
Office space lease/ 4 practice sites	Easton: 881.60 Allentown: 459.40	Bethlehem: 440.00 Quakertown: 459.40	Over a 3 month time period Total 2240.40
Davita RN educator	36.00/hour	12 hours monthly for 3 months (36 hours total)	36 x 36.00 = 1296.00 **8 x 36= 288 (1008.00)***
Computer Locked file cabinet Educational supplies/paper/pens	800.00 one time 200.00 one time 4.15 (12 pack pens) 30.70 (paper)	One time: donated One time: donated 3 months 3 months	800.00 200.00 Total: 12.45 1012.45 92.10
Training (group-6 staff)	15.00/hour (3) 13.00/hour (3)	1 hour of group training for 6 staff	45.00 Total: 39.00 84.00 **Estimated Grand Total** 8172.32 **(7466.90)***

Appendix D

Logic Model

Resources	**Activities**	**Outputs**	**Short Term Outcomes**	**Long Term Outcomes**	**Impact**	**Constraints**
Donated classroom space Two hour allotment for education class Providers: MD, NP, PAs DaVita's Educators Office staff to schedule classes Computers, power points, time, and materials per class Jill Stoltzfus, PhD. Statistician	The Kidney Smart Class will be provided to patients diagnosed with Stage III/IV CKD Pre and post Surveys will be obtained Maintain availability of Educators, classroom space and time allotment for the Kidney Smart Class	Better understanding of CKD Improved awareness of risk factors causing CKD Providers and patients will have better communication concerning the diagnosis of CKD Improved self-management	Increased referrals Improved perception of CKD	Improved stability of kidney biomarkers/ Electrolytes/ controlled BP Established patients are offered classes to improve and maintain knowledge	Improved CKD health knowledge Improved awareness of risk factors, potential decreased progression, improved compliance Decrease hospitalization, overall cost, and improve self-management	Nephrology Late referrals Poor discussion on the topic of CKD between healthcare providers and patients Refusal to attend the class Lack of interest from patients.

Appendix E

Infromation Sheet for Experimental Group

My name is Donna Bobo. I am a Doctoral student at Regis University. My contact information is: 701 Ostrum Street, suite 602, Bethlehem, Pa. 18015; phone: 610-865-5888. I am conducting a research study entitled "Improving the Education Gap for Patients with Chronic Kidney Disease." The purpose of this study is to examine the effects of a structured education program on percveived knowledge about chronic kidney disease.

I am asking you to participate in this study for you have been referred to a nephrologist (kidney doctor) for chronic kidney disease. I hope to show that this education class will improve knowledge and decrease the gap in education for better understanding. This research study will be performed at all four offices affiliated with St. Luke's Nephhrology Associates. Your participation is voluntary. Choosing not to participate will not affect your access to any goods or services. There are no direct benefits to participating in the study.

I will be conducting the study by asking you to fill out a 12 question survey related to basic kidney knowledge at today's office visit and again at your next follow-up office visit. Participation in this study will take up to three months. Each survey takes five minutes to fill out. Your participation will involve an additional two hours of your time to attend the structured education class, which will be completed before your next office visit. The cost of this rsearch study is free of charge to all participants.

I will not be collecting any data that can link you to the answers you provide. Your anonymity and the confidentiality of your responses will be protected as much as possible. If you are uncomfortable answering any questions, you may choose to not answer that question or to stop your participation and have any notes, recording, or hard copy answers destroyed. To protect the confidentiality of your responses, I will not be collecting a signed consent form but will instead consider your participation in the study as consent permitting me to collect the data you provide.

Should you have any questions or concerns about participation in this study, you may contact me using the information in the first paragraph. My capstone chair is Dr. Judy Crewell; email:jcrewell@regis.edu; phone: 303-458-4365. You may also contact Regis University Institutional Review Board (IRB) for human subjects participation by telephone at 303-458-4206; by mail at Regis University, Office of Academic Grants, 447 Main, Mail Code H-4, 3333 Regis Blvd., Denver, CO. 80221; or by email at irb@regis.edu with questions or concerns, or if you feel that participation in this study has resulted in some harm.

Sincerely,

Donna Bobo, MSN, FNP-BC

Appendix F

Infromation Sheet for Control Group

My name is Donna Bobo. I am a Doctoral student at Regis University. My contact information is: 701 Ostrum Street, suite 602, Bethlehem, Pa. 18015; phone: 610-865-5888. I am conducting a research study entitled “Improving the Education Gap for Patients with Chronic Kidney Disease.” The purpose of this study is to examine the effects of a structured education program on percveived knowledge about chronic kidney disease.

I am asking you to participate in this study for you have been referred to a nephrologist (kidney doctor) for chronic kidney disease. I hope to show that this education class will improve knowledge and decrease the gap in education for better understanding. This research study will be performed at all four offices affiliated with St. Luke’s Nephhrology Associates. Your participation is voluntary. Choosing not to participate will not affect your access to any goods or services. There are no direct benefits to participating in the study.

I will be conducting the study by asking you to fill out a 12 question survey related to basic kidney knowledge at today’s office visit and again at your next follow-up office visit. Participation in this study will take up to three months. Each survey takes five minutes to fill out. The cost of this rsearch study is free of charge to all participants.

I will not be collecting any data that can link you to the answers you provide. Your anonymity and the confidentiality of your responses will be protected as much as possible. If you are uncomfortable answering any questions, you may choose to not answer that question or to stop your participation and have any notes, recording, or hard copy answers destroyed. To protect the confidentiality of your responses, I will not be collecting a signed consent form but will instead consider your participation in the study as consent permitting me to collect the data you provide.

Should you have any questions or concerns about participation in this study, you may contact me using the information in the first paragraph. My capstone chair is Dr. Judy Crewell; email:jcrewell@regis.edu; phone: 303-458-4365. You may also contact Regis University Institutional Review Board (IRB) for human subjects participation by telephone at 303-458-4206; by mail at Regis University, Office of Academic Grants, 447 Main, Mail Code H-4, 3333 Regis Blvd., Denver, CO. 80221; or by email at irb@regis.edu with questions or concerns, or if you feel that participation in this study has resulted in some harm.

Sincerely,

Donna Bobo, MSN, FNP-BC

Appendix G

CITI Training Certificate

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI)

HUMAN RESEARCH CURRICULUM COMPLETION REPORT

Printed on 05/25/2014

LEARNER

DEPARTMENT EMAIL INSTITUTION EXPIRATION DATE

Donna Bobo (ID: 4172878) 402 4th Street
Whitehall
PA - Pennsylvania 18052
nursing dbobo@regis.edu Regis University
05/24/2017

SOCIAL BEHAVIORAL RESEARCH INVESTIGATORS AND KEY PERSONNEL

COURSE/STAGE: PASSED ON: REFERENCE 10:

Basic Course/1 05/25/2014

13047313
REQUIRED MODULES
Introduction
History and Ethical Principles - SBE The Regulations - SBE
Assessing Risk - SBE Informed Consent - SBE
Privacy and Confidentiality - SBE Regis University

DATE COMPLETED 05/22/14
05/22/14
05/22/14
05/24/14
05/24/14
05/25/14
05/25/14

For this Completion Report to be valid, the learner listed above must be affiliated with a CITI Program participating institution or be a paid Independent Learner. Falsified information and unauthorized use of the CITI Program course sites unethical, and may be considered research misconduct by your institution.

Paul
Braunschweiger
Ph.D.
Professor,

Appendix H

Permission to Utilize the Survey

Dear Donna,

Thank you for your interest in our research and the KiKS measure. You are welcome to use it in your research. We ask that you include its citation in any reports or publications. I have attached a version for your convenience.

Best wishes in your research!
Sincerely,
Kerri Cavanaugh

Kerri Cavanaugh, MD MHS
Assistant Professor of Medicine
Medical Director, Vanderbilt Dialysis Clinic-Campus
Vanderbilt University Medical Center
Division of Nephrology & Hypertension
Center for Health Services Research
1161 21st Ave South
S-3223 MCN
Nashville, TN 37232-237
Phone: 615-936-7306
Fax: 615-875-5626

Donna,

Same permissions are in place for the PiKS (perceived kidney knowledge) – which is the 9 items at the end of the KI paper. Just keep in mind that those questions are asking what people think they know, and not directly testing their understanding/knowledge. Similarly, we just ask that you cite the survey in your report/publications.
Our group thinks both are important….so just depends on what you are trying to look at in your study.

Best,
Kerri

Appendix I

Perceived Kidney Knowledge Survey (PIKS) questions

Questions	**I don't know anything (1)**	**I know a little amount (2)**	**I know a good amount (3)**	**I know a lot (4)**
1. Medications that help the kidney				
2. Medications that hurt the kidney				
3. Foods that should be avoided if a person has low kidney function				
4. Your goal blood pressure				
5. Understanding treatment options if kidney functions gets worse				
6. Symptoms of chronic kidney disease				
7. How kidney function is checked by a doctor				
8. The functions of the kidney				

9**.** Knowledge about why you have been sent to see a kidney doctor				

Appendix J

Background Information

Background information questions. Please choose the one that best describes you.

What is the highest level of education you have completed?

- ___No Formal Education (1)
- ___Grade School (2)
- ___Some High School (3)
- ___High School (4)
- ___GED (5)
- ___College (6)
- ___Graduate School (7)

What is your ethnic background?

- ___African American (1)
- ___Asian (2)
- ___Caucasian (3)
- ___Hispanic (4)
- ___Pacific Islander/Native American (5)
- ___Other, Please Specify___________ (6)

Is your primary language something other than English?

No____________ (1)   Yes, Please Specify______________ (2)

- Age and Gender were obtained at the initial assessment.

	Control Group Frequency	**Control Group Percentage**	**Experimental Group Frequency**	**Experimental Group Percentage**
Gender				
Male	n= 15	53.6%	n= 10	29.4%
Female	n= 10	35.7%	n= 15	44.1%
Ethnicity				
African American	n= 3	10.7%	n=1	2.9%
Caucasian	n= 21	7.5%	n=17	50.0%
Hispanic	n= 1	3.6%	n= 7	20.6%
Education				
No Formal Education			n= 1	2.9%
Grade School	n= 3	10.7%		

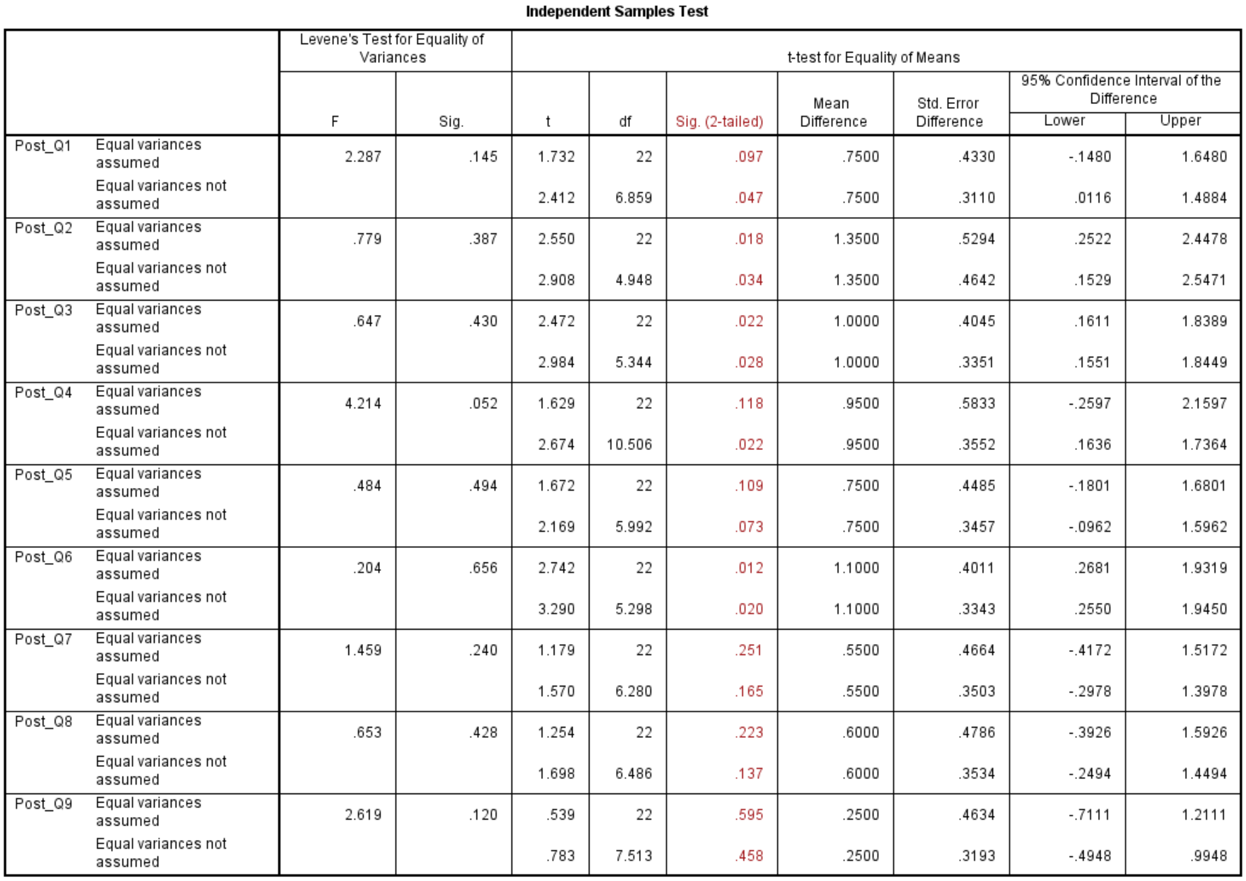
Appendix K

Demographics of Initial Sample

Some High School	n= 6	21.4%	n= 7	20.6%
High School	n= 10	35.7%	n= 7	20.6%
GED	n= 5	17.9%	n=2	5.9%
College			n=5	14.7%
Graduate School	n= 1	3.6%	n=3	8.8%
Primary language				
English	n= 24	85.7	n=19	55.9%
Other (but can read and write in English)	n= 1	3.0%	n=6	17.6%
Missing data (Refusal)	n= 3	10.7%	n= 9	26.5%

Appendix L

SPSS Output for Independent Samples T-test

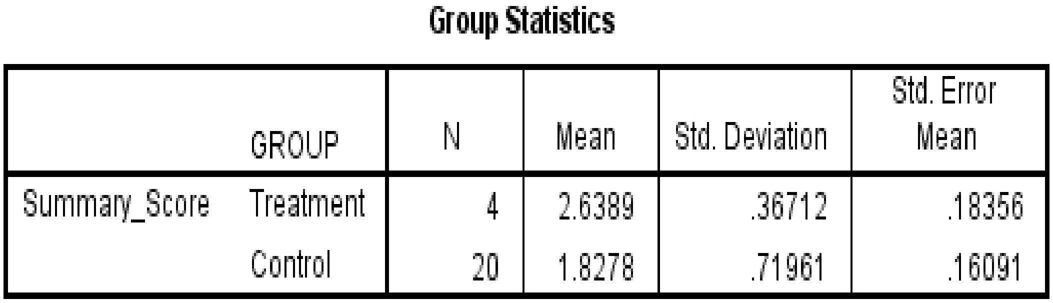


Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Post_Q1	Equal variances assumed	2.287	.145	1.732	22	.097	.7500	.4330	-.1480	1.6480
	Equal variances not assumed			2.412	6.859	.047	.7500	.3110	.0116	1.4884
Post_Q2	Equal variances assumed	.779	.387	2.550	22	.018	1.3500	.5294	.2522	2.4478
	Equal variances not assumed			2.908	4.948	.034	1.3500	.4642	.1529	2.5471
Post_Q3	Equal variances assumed	.647	.430	2.472	22	.022	1.0000	.4045	.1611	1.8389
	Equal variances not assumed			2.984	5.344	.028	1.0000	.3351	.1551	1.8449
Post_Q4	Equal variances assumed	4.214	.052	1.629	22	.118	.9500	.5833	-.2597	2.1597
	Equal variances not assumed			2.674	10.506	.022	.9500	.3552	.1636	1.7364
Post_Q5	Equal variances assumed	.484	.494	1.672	22	.109	.7500	.4485	-.1801	1.6801
	Equal variances not assumed			2.169	5.992	.073	.7500	.3457	-.0962	1.5962
Post_Q6	Equal variances assumed	.204	.656	2.742	22	.012	1.1000	.4011	.2681	1.9319
	Equal variances not assumed			3.290	5.298	.020	1.1000	.3343	.2550	1.9450
Post_Q7	Equal variances assumed	1.459	.240	1.179	22	.251	.5500	.4664	-.4172	1.5172
	Equal variances not assumed			1.570	6.280	.165	.5500	.3503	-.2978	1.3978
Post_Q8	Equal variances assumed	.653	.428	1.254	22	.223	.6000	.4786	-.3926	1.5926
	Equal variances not assumed			1.698	6.486	.137	.6000	.3534	-.2494	1.4494
Post_Q9	Equal variances assumed	2.619	.120	.539	22	.595	.2500	.4634	-.7111	1.2111
	Equal variances not assumed			.783	7.513	.458	.2500	.3193	-.4948	.9948

Appendix M

SPSS Output for Group Summary Scores

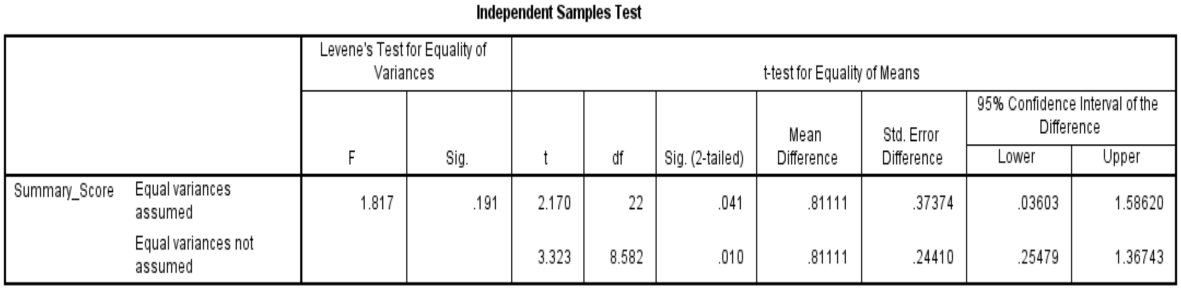


Group Statistics

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
Summary_Score	Treatment	4	2.6389	.36712	.18356
	Control	20	1.8278	.71961	.16091

Appendix N

SPSS Output for Independent Samples T-test Summary Scores



Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Summary_Score	Equal variances assumed	1.817	.191	2.170	22	.041	.81111	.37374	.03603	1.58620
	Equal variances not assumed			3.323	8.582	.010	.81111	.24410	.25479	1.36743

Appendix O

Project Timeline

- October 15, 2014: Successful Capstone Proposal Defense

- Novermber, 2014: St. Luke’s University Hospital Health Network IRB Approval
- March, 2015: Regis University IRB Approval
- March, 2015: Pre-Survey (Initial Enrollment)
- April to July, 2015: Post-Survey (Follow-up Appointments)
- July to August, 2015: Data Analysis
- August 21, 2015: Oral Capstone Defense
- November 12, 2015: Written paper
- Spring, 2016: Future Submission for Publication

Appendix P

Regis University IRB Approval Letter

May 13, 2015

Donna L. Bobo
402 4th Street
Whitehall, PA 18052

RE: IRB #:**15-121**

Dear Ms. Bobo:

Your application to the Regis IRB for your project, "Improving the Education Gap for Patients with Chronic Kidney Disease", was approved as an exempt study on March 13, 2015. This study was approved per exempt study category of research 45CFR46.101.b(#l).

The designation of "exempt" means no further IRB review of this project, as it is currently designed, is needed.

If changes are made in the research plan that significantly alter the involvement of human subjects from that which was approved in the named application, the new research plan must be resubmitted to the Regis IRB for approval.

Sincerely,

Patsy Cullen

Patsy McGuire Cullen, PhD,
CPNP-PC Chair, Institutional
Review Board Professor &
Director

Doctor of Nursing Practice & Nurse Practitioner
Programs Loretto Heights School of Nursing

Regis University

Cc: Dr. Judy Crewell

Appendix Q

St. Luke's University Hosptial Health Network IRB Approval Letter

From: do not reply@ddots.com [do not repiy@ddots.comJ

Sent: Tuesday, November 18, 2014 9:29 AM

To: Bobo, Donna L

Subject: Documents have been IRB reviewed:

SLHN 2014-61 IRB No.: SLHN 2014-61

An event for Protocol SLHN 2014-61 has been marked as having completed review.

Local ID: SLHN 2014-61

Protocol: SLHN 2014-61

Type of Submission: Revisions & Amendments

IRB Meeting Date: 12/02/2014

Action: Approved

Reviewed By: Expedited Review

Action Date: 11/ 18/2014

Agenda: Amendment - start date January 2015 to July 2015

Please consider for expedited review.

Thanks.

Review Completed By: Stawicki, Stanislaw P.

Completed Date: 11/18/2014

Appendix R

Letter of Support from DaVita

Donna –

As discussed, Kidney Smart is publically available – all classes are open to the community and offered nationwide. The online self-guided content can also be accessed by anyone via the Kidney Smart website (www.kidneysmart.org).
https://kidneysmart.edmeasures.com/welcome.php

Best,
Meghan

Meghan McNulty Epps
Senior Manager, CKD Programs / Kidney Smart
DaVita VillageHealth
2476 E. Swedesford Road, Suite 150
Malvern, PA 19355
Office: (610) 722-6421
Cell: (610) 299-8829
Fax: (855) 235-6269

(The above email was written by the Senior Manager of Kidney Smart ℠, Meghan Epps, to assist in verifying that the Kidney Smart Class ℠ is open to the public. This was done because the Corporate and Legal Departments of DaVita have declined to provide a letter of support for this research project. By placing DaVita’s support in writing, it was felt that this would go against the Anti-Kickback Statue Law.)