Chronic Kidney Disease: Early Education Intervention

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Abstract

Background: Chronic kidney disease is a public health problem worldwide. Awareness of chronic kidney disease among patients is low. Providing early education will empower the patient with tools, resources, and knowledge to self-manage the disease.

Purpose: The aim of this study was to determine if providing early self-management education will improve the awareness of chronic kidney disease and increase knowledge regarding the disease process in the primary care setting.

Design: A quasi-experimental study was conducted with pre-post comparison using a survey of kidney disease knowledge. *The National Kidney Foundation: Take the Kidney Quiz.*

Methods: A pre and post patient/caregiver knowledge survey was conducted in a primary care nephrology clinic at an academic medical center in the South Eastern United States to evaluate knowledge gains following an educational intervention during the clinic appointment for patients diagnosed with chronic kidney disease stages 1-4 and their care partners. The knowledge survey tool was administered to 25 individuals. A paired t-test was used to compare the pre-intervention and post-intervention knowledge survey scores.

Results: A statistically significant improvement was found between pre and post scores (t= 5.192, df= 24, p= .001) on the test scores following participation in the educational intervention session.

Keywords: chronic kidney disease, self-management, education, National Kidney Foundation

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Chronic Kidney Disease Education

Chronic kidney disease (CKD) is increasing globally, affecting approximately 10% of the adult population (Eckardt et al., 2013). The increasing incidence of diabetes, hypertension, and obesity (Eckardt et al., 2013) contributed to CKD becoming one of the most common chronic diseases. Furthermore, the statistics regarding life expectancy, disease related complications, quality of life and healthcare dollars consumed are shocking. There are 26 million American adults with CKD and millions of others who are at increased risk for CKD (NKF, 2016). Further review of the data reveals that 23.4-35.8% of individuals diagnosed with CKD are 65 years of age or older. That percentage is expected to continue to rise with the aging Baby Boomer population. CKD is a progressive disease, classified into five stages based on declining glomerular filtration rate (GFR) (See Table 1). People suffering with CKD need to invest considerable time into managing their health, including modifying their diet and lifestyle, managing numerous medications and attending medical appointments. Although the progression of CKD is related to some non-modifiable characteristics such as race, baseline renal function, male gender and increased age, there are a number of modifiable characteristics (NKF, 2016).

Given the pathogenic progression of kidney disease, patients with CKD are at high risk for progression to Stage 5, end stage renal disease (ESRD), a condition requiring dialysis or kidney transplantation to maintain a patients' long-term survival. ESRD places a greater burden on individuals due to the addition of renal replacement therapy (RRT) and places considerable demand on healthcare resources due to the cost associated with ESRD. In 2011, the average annual cost for maintenance of ESRD therapy was between $70 and $75 billion worldwide (Lysaght, 2002). The costs of treatment create a burden for families and the health care system

(Lysaght, 2002).

Medicare spending in 2013 for CKD Stage 2 was $4.6 billion dollars, $37.2 billion for Stage 3 CKD, and $7.2 billion for Stage 4 CKD. The cost of care totaled approximately $50 billion among people 65 and older (USRDS, 2013).

Due to the asymptomatic nature of CKD it is frequently not detected until later in its progression, resulting in lost opportunities for prevention. Progression to kidney failure or other adverse outcomes could be prevented or delayed through early detection and treatment of CKD (Locatrelli, Vecchio, & Pozzoni, 2002). CKD patients approaching ESRD are often not completely informed or educated on their disease stage, progression, and treatment options (Branson, 2007). The absence of early education has been implicated as a cause of significant psychological trauma for patients and families, which adds to the burden of their disease and contributes to poor and potentially fatal health outcomes.

Early CKD education has the potential to reduce the burdens of disease progression and improve health outcomes (Branson, 2007). People with CKD can benefit from early, frequent, focused education to increase awareness of how self-management can slow the progression of the disease. Evidence reveals that educational interventions are lacking during hospitalization for those diagnosed with early stages of CKD (Chen et al., 2011). This scholarly project describes the implementation of an educational intervention for CKD patients in the primary care setting to evaluate their awareness of the disease process and increase their knowledge regarding the impact of self-care on reducing progression of the disease.

Theoretical Framework

Trends of rising healthcare costs illustrate the need for alternative models of care to mitigate the risk factors associated with chronic disease. New approaches are needed to manage chronic disease that will reduce cost and add value. Self-management programs have been designed and implemented with evidence of positive outcomes (Du & Yuan, 2010).

Healthcare providers focus on management of disease. Self-management allows the patient to become the expert by learning how to manage the symptoms, treatment, physical and psychological consequences along with life style changes that are necessary when living with a chronic condition (Du & Yuan, 2010). As health is affected by lifestyle and habits adopted by the individual, it is possible to have some control over the factors that affect one's health (Benight & Bandura, 2004). Some individuals will choose to change behavior to prevent negative outcomes associated with the chronic disease and others will not.

The theory of self-efficacy has been defined by Albert Bandura as one's belief in their ability to succeed in specific situations or accomplish a task (Bandura, 1977). The theory of self-efficacy is the cornerstone of Bandura's social cognitive theory, which emphasizes the role of observational learning and how the person approaches goals, tasks, and challenges. The main concept of the theory is the individual's actions and reactions are related to social and cognitive behaviors. According to Benight & Bandura (2004), people with high self-efficacy that believe they can perform well are more likely to view difficult tasks as something to be mastered rather than something to avoid. Choices affecting one's health are dependent on self-efficacy. Self-efficacy beliefs determine if health behavior change will be initiated, how much effort will be expended, and how long the changes will be sustained when an obstacle surfaces. Self-efficacy influences how high one will set their health goals. Healthy behavior change is influenced by what the individual believes the consequences to be. An individual adopts changes in health behaviors based on understanding the risks and benefits of the behavior, perceived confidence that those health behaviors can be learned, and expectations that the outcomes of the behaviors will be achieved. Cognitive processes are key in the acquisition and retention of new behavior patterns (Bandura, 1977). Knowledge of the need for change is necessary for the process to be successful. The ability to develop self-management or achieve necessary behavior change is rooted in the core belief that one has the power to produce desired changes by the individual's actions (Benight & Bandura, 2004).

Self-management of chronic disease begins with cognitive learning about the disease process, since this plays a significant role in the development and retention of new behaviors (Bandura, 1977). Another means of acquiring new behaviors includes learning from others. Change in behavior can be validated through feedback and demonstration. As an individual successfully implements new health behaviors, there is an expected increase in the individual's level of self-management or the belief in one's capabilities (Bandura, 1977). Over time, individuals develop the confidence to do what needs to be done to achieve the desired health outcomes in managing the chronic disease (Marks, Allegrante, & Lorig, 2005).

Self-efficacy serves as the conceptual framework for the application of self-management programs for chronic disease. Self-efficacy determines how the person feels, thinks, is motivated and behaves (Benight & Bandura, 2004). A patient exercising self-efficacy using the cognitive process will choose to make decisions to change behaviors to promote better health. The person will approach decisions differently through self-efficacy and see the change as an opportunity (Bandura, 1977). The patient embracing self-efficacy will be proactive, make choices to adapt to change in life, and overcome perceived barriers rather than manage the stressors (Benight & Bandura, 2004). Results will occur through learning mastery of self-management tasks, observations of others, persuasion by others, and assessment of the patient's emotional state. Once new behaviors are adopted through a structured self-management program, which mitigates poor health habits, the changes will result in positive health outcomes. The use of health care services will be impacted by self-management success through potentially reducing costs to the healthcare system. Figure 1 is the theoretical framework for self-management and Figure 2 includes sources of self-efficacy.

The Standard Chronic Disease Self-Management program has produced outcomes that indicate patients have increased their confidence in managing the chronic disease. Self-management utilization reduced the need for emergency department visits and decreased the number of hospital days (Lorig, Sobel, Ritter, Laurent, & Hobbs, 2001). The reduction of health care visits will decrease the cost to the health care system. A patient's perception and ability to generate solutions is critical for success with the multiple challenges associated with managing chronic disease. The aim of this study was to determine if providing early self-management education will improve the awareness of chronic kidney disease and increase knowledge regarding the disease process in the primary care setting.

Review of the Literature

The evidence illustrates that knowledge of CKD is unacceptably low in the general population, the CKD population and among primary care providers and family practitioners (Tuot et al., 2011). A search was initiated to review the evidence, using the following key words: chronic kidney disease, self-care, self-management, and education. Databases queried included Cochrane Databases, CINAHL, Medline, and Ovid. The search included the time period of 1999-2015. One study was conducted in Canada, one in the United Kingdom, one in the United States, and two in Taiwan. Inclusion criteria were studies that included adults >18 years of age and examined the efficacy of self-management education for chronic kidney disease. Five studies met criteria for inclusion in this review as shown in Table 2.

Knowledge

Yen, Huang, and Teng (2008) conducted a single group repeated measure design to evaluate the effects of the intervention to assess the knowledge of patients with early stage chronic disease. Sixty-six patients with CKD stage 3 were recruited through the health department community screen data bank. A multidisciplinary team delivered an educational intervention with follow up data collection at six and twelve months. Patients could contact the team with questions about CKD during the twelve-month period. Yen et al. (2008) used the World Health Organization Quality of Life Questionnaire (WHOQOL-BRIEF). Yen et al. (2008) reported significantly improved BMI and no improvement in GFR over time. The decrease in BMI may explain the reason for the GFR remaining stable at the checkpoints. Obesity is associated with renal damage (Yen et al., 2008) and the central fat distribution may cause more damage to the kidneys than general obesity. The GFR level was stable in the patients in the study; the mean age was 67.4 years old. This age was slightly higher than ages reported in other studies. Age is a major risk factor for declining renal function. Preventing declining renal function is a key task of early stage CKD educational intervention. This outcome provides supporting evidence for early educational intervention in CKD to slow renal function decline. Yen et al. (2008) reported that CKD knowledge was higher than the baseline at 6 months and below baseline at 12 months. Limitations of the study are the small sample size and selection bias. Due to ethical reasons, all patients received an educational intervention.

Quality of Life

Two studies assessed HRQoL by utilizing different tools. Campbell, Ash, and Bauer (2008) conducted a randomized controlled trial, which demonstrated the effect of nutritional intervention on the quality of life of the patient with CKD. Patients were allocated to either the intervention group with regular individualized counseling for twelve weeks or to the standard care treatment group. The intervention group included 23 patients and the standard care group included 24 patients. The study was limited by the sample size. The study was underpowered to detect statistically significant differences in the QOL scales. Campbell et al. (2008) used the Kidney Disease Quality of Life Short-Form version 1.3 (KDQOL-SF v1.3). Yen et al. (2008) used the WHOQOL-BRIEF. Both measures provided evidence that the use of self-management programs may improve the HRQoL in CKD patients. Campbell et al. (2008) demonstrated statistically significant difference in cognitive functioning in mean change for scores of symptoms of kidney disease, $p = 0.047$, cognitive functioning, $p = 0.003$, and vitality, $p = 0.002$ in favor of the intervention group. No significant improvements were identified following the intervention in the physical, psychological, social, or environmental of the HRQoL. However, the patients did show a significantly higher rate of satisfaction with their personal health at 6 and 12-month follow-up than they did at baseline.

Self-management and Educational Intervention Outcomes

Chen et al. (2011) examined the impact of self-management support (SMS) in the outcome of CKD patients in a randomized controlled trial with 53 patients. The non-SMS patients received customary care from a nephrologist. The SMS patients received monthly face-to-face meeting on CKD self-management. Telephone based support involved a weekly telephone call by a nurse to enhance CKD self-management. A support group led by a social worker took place twice a month with at least 10 CKD patients. The patients were followed for 12 months. Patients with the SMS nurse led group had significantly improved CKD knowledge compared with the non-SMS patients after the 12-month study phase (SMS, 10.13 ± 2.49 points and non-SMS, 5.51 ± 3.22 points; $P < 0.001$). Limitations of the study include the small sample size, the limited 12-

month follow-up duration, and the potential information contamination of the control group. Due to the beneficial role of the SMS nurse led group and for ethical reasons, all patients in the non-SMS group were transferred to the SMS group after the study concluded. The study indicated that CKD knowledge was generally poor in newly diagnosed CKD patients. The application of SMS intervention could be beneficial in CKD care. Chen et al. (2011) reported data on hospital admission as a measured outcome. The randomized study findings suggested that the standard self-management support group intervention reduced hospitalizations in those with late stage CKD. The authors concluded that those who received self-management education had significantly less hospital admissions (18.5%) as compared to the control group (44.47%). This outcome provides supporting evidence for early educational intervention in CKD to reduce hospitalizations.

Krepsi, Bone, Ahmad, Worthington, and Salmon (2004) conducted a two-part study using qualitative and quantitative data. Qualitative research can identify patients' beliefs about a disease and the influences to adhere to management of the disease. Quantification is necessary to determine the beliefs that are likely to be prevalent in caring for the patient. Krepsi et al. (2004) developed a sixty-three-item questionnaire to represent each type of belief identified in the qualitative analysis. The patients participated in a sixty to ninety-minute individual interview. Half of the patients completed the questionnaire during dialysis and the other half completed the questionnaire at home. Sixteen patients in the hospital setting and clinic setting were interviewed to assess their understanding of their illness, including kidney failure. The study provided a detailed generalizable account of what patients believe about end stage renal disease treatment.

Tuot et al. (2011) assessed CKD awareness in 1852 adults with an estimated GFR <60 ml/min using 1999 to 2008 National Health and Nutrition Examination Survey (NHANES) data. CKD awareness was a “yes” answer to the question, “have you ever been told you have weak or failing kidneys?” The following abnormal markers of CKD were used to group the patients: hyperkalemia, acidosis, hyperphosphatemia, elevated blood urea nitrogen, anemia, albuminuria, and uncontrolled hypertension. A multivariable logistic regression was used to determine the odds of CKD awareness associated by each abnormal marker. Individuals with kidney disease and those with albuminuria had greater CKD awareness (adjusted odds ratio, 4.0, $P = <0.01$) than those without albuminuria. Odds of CKD awareness increased with each additional clinical marker of CKD (adjusted odds ratio, 1.3, $P = 0.05$). A staggering 90% of patients with two to four markers of CKD and 84% with ≥ 5 markers were unaware of their kidney disease. The high degree of CKD unawareness among individuals with at least five markers of kidney disease was not expected. The cross-sectional design of this study is a limitation, which could lead to misclassification. Self-reported information is another limitation of the study that could attribute to recall bias. Individuals with greater number of clinical markers were more likely than those with fewer markers to be male, older than 60 years of age, and race other than non-Hispanic.

Awareness of CKD is necessary as a first step towards modifying lifestyle and risk factors to prevent progression of kidney disease. The management of CKD patients involves many challenges, including timely diagnosis and establishment of disease management. Early diagnosis can be difficult, as CKD usually progresses silently. Identification of early stage CKD may reduce the incidence of end stage renal disease. There is a lack of research on the implementation of educational programs with outcomes in the literature. The National Institute for Clinical Excellence (NICE) framework already in use for complex interventions and diabetes education, could be revised to use for CKD education (Mason, Khunti, Stone, Farooqi, & Carr, 2008).

This review of literature focused on educational programs for CKD care, a scant amount of evidence is available to support the design of such programs. Fresenius Medical Care, reports success with their Treatment Options Program (TOPs) according to Mollicone, Pulliam, and Lacson (2013). The program was developed in response to consistent observations that a large number of patients initiating dialysis were mostly unaware of their treatment options. The TOPs program is a face-to-face meeting offered to patients with stage 3 and stage 4 CKD to review renal replacement treatment options once the patient is declared. The program is sustainable, reliable, and reports positive outcomes. The major barrier to its complete success is late referrals.

In summary, this review synthesized current evidence describing the effects of early awareness and education for people with CKD stage 1-4 and assess whether interventions improved knowledge, health literacy, self-efficacy, QOL, progression of CKD, or impacted hospitalizations. Surprisingly little research has been conducted in this area. More research has been conducted with individuals on hemodialysis.

The design of the studies varied in regards to study length; interventions delivered; outcomes assessed; assessment tools used and results obtained. Each of the interventions included a face-to-face meeting and some included phone call follow-up sessions. The delivery of the intervention intensity varied, ranging from sessions several times a week to only one session with a six-month follow-up. The most common element in each study was a nurse on each team.

Knowledge was measured differently across the studies. Not enough information was provided on the questions that the patients were asked. The most commonly reported outcome was clinical indicator. Two studies assessing HRQoL used a standardized assessment measure. Self-management was assessed using questionnaires developed by the authors. Krespi et al. (2004) developed a 63-item questionnaire based on data collected from the qualitative portion of the study. The questionnaires contained a five point Likert scale. The questions included 16 related to renal failure, 19 related to diet and fluid restrictions, and 27 related to hemodialysis. A large number of patients blamed their kidney disease on “bad luck”, structural problems or spontaneous kidney disease. The majority of the patients identified causal agents such as high blood pressure, infection, and mismanagement by the patient or the physician.

Few studies examine self-management and CKD clients. The largest effects observed were for increase in CKD knowledge (Yen et al. 2008; Chen et al. 2011); the interpretation of the findings is difficult due to issues with measurement. Yen et al. (2008) reported knowledge was higher at six-months than at baseline and reported it lower at twelve-months than at baseline. The authors indicated after the initial educational intervention, reinforcement consultations were conducted with the patients. Outcome assessments were conducted with the patients; however, there is no indication as to when the reinforcement consultations were conducted. Chen et al. (2011) suggested that empowered and informed patients who can self-manage their disease have a higher well-being. Knowledge about CKD may be a key factor to slow the progression of CKD, help improve relationship between patient and clinicians, and leads patient to embrace treatment (Chen et al. 2011). Reviewing literature on other chronic illnesses, such as diabetes is essential to further understand the self-management concept. Bodenheimer, Lorig, Holmann & Grumbach (2002) reported self-management programs that include problem solving and decision making improved diabetic self-care and health outcomes. Whereas traditional patient education offers information and technical skills, self-management education teaches problem-solving skills. The experimental group receiving self-management education spent less time hospitalized due to illness-related complications**.** The quantitative findings suggest self-management education enhances chronic disease adaptation in the diabetic patient population and can be adapted for use in the patient with chronic kidney disease. Although the results are positive, further studies are needed to determine the exact educational component that produces success. Bodenheimer et al. (2002) reported self-management programs can increase the ability, confidence and problem-solving skills of people with chronic health conditions that will help them to effectively manage their illness.

For many the diagnosis of CKD is traumatic. These emotions can prevent patients from taking the immediate and appropriate steps to best address the disease. Breaking through the realities of stress and depression is an important initial role for education. Appropriate, timely, tailored self-management programs which aim to maximize an individual's confidence to understand, cope, problem solve and remain motivated with regard to adherence with diet, fluids, medications, and follow up appointments can contribute to a better quality of life, a reduction in hospitalizations, and a decrease in mortality. Nurses in primary care are in an ideal place to have a leading role in delivering self-management program to patients diagnosed with CKD stages 1-4. Such programs are relatively recent and important in improving the treatment of early stages of CKD.

Although current data is sparse and not without limitations, the general consensus is that patient awareness of CKD is unacceptably low. Further explorations of factors associated with CKD awareness, behavioral changes, and the impact of CKD awareness on outcomes is greatly needed to guide awareness efforts. Providers should be armed with knowledge and awareness of

CKD as well as the tools necessary to communicate information to encourage early self-management and provide education.

Methods

Purpose

The purpose of the study was to evaluate the disease awareness and knowledge of patients diagnosed with CKD with an aim of providing an educational intervention on self-management to potentially slow the progression of kidney disease and close the gap in patient and caregiver knowledge deficit.

Hypothesis

Participation in the education intervention will improve the patients;

- Awareness of the stages of chronic kidney disease
- Knowledge about chronic kidney disease
- Knowledge on how to reduce the progression of chronic kidney disease
- Role of self-management of diabetes, obesity, and hypertension as it relates to CKD

Practice Question

Does providing self-management education in the primary care setting to the patient diagnosed with chronic kidney disease improve their awareness and knowledge of the disease process?

Study Design

A quasi-experimental study with an educational intervention assessed with a pre and post comparison using a survey of test questions on the effects a chronic kidney disease.

Measures

The *Take the Kidney Quiz* (National Kidney Foundation, 2010) was used to assess the participant's knowledge before and knowledge gain after the educational intervention. The *Take the Kidney Quiz* is a ten question, multiple-choice quiz used to assess the usefulness of an educational interventional to increase the awareness of CKD management. Scoring of the quiz occurred prior to the educational intervention and after the educational intervention. Permission to use *Take the Kidney Quiz* was granted by The National Kidney Foundation (See Appendix A for the quiz questions). Upon review by the Institutional Review Board (IRB) the recommendation was made to include family and care providers in the sample size. Family members and care providers participated in the educational session, however, only the patient data was included in the sample.

Patients who met the following criteria were included in the sample and the analyses:

- Adult male and females ≥18 years of age
- CKD diagnosis
- English speaking
- Not presently on dialysis
- Able to give informed consent

Setting

The study was conducted at an academic medical center (AMC) in central Virginia in a large primary care medicine clinic and specialty nephrology clinic. The primary care family medicine clinic offers primary care for adult patients of all ages. The primary care clinic offers general services in the care of chronic health conditions. Approval to conduct the study was obtained from the Nurse Manager of the primary care clinic and nephrology clinic.

Description of Sample

Twenty-five patients participated in a 60-minute educational intervention immediately following a scheduled clinic appointment. Family members and friends were invited to participate in the educational intervention. The patients who participated in the intervention were male (n=13, 52%) and female (n=12, 48%). The age of the patients ranged from 35-84 years, with the mean age of 63 years (Table 3). The majority of the patients were either CKD Stage 3 with a GFR between 30-59 mL/minute (n=13, 52%) or CKD Stage 4 with a GFR between 15-29 mL/minute (n=9, 36%). The majority of the patients had a secondary diagnosis of hypertension (n=23, 92%) and diabetes (n=16, 64%).

Data Analysis Plan

Data from the 10 question *Take the Kidney Quiz* were analyzed using IBM SPSS 24 statistical software. Descriptive statistics were computed on the demographic data. Pre and post scores on the *Take the Kidney Quiz* were compared using a paired *t*-test. Data collection included: age, gender, race, CKD stage and GFR, diabetes status, hypertension, obesity, and BMI (Table 4).

Protection of Human Subjects

The protocol was approved by the Institutional Review Board for Health of the University of Virginia. The highest risk was for loss of confidentiality of the patients. Recording and analyzing the data electronically protected confidentiality of the patients. Patients were assigned a number in order of intervention. A name and medical record list was maintained on a separate protected spreadsheet. Once the study was complete the spreadsheet was deleted to limit risk of confidentiality loss. All paper survey results were destroyed. See Appendix B for the IRB protocol consent forms.

Program Description

Recruitment. Patients were recruited during the scheduled clinic appointment. Those with a diagnosis of CKD were approached to participate in the study. Not all patients approached were able to participate in the educational session due to overlapping clinic appointments. A review of electronic medical record (EMR) was conducted the day prior to the scheduled appointment to determine GFR value and to determine if the inclusion criteria would be met. Family members and care providers were invited to participate in the educational intervention.

Educational Intervention. The educational sessions were scheduled for 60 minutes at the conclusion of the clinic appointment. The educational session was conducted in an exam room with access to a computer to educate patients on available electronic resources. The first 10 minutes was allocated for the patients to complete *Take the Kidney Quiz* (*Learn About Kidneys and Kidney Disease*, National Kidney Foundation, 2010). Thirty minutes was allotted for the educational intervention using a booklet from the National Kidney Foundation, *Learn About Kidneys and Kidney Disease* (2010). Ten minutes was allotted for questions after the educational intervention. Ten minutes was allotted for the post educational intervention quiz.

Procedures

The educational intervention session occurred immediately following the scheduled clinic appointment. The patients were invited to complete a ten-question quiz prior to the educational intervention (Appendix A); this ensured data on knowledge of kidney disease was collected before any interventions were conducted. Laboratory results and vital signs were reviewed with the participant during session. Each participant was educated on how to document laboratory results and vital signs. A log was provided to each participant for documentation of data to share with the physician at each clinic appointment (Appendix C). A post-test was conducted at the conclusion of the educational intervention. The participant was provided with an educational booklet at the conclusion of the educational session to review or refer to as a tool to promote self-management. Education on obtaining mobile applications for tracking data was provided to those expressing interest. Contact information was provided to each participant to contact the nurse educator with questions at the conclusion of the session. An evaluation was completed by each participant at the conclusion of the education intervention (Appendix D).

Results

Patients with any stage of CKD attended a 60-minute educational session during their scheduled clinic visit. The effectiveness of providing early education about CKD in the clinic setting was measured and evaluated by comparing pre and post educational intervention quiz scores. Twenty-five patients completed the pre and post quiz along with the educational intervention.

All participants scored 100% on the post-intervention quiz. The results of a paired *t*-test provided strong evidence (t=5.192, p<.001) that the mean post-intervention kidney quiz score (Mean=100.00, SD=0.00) was higher than the mean kidney pre-intervention kidney quiz score (Mean=81.60, SD=17.50). There was strong evidence that the educational intervention increased the patients' knowledge of Chronic Kidney Disease (Table 5).

CKD Stage 3 (n=13, 52%) and 4 (n=9, 36%) accounted for the majority of the patients in the educational sessions. Patients who participated in the intervention were also diagnosed with co-morbid conditions such as hypertension (n= 23, 92%) and diabetes (n= 16, 64%). The body mass index (BMI) ranged from 22.30 – 45.37 (Mean= 31.3, SD=6.02). A BMI of 30 or greater is considered obese. Dedicated time in the intervention was spent on dietary teaching and methods for initiating physical activity into daily routines. Two of the twenty-five participants

(8%) self-reported regular exercise. All participants reported understanding the importance of exercise; however, most felt they lacked the energy to exercise regularly.

Patients' ages ranged from 35 to 84 (Mean=63.56, SD=15.28). A statistically significant negative Pearson correlation (r=-.439, *p*=.028) between age and pre-intervention test score indicated that lower pre-test scores were associated with higher ages (Figure 3).

The pre-intervention scores for females (Median=95.00, IQR=20) tended to be higher than those for males (Median=80, IQR=30), but the difference was not significant (Mann-Whitney U=51.50).

Patient's receiving an educational intervention showed an overall improvement in the mean score of the kidney quiz. Specific post-intervention improvements included an increase in knowledge on kidney disease and self-management knowledge; an increased understanding of the functions of the kidneys; an increased understanding of what can damage the kidneys; what can happen if kidney disease is not treated; and an increased understanding in what can be done to protect the kidneys to reduce the progression of CKD. The largest gap in knowledge identified in the pre-education survey was the main functions of the kidneys. Of the twenty-five participants, twelve participants (48%) answer the question incorrectly (Table 6).

Each participant completed an evaluation designed by the author at the conclusion of the session. The author designed the seven question evaluation to gain knowledge about the design of the educational intervention. A five point Likert scale was utilized to assess seven questions pertaining to the educational intervention. The mean range of the evaluation results was 4.28-5.0, indicating the patients were highly satisfied with the educational session. The patients had an opportunity to add comments to three open ended questions to improve the design of the educational intervention (Table 7).

Discussion

Although the sample size was small the data revealed a statistically significant improvement between pre and post scores (*t*= 5.192*, df*= 24, *p*= .001) on the test scores following participation in the educational intervention session. Therefore, more exposure to education in the CKD population can lead to an increase in an individual's knowledge about the disease and how self-management can impact outcomes of kidney function.

The participant's educational intervention was examined statistically. A significant negative Pearson correlation (r=-.439, *p*=.028) between age and pre-intervention test score indicated that lower pre-test scores were associated with higher ages as noted in the literature (Figure 3). Age is a major risk factor for declining renal function. There was a significant increase from pre-test scores to post-test scores in the majority of the educational intervention patients. Preventing declining renal function is a key task of early stage CKD educational intervention. Obesity is associated with renal damage (Yen et al., 2008) and the central fat distribution may cause more damage to the kidneys than general obesity. The stages of CKD or BMI were not found to be related to lower pre-test scores. Further study with a larger sample size is needed to validate the findings.

The educational intervention session provided an opportunity for patients to review their knowledge about CKD and how to best apply early self-management techniques to specific areas of management to impact the progression of kidney disease. The patients were educated on kidney disease by reviewing the *Kidneys and Kidney Disease* booklet (The National Kidney Foundation, 2010). All patients verbalized they understood the need to manage their blood pressure, blood glucose levels, maintain a proper diet, and participate in regular exercise. The patients were taught how to enter data on a simple log to monitor blood pressure, blood glucose, GFR, weight, and amount of daily exercise. The informational booklet and log were given to each participant at the conclusion of the educational intervention.

The evidence suggests that the intervention had a positive effect on the CKD patients' knowledge about CKD. Resources were provided for the primary clinic staff to refer patients with CKD to the *Taking Care of Kidneys* class that has been set up by the Nephrology clinic to provide more intense education on CKD. The primary clinic staff showed interest in providing the National Kidney Foundation booklet to patients as a resource since dedicated education would not be possible once the study concluded due to the number of clinic appointments in a day. The clinic doesn't currently provide an educator to assist with patient education. The clinic does provide written resources on numerous chronic medical conditions. The clinic staff does allow and encourages patients to ask questions and express concerns that may need to be addressed. All twenty-five of the patients reported feeling their knowledge level increased as a result of the educational session. All reported changes would be made to their self-management regimen to effectively manage their CKD. Most indicated the desire for further education as part of their future clinic appointments.

The results of this small study reinforce the need for a dedicated patient educator. Long term follow-up of patients exposed to this educational intervention could provide additional evidence if the patients' disease progression and QOL were altered.

Limitations

This study was conducted at a single academic medical center location, which limits the generalizability of the findings. There was a single nurse researcher. Additional limitations included: inability to conduct follow-up evaluations at consecutive clinic visits due to duration between appointments, small sample size, and a high clinical operational tempo which limited available space to conduct the intervention. Finally, the pace of the clinic and turnover of patients limited the time that could be spent in the examination room.

Future Study Opportunities

The results of the study illustrated an increase in the knowledge level of the patients with one-on-one education. A future study could attempt to compare outcomes of a group educational session to an individual educational session. A similar study with a larger sample size would be necessary to validate the results. It would be sufficient to assess QOL and progression rate overtime to current group. The review of literature illustrated telephone follow-up after the educational sessions and face-to-face meetings twice a month over a greater duration might improve the outcomes.

Nursing Practice Implications

Demonstrating an increased knowledge related to CKD was related to participation in the educational session. This provides evidence that can be used to encourage patients and clinic providers to continue to offer an educational intervention. Recommendations were provided to the clinic manager to encourage ongoing CKD education either with written materials or referring the patient to a live educational session through the Nephrology clinic. Nursing is pivotal to providing the necessary educational resources to patients with chronic medical conditions requiring lifelong interventions. The clinic nurse often serves as the caregiver, educator, and coordinator of care. Nurses and other healthcare providers can provide education to those diagnosed with CKD on the management of kidney disease. Self-management should be encouraged along with empowering the patient to provide self-care in the management of the disease. Early education provides the patient the opportunity to gain knowledge on how to properly self-manage CKD. Early access to education can guide patients to participate in health behaviors to slow the progression of renal disease, and reduce the need for emergency room visits and hospitalizations. Early education regarding the management of CKD has the potential to decrease morbidity and costs to the healthcare system (Branson, 2007).

This study demonstrated self-knowledge in early stages of CKD can be accomplished and has potential to slow progression of the disease.

Recommendations

The CKD early education model in the primary clinic setting is an approach supported by literature to provide early education on self-management to a population of patients with a disease that is recognized as a global public health problem (Eckardt et al., 2013). Careful review of current staffing will need to be evaluated to determine how to best support a dedicated educator in the clinic setting. Displaying educational resources in the clinic would enhance the educational opportunity for the patient, such as a poster demonstrating the stages of CKD or the anatomy of the kidney. Developing hybrid educational programs to fit the learning need of the individual patient, and implementing an educational program with one-on-one teaching that graduates to a group educational environment might be considered. A partnership with the community to educate the public about CKD by offering public service announcements, offering community based education, and offering sites in the community to hold screening tests could strengthen knowledge. Eckardt et al., (2013) demonstrates that a lack of educational intervention has the potential to worsen kidney function resulting in End Stage Renal Disease, requiring renal replacement therapy or kidney transplantation.

To strengthen these findings, replication of similar studies in other primary clinic sites with co-morbidities would be needed. Studies over a longer period of time could increase the strength of the findings. Further studies could evaluate the costs savings to the organization if admissions were prevented due to chronic disease management. Every healthcare provider has an opportunity to communicate with policy makers to raise awareness about CKD and the impact on the healthcare system.

Primary care physicians can play a valuable role in improving the outcomes for the patient with CKD. Focusing on efforts to reduce morbidity in the early stages can contribute to improving outcomes. Proper screening and early educational intervention in the primary care setting can reduce the progression of CKD. Referral to a nephrologist is an option to collaboratively manage the CKD patient.

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Table 1

Stages of Chronic Kidney Disease

Stage	**Description**	**GFR (mL/min/1.73m2)**
1	Kidney Damage with normal or ↑ GFR	≥90
2	Kidney Damage with mild ↓ GFR or kidney function	60-89
3	Moderate ↓ GFR or kidney function	30-59
4	Severe ↓ GFR or kidney function	15-29
5	Kidney Failure	<15 or dialysis

Note. Chronic kidney disease is defined as either kidney damage or GFR <60 mL/min/1.73m2 for ≥ 3 months. Kidney damage is defined as pathologic abnormalities or markers or damage, including abnormalities in blood or urine tests or imaging studies. Adapted from KDOQI clinical practice guidelines for chronic kidney disease: Evaluation, classification, and stratification. 2002. Retrieved from https://www.kidney.org/sites/default/files/docs/ckd_evaluatin_classification_stratification.pdf

Table 2

Summary of Chronic Kidney Disease Education Research

Author, Year	Purpose	Design	Subjects and Setting	Pertinent Findings
Campbell, 2008	Aims to investigate whether providing individualized nutritional counseling can improve nutritional status and influence quality of life in pre-dialysis chronic kidney disease patients	Randomized controlled trial Nutrition intervention utilizing self-management principles HRQoL and nutritional status	53 Patients with Stages 4 and 5 pre-dialysis CKD patients in a pre-dialysis clinic	-the intervention group was provided with individual consultation with a dietitian and then regularly monitored by telephone -the nutritional status is related to quality of life in CKD patient and providing intervention improved QOL -patients felt more hopeful in managing kidney disease -the standard care group received generic nutrition information, no individualized advice or monitoring -Statistically significant difference in mean change for scores of symptoms of kidney disease $p = 0.047$, cognitive functioning $p = 0.003$, and vitality $p = 0.002$ in favor of the intervention
Chen, 2011	Examine the impact of self-management support in the outcome of late-stage CKD patients	Randomized controlled trial Self-management support (SMS) group for 12 months in outpatient nephrology clinic	54 patients with stages 3-5 CKD	-the non-SMS patients received customary care from a nephrologist -The SMS intervention group were followed for 1 year -SMS group received support from dietitians, nurses, peers and volunteers with monthly face-to-face meetings on CKD self-management education -CKD knowledge was generally poor -Number of CKD patients was underestimated and undereducated -SMS intervention for daily care of CKD patients should be part of integrated CKD care -SMS had significantly improved CKD knowledge compared to non-SMS group after 12-month study, $P < 0.001$
Krespi, 2004	Identify the range of beliefs that patients hold about renal disease and its treatment	Qualitative and quantitative Study 60-90 minutes interviews and a 63 items	Qualitative-16 patients Quantitative-156 patients Hospital unit	-Most patients had an explanation about their renal disease. -Many patients related the cause of renal disease to mismanagement of their own or their doctor -Contributes to evidence-base patient centered care

		beliefs questionnaire	5 satellite units, suburbs and inner city	
Tuot, 2011	Examine whether clinical cues prompt recognition of CKD among providers	Cross-sectional Questions from the 1999-2008 NHANES	Chronic kidney disease awareness assessed using the National Health and Nutrition Examination 1999-2008 1852 patients	-only those with albuminuria had greater awareness of CKD -84% of individuals were unaware of their disease -individual awareness of CKD and risk factors remains low -CKD awareness is important among persons with clinical markers to educate about interventions to enhance well-being -Individuals with 2 to 4 clinical markers of CKD compared to 0 markers demonstrated greater awareness of CKD $p = 0.04$
Yen, 2008	Investigate the physical, knowledge and quality of life outcomes of an educational intervention for patients with early stage chronic kidney disease	Prospective Single group repeated measures Educational intervention delivered and a repeated measure post education	66 patients with Stage 3 CKD Community Health Department	-BMI significantly decreased over the 12-month follow-up -QOL increased at 6 months and decreased at 12 months -General health increased over time -GFR levels were not significantly changed during baseline, 6 months, and 12-month follow up -Patients were older in this study and may attribute to normal kidney deterioration -BMI significantly different at three time points $p < 0.05$ -The scores for satisfaction with personal health increased significantly $p < 0.05$ -BUN and GFR were not significantly changed

Table 3

Age, Gender, and BMI Descriptive Statistics

	Total Sample
N	25
Mean Age	63.56
SD	15.278
Mean BMI	31.32
SD	6.015
Female (%)	12 (48%)
Male (%)	13 (52%)

Table 4

Demographic Data

Characteristics	**N (%)**
Gender	
Female	12 (48)
Male	13 (52)
Race	
Caucasian	20 (75)
African American	5 (25)
CKD Stage	
Stage 1	1 (4)
Stage 2	2 (8)
Stage 3	13 (52)
Stage 4	9 (36)
Diabetes Dx	16 (64)
Diabetes Meds	15 (60)
Diabetes Controlled	9 (36)
Hypertension Dx	23 (92)
Hypertension Meds	23 (92)
Hypertension Controlled	23 (92)

Table 5

Paired Samples Statistics

	N	**Mean**	**Median**	**IQR**	**SD**	***t***	**df**	**Sig (2 tailed)**
Post test	25	100			.000			
Pre-test	25	81.60			17.720			
Pre-test Female	12	86.67	95	20	17.233			
Pre-test Male	13	76.92	80	30	17.505			
Pre & Post test Difference	25	18.4			17.720	5.192	24	.0000256

Table 6

Take the Kidney Quiz Question Results

Question	**Number Incorrect Responses 25 pre quizzes***	**% Incorrect Responses**
1. How many kidneys do most people have?	*	0
2. How big are your kidneys?	9	36%
3. Where are you kidneys?	7	28%
4. Which of the following are main jobs of your kidneys?	12	48%
5. Who can get kidney disease?	6	24%
6. If your kidneys fail, you'll need a kidney transplant or dialysis.	*	0
7. What can you do to keep your kidneys healthy?	4	16%
8. You're at risk for kidney disease if you have.	4	16%
9. 1 in 9 American adults has kidney disease?	4	16%
10. Chronic kidney disease can be detected and treated early, which may slow it from getting worse?	*	0

Note: *There are no incorrect responses on the post intervention quiz.

Table 7

Mean and Mode Post Education Intervention Evaluation

Question #	1	2	3	4	5	6	7
Mean	4.52	4.28	5.0	4.36	4.48	4.48	5.0
Mode	5	4	5	4	4	4	5

Note. Scale: 1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree. Questions are available in Appendix E.

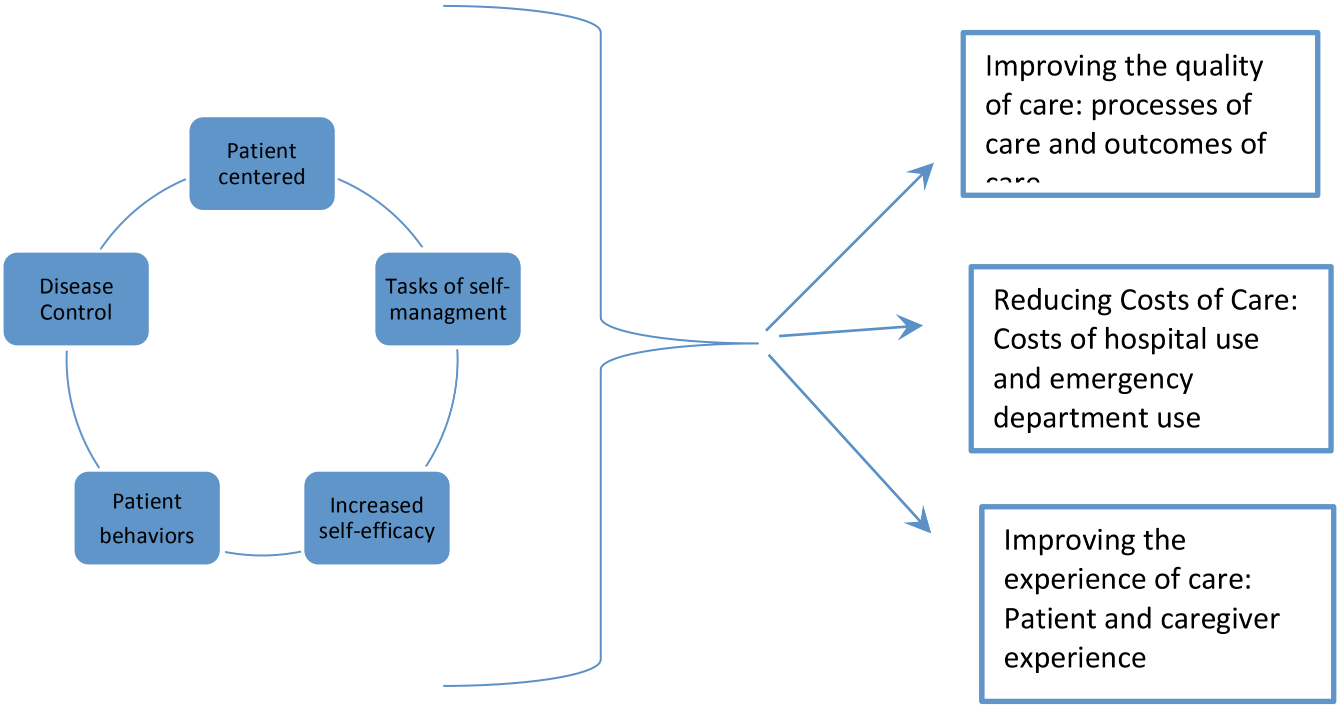

Figure 1. Theoretical Framework Self-Management

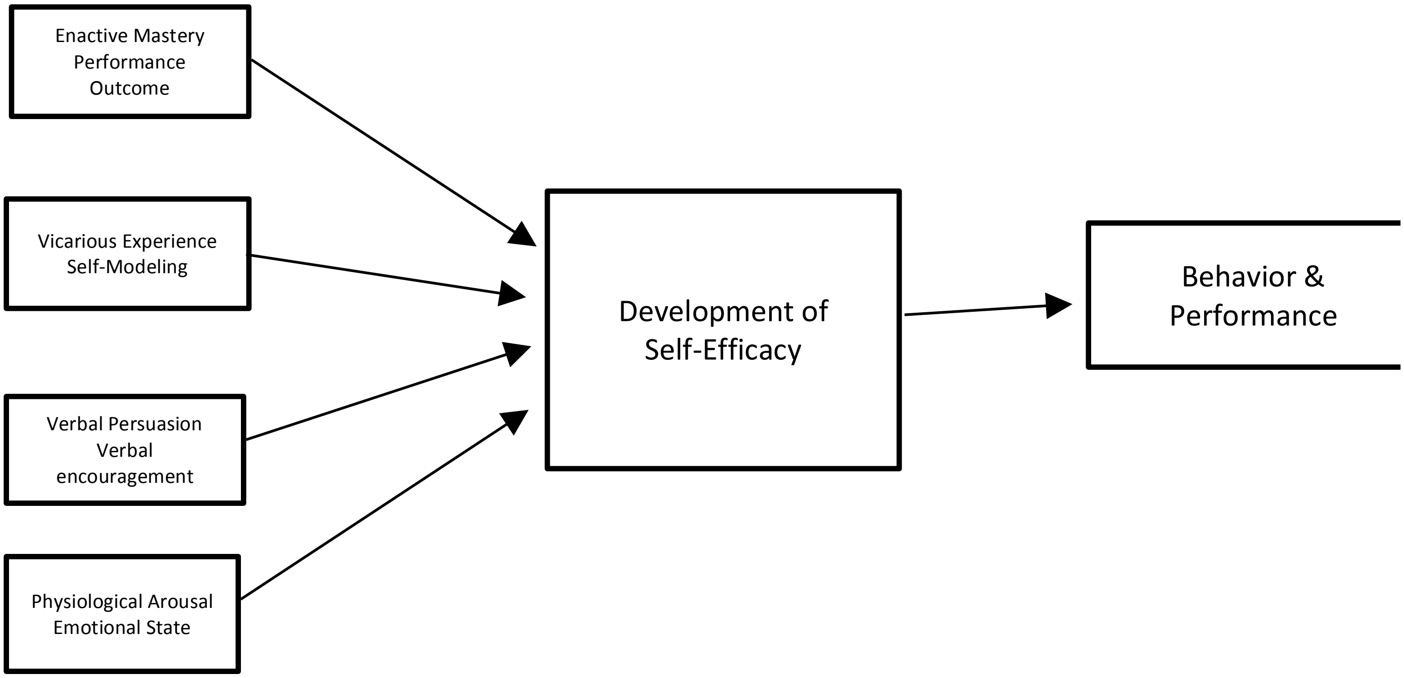

Figure 2. Sources of Self-Efficacy

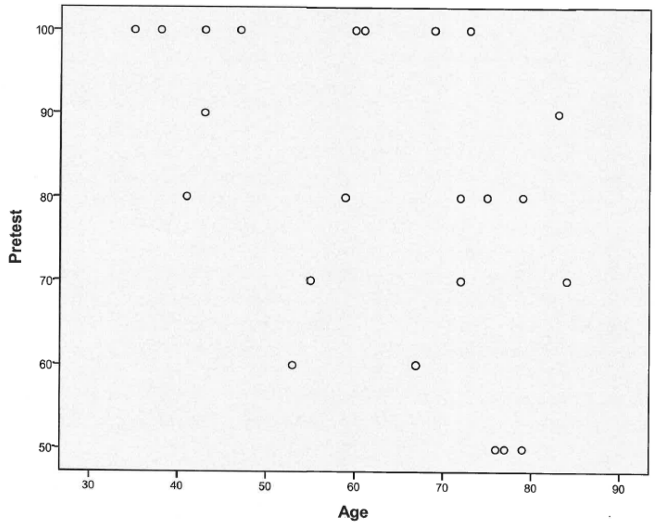

Figure 3. Age with Pre-test Scatterplot
N=25, Pearson Correlation -.439, Sig (2-tailed) 0.028.
**Note.* Correlation is significant at the 0.05 level.

Appendix

Nephrology Nursing Journal Author Guidelines

The Nephrology Nursing Journal is the official publication of the American Nephrology Nurses' Association (ANNA). The Nephrology Nursing Journal is a refereed clinical and scientific publication that provides current information on a wide variety of subjects to facilitate the practice of professional nephrology nursing. Its purpose is to disseminate information on the latest advances in research, practice, and education to nephrology nurses and to positively influence the quality of care provided.

The Nephrology Nursing Journal welcomes both solicited and unsolicited manuscripts and suggestions for articles. Manuscript queries should be submitted to BethUlrich@aol.com. All materials must be original and submitted for the exclusive use of the Nephrology Nursing Journal.

Manuscript Preparation

Manuscript format should follow the guidelines established by the Publication Manual of the American Psychological Association (APA), 6th edition (2010). In addition, NNJ adheres to APA guidelines regarding the use of non-biased language. Authors should refer to that text for all details of their manuscript.

Technical Format

Manuscripts should be submitted using MS Word. The manuscript should be submitted in a 12 point font, be double spaced, and have at least one inch (1”) margins. The preferred font is Times New Roman. The text in the body of the manuscript should be indented at the beginning of each paragraph. A running header (shortened title) and page number should be included at the top of each page of the manuscript except for the title page.

Reference software programs (including the program that comes with MSWord) should NOT be used.

Headings

NNJ uses three levels of headings in the body of the manuscript:

First Level (bold, left justified, underlined, Arial font) Second Level (bold, left justified, Times New Roman font)

Third level. (bold, at the start of the paragraph, Times New Roman font)

Punctuation Guidelines (APA, Chapter 4)
Spacing - Insert one space after commas, colons, and semicolons; periods that separate parts of a reference

citation; and periods of the initials of personal names.
Commas - Within a sentence, use commas to separate three or more elements that do not have internal commas

(for example – apples, oranges, and bananas); use semicolons to separate three or more elements that have internal commas.

Quotation marks - Use double quotation marks when quoting material directly from the source, the first time a word or phrase is used for an invented or coined expression, and to set off the title of an article or chapter when the title is mentioned in the text. Do not use double quotation marks to identify the anchors of a scale or to introduce a technical term - italicize them instead. Do not use double quotation marks to enclose block quotations of 40 or more words.

Bullet points - If each bullet point is a complete sentence, start each with a capital letter and end each with a period.

If the bullet points are a list, then end each bullet point with a comma or semicolon as noted above. End the last bullet point with a period.

NNJ Author Guidelines

Order of the Manuscript

The following order should be followed for all manuscripts submitted to NNJ including department submissions.

· Title Page – Include
o title of the manuscript

o the names of the author(s) with their credentials
o keywords – Three to five words/phrases typically used when people are searching for information

(e.g., hemodialysis, transplantation, work environment). · Author Information – For each author, provide the

o Name
o Credentials - according to the ANA 2009 Position Statement, the correct order of credentials is

education (list highest attained degree first), licensure (state designation or requirement), national

certification, awards and honors, other certifications
o Current job title, name of employer, city and state of employer
o If applicable, any current ANNA leadership position titles
o If applicable, ANNA chapter of which the author is a member
o Contact information including email address, phone number, and land mail address (home address

preferred).
o Disclosure statement. Include a statement signed by all authors that the contents, in whole or in

part, have not been previously reported, and are not under consideration for publication elsewhere,

nor will be, until a decision is made by the Nephrology Nursing Journal Editor.

- · •Acknowledgement of funding or other contributions (include only if applicable)
- · •Abstract (75-125 words)
- · •Key words
- · •Learning outcome
- · •Manuscript text
- · •References
- · •Tables (each on a separate page)
- · •Figures (each on a separate page)

Tables, Figures, and Photographs (APA, Chapter 5)
Each table and figure (including photographs, which are considered to be figures) should appear on a separate page after the reference section. Each table and figure should have a title at the top and any sources or permissions for the use of the table listed under the table/figure. For figures, make sure to submit the figure in a format that can be recreated for publication. If the figure is a graph, for example, submit the graph in a format that includes access to the data used to create the graph. The data in the tables and figures should be carefully checked for accuracy - make sure all the numbers that should add up actually do add up.

Photographs must be of high resolution. If the table or figure is taken from another source, include a full reference citation. Obtaining permission to reprint another's work is the responsibility of the author. In addition, photographs that contain the image of an individual or individuals must be accompanied by signed releases from those individuals stating that they give permission for the photograph to be used in NNJ.

Citations and References

The purpose of citations and references is for readers to be able to find the sources cited. Citations and references must follow the guidelines in the APA Publication Manual, 6th edition, 2010. Examples are provide below. For other types of citations or references, refer to the APA Publication Manual, Chapter 6: Crediting Sources.

Citations

Citations should be from primary sources and should be as current as possible.

Citations from references with one or two authors should list all authors in each citation. (Kear, 2014; Ulrich & Robbins, 2015).

Citations from references with three, four, or five authors should list all authors the first time the reference is cited.

(Headley, Brooks, Szromba, & Dutka, 2011)
All future citations should list the first author followed by et al.

NNJ Author Guidelines (Headley et al., 2011)

Citations from references with six or more authors should list the first author followed by et al. on all citations. (Colaneri et al., 2014)

When multiple citations are listed for the same information, they should be listed in alphabetical order, with each citation - except the last - followed by a semi-colon.

(Colaneri et al., 2014; Headley, Brooks, Szromba, & Dutka, 2011; Kear, 2014; Ulrich & Robbins, 2015)

References

Reference information should be obtained from the original (primary) source. There should be a reference for each source cited in the manuscript. References should be listed in alphabetical order at the end of the manuscript and should begin on a new page. Authors are encouraged to provide digital object identifier (DOI) numbers, when available, at the end of the reference.

For references with one, two, three, four, five, or six authors, all author names should be listed. For references seven or more authors, the names of the first six authors should be listed followed by an ellipses (...) and the name of the last author. Note that in the reference titles, only the first word, proper names, and the first word after a colon are capitalized.

When there is more than one reference by the same author, the references by that author should be listed in order of the publication years with the earliest article listed first. When there is more than one reference by the same author in the same year, those references should be ordered alphabetically by the first word of the title and a lowercase suffix should be added to the year beginning with the letter “a” (i.e., 2015a, 2015b).

References for an entire book must contain the name(s) of the author(s), year of publication, title of book, edition of book (if multiple additions have been printed), location of the publisher, and the name of the publisher.

Examples:
Author, A.A. (2014). Title of book. Location: Publisher. Editor, A.A. (Ed.) (2016). Title of book. Location: Publisher.

References for a book chapter must include information on the chapter as well as on the book as a whole. Example: Author, A.A., & Author, B.B. (2012). Title of chapter. In A. Editor & B. Editor (Eds.), Title of book (pp.

xxx-xxx). Location: Publisher.

References for articles must include the name(s) of the author(s), year of publication, title of the article, name of the journal, volume number, issue number, page numbers, and DOI number, if available. In addition, if the article can be retrieved online by readers, the article's web address should also be included.

Examples:

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(2012). Title of article. Journal Name, 10(2), 101-110.
Author, A.A., Author, B.B., & Author, C.C. (2016). Title of article. Journal Name, 10(2), 101-110.

Retrieved from www.website.com (Note that there is no period after the name of the website address.)

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All manuscripts must be MS Word format. Manuscripts must NOT contain reference software codes, and the use of reference software is highly discouraged. Manuscripts must be submitted in both electronic and hard copy formats, with the electronic file submitted via email (joe.tonzelli@ajj.com) and two hard copies of the manuscript by

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Department Manuscript Submission

For manuscript submissions to NNJ departments, all author guidelines must be followed with the exception of the following:

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    - · •Books & Media, Deb Brooks, brooksdeb@bellsouth.net
    - · •Case Study, Jeannie Colaneri, ColaneJ@mail.amc.edu
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    - · •Patient Safety and Quality Care, Norma Gomez, NGomez610@aol.com
    - · •Professional Issues, Paula Dutka, pdutka@winthrop.org
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- · •Department submissions do not require an abstract unless specifically requested.
- · •Submissions to the Specialty Practice Networks (SPN) department are coordinated by the SPN Publication

Leaders and the Associate Editor.

Frequently Asked Questions

The following frequently asked questions and their answers are provided to assist authors in the development and submission of manuscripts. Additional questions may be directed to Beth Ulrich, EdD, RN, FACHE, FAAN, Editor, Nephrology Nursing Journal (BethUlrich@aol.com).

How is the order of authors determined?

NNJ adheres to the authorship requirements as specified in the Uniform Requirements for Manuscripts Submitted to Biomedical Journals (URMSBJ) developed by the International Committee of Medical Journal Editors (www.icmje.org). As noted in the URMSBJ, "All persons designated as authors should qualify for authorship, and all those who qualify should be listed. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content."

The order of authorship is a decision of the authors. The primary author should be indicated on the Author and General Information page. All correspondence concerning the article will be sent to the primary author. It is the primary author's responsibility to communicate this information to other authors and to communicate information from other authors to the NNJ.

NNJ Author Guidelines

What/who should be included in an acknowledgement?

Acknowledgements are used to recognize funding sources and are also often used to recognize the contributions and support of colleagues or groups in the performance of the research reported in the manuscript or the development of the manuscript. The acknowledgement should be concise and professionally worded. When readers may infer that those acknowledged endorse the data, conclusions, and/or the content in general, authors must obtain written permission from people included in the acknowledgement and must submit that permission to NNJ.

What is included in an abstract and how long should it be?

An abstract is a brief, concise, comprehensive summary of the article. It should be 75-100 words in length. In general, abbreviations should be avoided in abstracts. The abstract should be on a separate page at the beginning of the manuscript. When an article is indexed, only the title, the abstract, and reference information will appear in article searches.

What is non-biased language?

NNJ adheres to APA guidelines regarding the use of non-biased language. The overall principle of non-biased language is that the integrity of all human beings should be maintained and that they should not be described by language that objectifies them. This requires, for example, replacing terms like "hemodialysis patients" with "patients on hemodialysis" and using "people with diabetes" instead of "diabetics."

What are primary sources for citations and references and why should they be used?

Primary sources are the original sources of information, such as the original report of a research study. You should not rely on other people's interpretation(s) of what was reported in another publication. If Author A cites Author B's publication as the source for information in Author A's article, then you should read Author B's publication and confirm Author A's interpretation or, better yet, create your own interpretation. You also should not copy reference information from Author A's article, but should confirm the correct reference information before including it in your article.

Why do you discourage the use of reference management software?

Reference management software can be very useful, but many reference management software products do not create complete and accurate citations and references. Editing citations and references in a manuscript in which reference management software has been used is often very difficult.

What abbreviations can be used?

NNJ allows the use of common abbreviations. In any case in which an abbreviation is not in common use or may be confused with a similar abbreviation, an abbreviation should NOT be used. NNJ also does not use any abbreviations in the manuscript that are on the Joint Commission ‘do not use’ list.

What units of measure should be used?

In general, NNJ uses the metric system and adheres to the International System of Units (SI) and its abbreviations. Metricunitsarepreferredformeasurementsofvolume,weight,height,andlength. RefertotheAPA Publication Manual for more details. Conversion information may be included in parentheses as appropriate.

What names of pharmaceuticals, devices, etc. should be used?

Nonproprietary names of pharmaceutical products, devices, etc. should be used at all times unless the brand/trade name is relevant to the content.

What are the guidelines for numbers? (APA, Chapter 4)

- · •In general, use numerals for numbers 10 and above and words to express numbers below 10.
- · •There are exceptions to this such as

o numbers that immediately precede a unit of measure;
o numbers that represent statistical or mathematic functions, percentages, ratios, and the like;
o numbers that represent time, dates, ages, scores, and points on a scale, exact sums of money, and

numerals as numerals;
o numbers that denote a specific place in a numbered series, parts of books and tables, and each number

- · •Use
- · •Use

in a list of four or more numbers.
words for numbers and for common fractions that begin a sentence, title, or heading.
a zero before the decimal point with numbers that are less than one when the statistic can exceed one.

NNJ Author Guidelines

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What do I need to know about protecting people’s privacy?

People have a right to their privacy. No identifying details should be included unless they are essential for scientific purposes. If initials are used as identifiers, they must be pseudonym initials. If any identifying information is included in photographs, written descriptions, or pedigrees the person or the person’s legal guardian must give written consent for publication. The identified person or the person’s legal guardian, if appropriate, should see the manuscript before granting permission.

The obligation to protect people’s privacy applies to staff members, colleagues, and others as well as to patients. Some people like being identified in articles, but some do not, and their wishes should be honored.

What is considered plagiarism?

Plagiarism is not borrowing or copying. It is an act of fraud and is illegal.

"The expression of original ideas is considered intellectual property and is protected by copyright laws, just like original inventions. Almost all forms of expression fall under copyright protection as long as they are recorded in some way (such as a book or a computer file). All of the following are considered plagiarism:

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- · •copying words or ideas from someone else without giving credit
- · •failing to put a quotation in quotation marks
- · •giving incorrect information about the source of a quotation
- · •changing words but copying the sentence structure of a source without giving credit
- · •copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not" (iParadigms, 2014).

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Other questions?

If you have other questions concerning NNJ Author Guidelines, please contact the Editor (BethUlrich@aol.com).

Revised: Ap

Appendix B

Consent of an Adult to Be in a Research Study

In this form "you" means a person 18 years of age or older who is being asked to volunteer to participate in this study.

Participant's Name______________________________

Principal Investigator: Dr. Elizabeth Friberg
Associate Professor of Nursing
CMNEB 3003
University of Virginia, Charlottesville, VA 22903
Telephone: (434) 924-0114
eef3c@virginia.edu

What is the purpose of this form?

This form will provide you with information about this research study. You do not have to be in the study if you do not want to. You should have all your questions answered before you agree to be in this study.

Please read this form carefully. If you want to be in the study, you will need to sign this form. You will be given a signed copy of this form.

Why is this research being done?

The purpose of the study is to learn more about the awareness and knowledge of patients diagnosed with chronic kidney disease (CKD) with an aim of providing information on self-management to reduce the progression of kidney disease. CKD it is not frequently detected until later in its progression, resulting in lost opportunities for prevention. Kidney failure could be prevented or delayed through early detection and treatment. CKD patients approaching end stage renal disease (ESRD) are often not completely informed or educated on their disease stage, progression, and treatment options. We believe that providing early education about CKD will slow down the progression of the disease.

You are being asked to be in this study because you have CKD.

Minimum of 25 people will be in this study at UVA.

What will happen if you are in the study?

CKD education will take place at the end of your clinic visit.

Study Schedule

Consenting (approximately 10 minutes)

- If you agree to participate in the study, you will be asked to review the consent form (or have it read to you) for the study. You will be given an opportunity to ask any questions you wish regarding the study. You may also take the consent home to review and to further consider participating in the study.
- You will be asked if you want to review the study questions online or in a book.

Questionnaire (approximately 30 minutes)

- You will be given a brief 10 question survey about kidney disease. You will have education on kidney disease. After the education you will be given a brief 10 question post survey about kidney disease. You may take the questionnaire on your own or you may ask to have the questions read out loud to you and have your answers recorded for you.
- You will be provided with a booklet, "Learning about Kidneys and Kidney Disease".

During this study, you will be asked to fill out some questionnaires. These questionnaires ask about:

- How many kidneys do most people have
- How big are your kidneys
- Where are you kidneys
- What are main jobs of your kidneys
- If your kidneys fail will you need a kidney transplant or dialysis
- What can you do to keep your kidneys healthy
- You're at risk for kidney disease if you have, diabetes, high blood pressure, family history of kidney failure
- 1 in 9 American adults has kidney disease
- Can Chronic kidney disease be detected and treated early, which may slow it from getting worse

How long will this study take?

Your participation in this study will require 1 visit during your scheduled clinic visit and will take approximately 30-60 minutes.

What are the risks of being in this study?

No anticipated risks are expected with the educational intervention.

Could you be helped by being in this study?

You may or may not benefit from being in this study. Possible benefits include:

- Improvement in understanding CKD
- Understanding of how to care for yourself

What are your other choices if you do not join this study?

You do not have to be in this study to be treated for your illness or condition. You can get the usual treatment even if you choose not to be in this study

Will you be paid for being in this study?

You will not get any money for being in this study.

What happens if you leave the study early?

You can change your mind about being in the study any time. You can agree to be in the study now and change your mind later. If you decide to stop, please tell us right away. You do not have to be in this study to get services you can normally get at the University of Virginia.

How will your personal information be shared?

The UVa researchers are asking for your permission to gather, use and share information about you for this study. If you decide not to give your permission, you cannot be in this study, but you can continue to receive regular medical care at UVA.

If you sign this form, we may collect any or all of the following information about you:

- Personal information such as name, address and date of birth
- Your health information will be reviewed for this study. This may include a review of your medical records and test results from before, during and after the study from any of your doctors or health care providers.

Who will see your private information?

- People or groups that oversee the study to make sure it is done correctly

What if you sign the form but then decide you don't want your private information shared?

You can change your mind at any time. Your permission does not end unless you cancel it. To cancel it, please send a letter to the researchers listed on this form. Then you will no longer be in the study. The researchers will still use information about you that was collected before you ended your participation.

Please contact the researchers listed below to:

- Obtain more information about the study
- Ask a question about the study procedures or treatments
- Report an illness, injury, or other problem (you may also need to tell your regular doctors)
- Leave the study before it is finished
- Express a concern about the study

If you have questions about the study, contact:

Judy Kauffman
DNP Student
School of Nursing
University of Virginia, Charlottesville, VA 22903
Telephone: (540) 255-6909
jkauffman@virginia.edu

Elizabeth Friberg
Associate Professor of Nursing
CMNEB 3003
University of Virginia, Charlottesville, VA 22903
Telephone: (434) 924-0114
eef3c@virginia.edu

What if you have a concern about this study?

You may also report a concern about this study or ask questions about your rights as a research subject by contacting the Institutional Review Board listed below.

University of Virginia Institutional Review Board for Health Sciences Research
PO Box 800483
Charlottesville, Virginia 22908

Telephone: 434-924-9634

When you call or write about a concern, please give as much information as you can. Include the name of the study leader, the IRB-HSR Number (at the top of this form), and details about the problem. This will help officials look into your concern. When reporting a concern, you do not have to give your name.

Signatures

What does your signature mean?

Before you sign this form, please ask questions about any part of this study that is not clear to you. Your signature below means that you have received this information and all your questions have been answered. If you sign the form it means that you agree to join the study. You will receive a copy of this signed document.

Consent From Adult

____________________	______________________	______
PARTICIPANT (SIGNATURE)	PARTICIPANT (PRINT)	_ DATE

To be completed by participant if 18 years of age or older.

Person Obtaining Consent

By signing below you confirm that you have fully explained this study to the potential subject, allowed them time to read the consent or have the consent read to them, and have answered all their questions.

________________________	______________________	______
PERSON OBTAINING CONSENT (SIGNATURE)	PERSON OBTAINING CONSENT (PRINT)	_ DATE

Consent from Impartial Witness

If this consent form is read to the subject because the subject is blind or illiterate, an impartial witness not affiliated with the research or study doctor must be present for the consenting process and sign the following statement. The subject may place an X on the

Participant Signature line above.

I agree the information in this informed consent form was presented orally in my presence to the **identified individual(s)** who has had the opportunity to ask any questions he/she had about the study.   I also agree that the **identified individual(s)** freely gave their informed consent to participate in this trial.

Please indicate with check box the identified individual(s):
☐ Subject

__________________________________	_________________________________	_________
IMPARTIAL WITNESS (SIGNATURE)	IMPARTIAL WITNESS (PRINT)	DATE

Appendix C

My Test Results

Test	Result/Date	Result/Date	Result/Date
Blood Pressure Goal: Less than 130/80			
GFR Chronic Kidney Stage____ Goal: Keep GRF from going down			
Urine Albumin Goal: the lower the better			
BMI Goal:			
A1C (for diabetics only) Goal:			

Tips for People with Chronic Kidney Disease:

- Choose foods with less salt
- Eat healthy
- Be physically active
- Stop smoking
- Keep your blood pressure below 130/80
- Track your blood pressure, take medications as prescribed
- Track your kidney function tests results
- Keep your blood glucose in the target range if you have diabetes, take medications as prescribed

Appendix D

CKD Educational Intervention Evaluation

Patients Name (optional):_________________________________Date:______________

Instructions
Please circle your response to the items. 1 represents the lowest and most negative impression on the scale and 5 represents the highest and most positive impression. Your feedback is sincerely appreciated. Thank you

1=Strongly disagree 2= Disagree 3=Neutral 4=Agree 5=Strongly agree

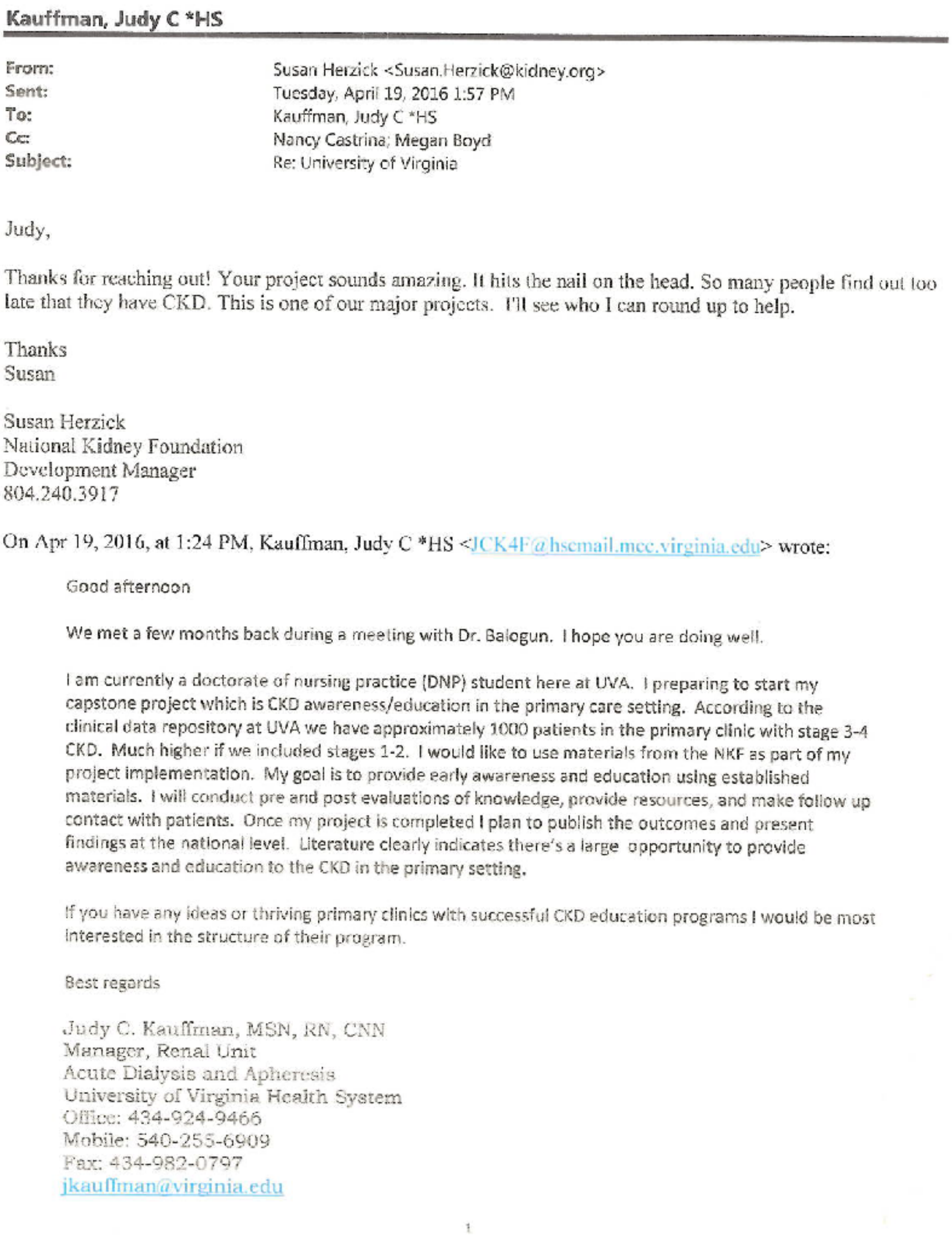
1.	The content is relevant to my chronic kidney disease management	1	2	3	4	5
2.	The pace of the course is appropriate	1	2	3	4	5
3.	The staff was professional and courteous	1	2	3	4	5
4.	The education stimulated my learning	1	2	3	4	5
5.	The information presented in chronic kidney disease Increased my awareness of how to live a healthier life	1	2	3	4	5
6.	I would highly recommend this class	1	2	3	4	5
7.	The instructor was very knowledgeable	1	2	3	4	5

What improvements would you recommend in this education program?

What is least valuable about this education program?

What is most valuable about this education program?

Additional Comments:



Kauffman, Judy C *HS

From:	Susan Herzick <Susan.Herzick@kidney.org>
Sent:	Tuesday, April 19, 2016 1:57 PM
To:	Kauffman, Judy C *HS
Cc:	Nancy Castrina; Megan Boyd
Subject:	Re: University of Virginia

Judy,

Thanks for reaching out! Your project sounds amazing. It hits the nail on the head. So many people find out too late that they have CKD. This is one of our major projects. I'll see who I can round up to help.

Thanks
Susan

Susan Herzick
National Kidney Foundation
Development Manager
804.240.3917

On Apr 19, 2016, at 1:24 PM, Kauffman, Judy C *HS <JCK4F@hscmail.mcc.virginia.edu> wrote:

> Good afternoon
>
> We met a few months back during a meeting with Dr. Balogun. I hope you are doing well.
>
> I am currently a doctorate of nursing practice (DNP) student here at UVA. I preparing to start my capstone project which is CKD awareness/education in the primary care setting. According to the clinical data repository at UVA we have approximately 1000 patients in the primary clinic with stage 3-4 CKD. Much higher if we included stages 1-2. I would like to use materials from the NKF as part of my project implementation. My goal is to provide early awareness and education using established materials. I will conduct pre and post evaluations of knowledge, provide resources, and make follow up contact with patients. Once my project is completed I plan to publish the outcomes and present findings at the national level. Literature clearly indicates there's a large opportunity to provide awareness and education to the CKD in the primary setting.
>
> If you have any ideas or thriving primary clinics with successful CKD education programs I would be most interested in the structure of their program.
>
> Best regards
>
> Judy C. Kauffman, MSN, RN, CNN
> Manager, Renal Unit
> Acute Dialysis and Apheresis
> University of Virginia Health System
> Office: 434-924-9466
> Mobile: 540-255-6909
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Chronic Kidney Disease: Early Education Intervention

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Keywords: chronic kidney disease, self-management, education, National Kidney Foundation

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Disclaimer: The contents have not been previously reported and are not under consideration for publication elsewhere, nor will be, until a decision is made by the *Nephrology Nursing Journal* Editor

Abstract

Patient awareness of chronic kidney disease (CKD) disease process is low. Providing early education empowers patients with knowledge to self-manage the disease. The study aim was to determine if providing self-management education in the primary care setting improves the patient's awareness of CKD and increases self-knowledge of the disease process. A quasi-experimental study was conducted with pre- and post-test comparisons using *The National Kidney Foundation: Take the Kidney Quiz*. The survey evaluated knowledge gains from a 30-minute educational intervention. The knowledge survey tool was administered to 25 participants. A paired t-test was used to compare the knowledge survey scores. A statistically significant improvement was found between pre and post scores ($t= 5.192$, $df= 24$, $p= .001$) following participation in the educational intervention.

Keywords: chronic kidney disease, self-management, education, National Kidney Foundation

Chronic Kidney Disease Education

Chronic kidney disease (CKD) is increasing globally, affecting approximately 10% of the adult population (Eckardt et al., 2013). Eckardt and colleagues (2013) noted that increasing rates of diabetes, hypertension, and obesity contributed to CKD becoming one of the most common chronic diseases. There are 26 million American adults with CKD and millions of others who are at increased risk for CKD (NKF, 2016). Further review of statistics reveals that 23.4-35.8% individuals diagnosed with CKD are 65 years of age or older. That percentage is expected to continue to rise with the aging Baby Boomer population. CKD is a progressive disease, classified into five stages based on declining glomerular filtration rate (GFR) (NKF, 2002) (See Table 1). People suffering with CKD need to invest considerable time into managing their health including modifying their diet and lifestyle, managing numerous medications and attending medical appointments. Although the progression of CKD is related to some non-modifiable characteristics such as race, baseline renal function, male gender and increased age, there are a number of modifiable characteristics (NKF, 2016).

Given the pathogenic progression of kidney disease, patients with CKD are at high risk for progression to Stage 5, end stage renal disease (ESRD), a condition requiring dialysis or kidney transplantation to maintain a patients' long-term survival. ESRD places a greater burden on individuals due to the addition of renal replacement therapy (RRT) and places considerable demand on healthcare resources due to the cost associated with ESRD. In 2011, the average annual cost for maintenance of ESRD therapy was between \$70 and \$75 billion worldwide (Lysaght, 2002). The costs of treatment create a burden for families and the health care system (Lysaght, 2002).

Medicare spending in 2013 for CKD Stage 2 was \$4.6 billion dollars, \$37.2 billion for

Stage 3 CKD, and $7.2 billion for Stage 4 CKD. The total cost of care for people 65 and older approaches $50 billion (USRDS, 2013).

Due to the asymptomatic nature of CKD it is frequently not detected until later in its progression, resulting in lost opportunities for prevention. Progression to kidney failure or other adverse outcomes could be prevented or delayed through early detection and treatment of CKD (Locatrelli, Vecchio, & Pozzoni, 2002). CKD patients approaching ESRD are often not completely informed or educated on their disease stage, progression, and treatment options (Branson, 2007). The absence of early education has been implicated as a cause of significant psychological trauma for patients and families, which adds to the burden of their disease and contributes to poor and potentially fatal health outcomes (Branson, 2007).

CKD education has the potential to reduce the burdens of disease progression and improve health outcomes (Branson, 2007). People with CKD can benefit from early, frequent, focused education to increase awareness of how self-management can slow the progression of the disease. Evidence reveals that educational interventions are lacking during hospitalization for those diagnosed with early stages of CKD (Chen et al., 2011). This scholarly project describes the implementation of an educational intervention for CKD patients in the primary care setting to evaluate their awareness of the disease process and increase the participant's knowledge regarding the impact of self-care on reducing progression of the disease. The theoretical framework for self-efficacy by Albert Bandura was used to guide the development of the project. The theory of self-efficacy has been defined by Albert Bandura as one's belief in their ability to succeed in specific situations or accomplish a task (Bandura, 1977). The theory of self-efficacy is the cornerstone of Bandura's social cognitive theory, which emphasizes the role of observational learning and how the person approaches goals, tasks, and challenges.

Methods

Purpose

The purpose of the study was to evaluate the disease awareness and knowledge of participants diagnosed with CKD with the aim of providing a 30-minute educational intervention on self-management to potentially slow the progression of kidney disease.

Hypothesis

Participation in the education intervention will improve the patients:

- Awareness of the stages of CKD,
- Knowledge about CKD,
- Knowledge on how to reduce the progression of CKD,
- Role of self-management of diabetes, obesity, and hypertension as it relates to CKD.

Practice Question

Does providing a 30-minute self-management education intervention following a scheduled clinic appointment in the primary care setting to a patient diagnosed with CKD improve their awareness and knowledge of the disease process?

Study Design

A quasi-experimental study with a 30-minute educational intervention using a standardized educational booklet and quiz instrument from *The National Kidney Foundation: Take the Kidney Quiz* to evaluate knowledge levels pre- and post-intervention (National Kidney Foundation, 2010).

Measures

The *Take the Kidney Quiz* (National Kidney Foundation, 2010) assesses the individual's knowledge before and knowledge gain after the educational intervention. This instrument was developed by NKF to assess the knowledge of CKD. The *Take the Kidney Quiz* is a ten question, multiple-choice quiz used to assess the usefulness of an educational intervention to increase the awareness of CKD management. Scoring of the quiz occurred prior to the educational intervention and after the educational intervention. Permission to use *Take the Kidney Quiz* was granted by The National Kidney Foundation (See Appendix A for the quiz questions). Upon review by the Institutional Review Board (IRB), a recommendation was made to include family and care providers in the sample size. Family members and care providers participated in the educational session, however, only data of 25 patients was included in the sample.

Patients who met the following criteria were included in the sample and the analyses:

- Adult male and females ≥18 years of age,
- CKD diagnosis Stage 1-4,
- English speaking,
- Not presently on dialysis,
- Able to give informed consent.

Setting

The study was conducted at an academic medical center (AMC) in central Virginia in a large primary care medicine clinic and specialty nephrology clinic. The primary care family medicine clinic offers primary care for adult patients of all ages. The primary care clinic offers general services in the care of chronic health conditions. Approval to conduct the study was obtained from the Nurse Manager of the primary care clinic and nephrology clinic.

Description of Sample

Twenty-five participants participated in a 60-minute educational intervention immediately following a scheduled clinic appointment. Ten minutes was allotted for the pre-intervention quiz, 30-minutes allotted for the educational intervention, 10-minutes for the questions following the educational intervention, and 10-minutes was allotted for the post-intervention quiz. Family members and friends were invited to participate in the educational intervention. The patients were educated on kidney disease by reviewing the *Kidneys and Kidney Disease* booklet (The National Kidney Foundation, 2010). The booklet was a written on a fifth grade level and included colorful illustrations. The patients were taught how to enter data on a simple log to monitor blood pressure, blood glucose, GFR, weight, and amount of daily exercise. The informational booklet and log was given to each participant at the conclusion of the educational intervention. The patients who participated in the intervention were male (n=13, 52%) and female (n=12, 48%). The age of the patients ranged from 35-84 years, with the mean age of 63 years (Table 2). The majority of the patients were either CKD Stage 3 with a GFR between 30-59 mL/minute (n=13, 52%) or CKD Stage 4 with a GFR between 15-29 mL/minute (n=9, 36%). The majority of the patients had a secondary diagnosis of Hypertension (n=23, 92%) and diabetes (n=16, 64%).

Data Analysis Plan

Data from the 10 question *Take the Kidney Quiz* was analyzed using IBM SPSS 24 statistical software. Descriptive statistics were computed on the demographic data. Pre and post scores on the *Take the Kidney Quiz* were compared using a paired *t*-test. Data collection included: age, gender, race, CKD stage and GFR, diabetes status, hypertension, obesity, and BMI (Table 3).

Protection of Human Subjects

The protocol was submitted to, and approved by, the Institutional Review Board for

Health of the University of Virginia. The highest risk was for loss of confidentiality of the patients. Recording and analyzing the data electronically protected confidentiality of the patients. Patients were assigned a number in order of intervention. A name and medical record list was maintained on a separate protected spreadsheet. Once the study was complete the spreadsheet was deleted to limit risk of confidentiality loss. All paper survey results were destroyed. See Appendix B for the IRB protocol consent forms.

Program Description

Recruitment. Patients were recruited during the scheduled clinic appointment. Those with a diagnosis of CKD were approached to participate in the study. Not all patients approached were able to participate in the educational session due to overlapping clinic appointments. A review of electronic medical record (EMR) was conducted the day prior to the scheduled appointment to determine GFR value and to determine if the inclusion criteria would be met. Family members and care providers were invited to participate in the educational intervention.

Educational Intervention. The educational sessions were scheduled for 60 minutes at the conclusion of the clinic appointment. The educational session was conducted in an exam room with access to a computer to educate patients on available electronic resources. The first 10 minutes was allocated for the patients to complete *Take the Kidney Quiz* (*Learn About Kidneys and Kidney Disease*, National Kidney Foundation, 2010). Thirty minutes was allotted for the educational intervention using a booklet from the National Kidney Foundation, *Learn About Kidneys and Kidney Disease* (2010). Ten minutes was allotted for questions after the educational intervention. Ten minutes was allotted for the post educational intervention quiz.

Procedures

The educational intervention session occurred immediately following the scheduled clinic appointment. The patients were asked to complete a ten-question quiz prior to the educational intervention (Appendix A); this ensured data on knowledge of kidney disease was collected before any interventions were conducted Laboratory results and vital signs were reviewed with the participant during session. Each participant was educated on how to document laboratory results and vital signs. A log was provided to each participant for documentation of data to share with the physician at each clinic appointment (Appendix C). A post-test was conducted at the conclusion of the educational intervention. The participant was provided with an educational booklet at the conclusion of the educational session to review or refer to as a tool to promote self-management. Education on obtaining mobile applications for tracking data was provided to those expressing interest. Contact information was provided to each participant to follow-up with the nurse educator with questions at the conclusion of the session. A formative evaluation of the intervention was completed by each participant at the conclusion of the intervention (Appendix D).

Results

Patients with any stage of CKD attended a 60-minute educational session following their scheduled clinic visit. The effectiveness of providing early education about CKD in the clinic setting was measured and evaluated by comparing pre and post educational intervention quiz scores. Twenty-five patients completed the pre and post quiz along with the educational intervention.

All participants scored 100% on the post-intervention quiz. The results of a paired *t*-test provided strong evidence (t=5.192, p<.001) that the mean post-intervention kidney quiz score (Mean=100.00, SD=0.00) was higher than the mean kidney pre-intervention kidney quiz score

(Mean=81.60, SD=17.50). That is, there was strong evidence that the 30-minute educational intervention increased the patient's' knowledge of CKD (Table 4).

A BMI of 30 or greater is considered obese. Dedicated time in the intervention was spent on dietary teaching and methods for initiating physical activity into daily routines. Two of the twenty-five participants (8%) self-reported regular exercise. All participants reported understanding the importance of exercise; however, most felt they lacked the energy to exercise regularly.

Patients' ages ranged from 35 to 84 (Mean=63.56, SD=15.28). A statistically significant negative Pearson correlation (r=-.439, *p*=.028) between age and pre-intervention test score indicated that lower pre-test scores were associated with higher ages (Figure 1). The pre-intervention scores for females (Median=95.00, IQR=20) tended to be higher than those for males (Median=80, IQR=30), but the difference was not significant (Mann-Whitney U=51.50).

Patients within the intervention group showed an overall improvement in the mean score of the kidney quiz. Specific post-intervention improvements included an increase in knowledge on kidney disease and self-management knowledge; an increased understanding of the functions of the kidneys; an increased understanding of what can damage the kidneys; what can happen if kidney disease is not treated; and an increased understanding in how to to protect the kidneys to reduce the progression of CKD. The largest gap in knowledge identified in the pre-education survey was the main functions of the kidneys. Of the twenty-five participants, twelve participants (48%) answer the question incorrectly (Table 5).

Each participant completed an author-designed seven question evaluation designed by the author at the conclusion of the session to gain knowledge about the design of the educational intervention. A five point Likert scale was utilized to assess seven questions pertaining to the educational intervention. The mean range of the evaluation results was 4.28-5.0, indicating the patients were highly satisfied with the educational session. The patients had an opportunity to add comments to three open ended questions to improve the design of the educational intervention (Table 6).

Discussion

Although the sample size was small the data revealed a statistically significant improvement between pre and post scores on the test scores following participation in the educational intervention session. Therefore, more exposure to education in the CKD population can potentially lead to an increase in an individual's knowledge gain about the disease itself and how self-management can impact outcomes of kidney function.

Age is a major risk factor for declining renal function. There was a significant increase from pre-test scores to post-test scores in the majority of the educational intervention patients. Preventing declining renal function is a key task of early stage CKD educational intervention. Obesity is associated with renal damage (Yen, Huang, & Teng, 2008) and the central fat distribution may cause more damage to the kidneys than general obesity. The stages of CKD or BMI were not found to be related to lower pre-test scores. Further study with a larger sample size will help to clarify the findings.

The educational intervention session provided an opportunity for patients to review their knowledge about CKD and how to best apply self-management techniques to specific areas of management to impact the progression of kidney disease. All patients verbalized an understanding of the need to manage their blood pressure, blood glucose levels, maintain a proper diet, and participate in regular exercise. The evidence suggests that the intervention had a positive effect on the CKD patients' knowledge about CKD. Resources were provided for the primary clinic staff to refer patients with CKD to the *Taking Care of Kidneys* class that has been set up by the nephrology clinic to provide more intense education on CKD. The primary clinic staff showed interest in providing the National Kidney Foundation booklet to patients as a resource since dedicated education would not be possible once the study concluded due to the number of clinic appointments in a day. The clinic doesn't currently provide an educator to assist with patient education. The clinic does provide written resources on numerous chronic medical conditions. The clinic staff does allow and encourages patients to ask questions and express concerns that may need to be addressed. All twenty-five of the patients reported feeling their knowledge level increased as a result of the educational session. All reported changes would be made to their self-management regimen to effectively management their CKD. Most indicated the desire for further education as part of their future clinic appointments.

The results of this small study reinforce the need for a dedicated patient educator for chronic care management. Long term follow-up of patients exposed to this educational intervention could provide additional evidence if the patients' disease progression and QOL were altered.

Limitations

This study was conducted at a single academic medical center location, which limits the generalizability of the findings. Additional limitations included: inability to conduct follow-up evaluations at consecutive clinic visits due to duration between appointments (average 3-6 months), small sample size, and a high clinical operational tempo which limited available space to conduct the intervention. Finally, the pace of the clinic and turnover of patients limited the time that could be spent in the examination room.

Future Study Opportunities

The results of the study showed an increase in the knowledge level of the patients with one-on-one education. A future study should attempt to compare outcomes of a group educational session to an individual educational session. A similar study with a larger sample size would be necessary to validate the results. The literature reported telephone follow-up after the educational sessions and face-to-face meetings twice a month over a greater duration might improve the outcomes.

Nursing Practice Implications

Demonstrating an increased knowledge related to CKD related to participation in the educational session provides evidence that can be used to encourage patients and clinic providers to continue to offer an educational intervention. Recommendations were provided to the clinic manager to encourage ongoing CKD education either with written materials or referring the patient to a live educational session through the nephrology clinic. Nursing is pivotal to providing the necessary educational resources to patients with chronic medical conditions requiring lifelong interventions. The clinic nurse often serves as the caregiver, educator, and coordinator of care. Nurses and other healthcare providers can provide education to those diagnosed with CKD on the management of kidney disease. Self-management should be encouraged along with empowering the patient to provide self-care in the management of the disease. Early education provides the patient the opportunity to gain knowledge on how to properly self-manage CKD. Early access to education can slow the progression renal disease, need for emergency room visits, and hospitalizations. Early education regarding the management of CKD has the potential to decrease morbidity and costs and to the healthcare system (Branson, 2007).

This study demonstrated self-knowledge in early stages of CKD can be accomplished and has potential to slow progression of the disease.

Recommendations

The CKD early education model in the primary clinic setting is an approach supported by literature to provide early education on self-management to a population of patients with a disease that is recognized as a global public health problem (Eckardt et al., 2013). Careful review of current staffing will need to be evaluated to determine how to best support a dedicated educator in the clinic setting. Displaying educational resources in the clinic would provide useful information about CKD to all visitors to the clinic. Another recommendation is to implement an educational program with one-on-one teaching that transitions to group education and support. A partnership with the community to educate on the public about CKD by offering public service announcements, offering community based education, and offering sites in the community to hold screening tests. Lack of education impacts the progression timeline by impeding self-management strategies that has the potential to worsen kidney function resulting in ESRD, requiring renal replacement therapy or kidney transplantation.

To strengthen these findings, replication of similar studies in other primary clinic sites would be needed. Longitudinal studies could increase the power of the findings. Cost-benefit evaluations could assist the organization in preventing admissions related to poor disease management. A step further would be to evaluate the costs saving to the health care system as a whole. Another step would be to encourage healthcare providers to communicate with policy makers to raise awareness about CKD and the impact on the healthcare system.

Primary care physicians can play a valuable role in improving the outcomes for the patient with CKD. Focusing on efforts to reduce morbidity in the early stages can contribute to improving outcomes. Proper screening and early educational intervention in the primary care setting can potentially reduce the progression of CKD. Referral to a nephrologist is an option to collaboratively manage the CKD patient.

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Table 1

Stages of Chronic Kidney Disease

Stage	**Description**	**GFR (mL/min/1.73m2)**
1	Kidney Damage with normal or ↑ GFR	≥90
2	Kidney Damage with mild ↓ GFR or kidney function	60-89
3	Moderate ↓ GFR or kidney function	30-59
4	Severe ↓ GFR or kidney function	15-29
5	Kidney Failure	<15 or dialysis

Note. Chronic kidney disease is defined as either kidney damage or GFR <60 mL/min/1.73m2 for ≥ 3 months. Kidney damage is defined as pathologic abnormalities or markers or damage, including abnormalities in blood or urine tests or imaging studies. Adapted from KDOQI clinical practice guidelines for chronic kidney disease: Evaluation, classification, and stratification. 2002. Retrieved from https://www.kidney.org/sites/default/files/docs/ckd_evaluatin_classification_stratification.pdf

Table 2

Age, Gender, and BMI Descriptive Statistics

	Total Sample
N	25
Mean Age	63.56
SD	15.278
Mean BMI	31.32
SD	6.015
Female (%)	12 (48%)
Male (%)	13 (52%)

Table 3

Demographic Data

Characteristics	**N (%)**
Gender	
Female	12 (48)
Male	13 (52)
Race	
Caucasian	20 (75)
African American	5 (25)
CKD Stage	
Stage 1	1 (4)
Stage 2	2 (8)
Stage 3	13 (52)
Stage 4	9 (36)

Diabetes Dx	16 (64)
Diabetes Meds	15 (60)
Diabetes Controlled	9 (36)
Hypertension Dx	23 (92)
Hypertension Meds	23 (92)
Hypertension Controlled	23 (92)

Table 4

Paired Samples Statistics

	N	**Mean**	**Median**	**IQR**	**SD**	***t***	**df**	**Sig (2 tailed)**
Post test	25	100			.000			
Pre-test	25	81.60			17.720			
Pre-test Female	12	86.67	95	20	17.233			
Pre-test Male	13	76.92	80	30	17.505			
Pre & Post test	25	18.4			17.720	5.192	24	.0000256

Difference

Table 5

Take the Kidney Quiz Question Results

Question	***Number Incorrect Responses 25 pre quizzes****	***% Incorrect Responses***
1. How many kidneys do most people have?	*	*0*
2. How big are your kidneys?	*9*	*36%*
3. Where are you kidneys?	*7*	*28%*
4. Which of the following are main jobs of your kidneys?	*12*	*48%*
5. Who can get kidney disease?	*6*	*24%*
6. If your kidneys fail, you'll need a kidney transplant or dialysis.	*	*0*
7. What can you do to keep your kidneys healthy?	*4*	*16%*

8. You're at risk for kidney disease if you have.	*4*	*16%*
9. 1 in 9 American adults has kidney disease?	*4*	*16%*
10. Chronic kidney disease can be detected and treated early, which may slow it from getting worse?	*	*0*

*Note: *There are no incorrect responses on the post intervention quiz.*

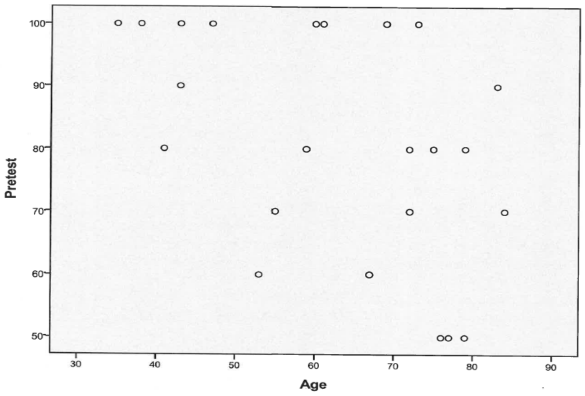
Table 6

Mean and Mode Post Education Intervention Evaluation

Question #	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Mean	4.52	4.28	5.0	4.36	4.48	4.48	5.0
Mode	5	4	5	4	4	4	5

Note. Scale: 1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree. Questions are available in Appendix E.

Figure 1. Age with Pre-test Scatterplot



N=25, Pearson Correlation -.439, Sig (2-tailed) 0.028.

**Note.* Correlation is significant at the 0.05 level.