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Management of Chronic kidney Disease by Advanced Practice Nurses

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
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Walden University
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Abstract

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Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Despite best available care, uncontrolled chronic kidney disease (CKD) – a complex disease that impacts millions in the United States, will eventually progress to end stage renal disease which is associated with high morbidity and mortality. New evidence suggests management of earlier stages of CKD is effective in delaying disease progression. This project evaluated the impact of a CKD class, led by a nephrology nurse practitioner, on preventing disease progression in advanced CKD patients with diabetes and hypertension. The purpose of the class was to validate the need for the advanced practice nurse (APN) in the care continuum of CKD. CKD education is a quality improvement project based on the chronic illness trajectory nursing model by Corbin and Strauss. Using a case-control method and a simple descriptive statistic to compare the mean values, retrospective data from 52 patients were analyzed. Twelve non-participating patients had a mean 7% increase in serum creatinine levels at the 1-year mark. Forty participating patients saw a mean decrease of 30% serum creatinine. With significant evidence suggesting that disease progression is delayed and renal function is improved in all study markers for patients who participated in a CKD education class led by a nephrology nurse practitioner and who received usual care – an argument can be made for updating the APN role in the continuum of care for those with CKD. The results may contribute to social change by providing improved access to quality care that addresses the socioeconomic devastation of end stage renal disease.

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Dedication

This work is dedicated to the eternal memory of my mother Chief (Mrs.) Theresa Adaku Amagwu a Nursing and public health pioneer.

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I would like to express my deepest appreciation to my committee chair Dr. Mattie Burton, Committee members Dr. Patrick Palmieri and Dr. Catherine Garner (URR) for their guidance, encouragement and patience over the last year by providing indispensable advice, information and support

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Section 1: Nature of the Project

Introduction

A significant public health problem, chronic kidney disease (CKD) progresses rapidly to end stage renal disease (ESRD) without evidence-based management. CKD is a term used to characterize a condition of gradual loss of kidney function over time. ESRD on the other hand is the final stage of chronic kidney disease when the kidney function is below 10 percent of its normal function requiring renal replacement therapy or kidney transplant. Dialysis - a process used for artificial replacement of functions of natural kidneys is an expensive life-saving therapy with high rates of complications such as infection, anemia, fluid volume overload, cardiovascular diseases and electrolyte disorders. Delaying the progress of CKD to ESRD is a goal of Healthy People 2020.

An estimated one in ten American adults or more than 20 million people are living with some degree of CKD (Leavey, 2012). In 2013, the United States Renal Data System (USRDS, 2013) noted a 3.4% growth, or more than 615,000 new cases in ESRD. In my local area the Dayton, Ohio Valley area there is about 449 individuals per million with ESRD (Coresh, et al., 2003). According to the American Heart Association (AHA), moderate to severe CKD is associated with increased cardiovascular (CVD) disease and death since individuals with CKD are five times more likely to die of CVD before developing end stage renal disease (Sarnak, et al, 2003). Combating the chronicity and delaying the progression of this disease in vulnerable populations can decrease morbidity and mortality (Sarnak, et al, 2003).

With the implementation of evidence-based practices for CKD management, the progression can be delayed. The revised clinical guidelines from the National Kidney Foundation (NKF) directed clinicians to develop individualized clinical action plans for each person with CKD (Inker, 2014). Critics of this original NKF guideline believed that recognizing the nephrologist as primary clinician responsible for CKD patient care overlooked the role of nurses, nurse practitioners, dieticians and some ancillary services. The American Nephrology Nurses' Association (ANNA) supports the role of the advanced practice nurse (APN) in CKD management in educating and providing quality patient care to delay progression of the disease process (2015).

The introduction of the Patient Protection and Affordable Care Act in March 2010, commonly referred to as the "Affordable Care Act" brought significant changes to the access to healthcare services for people with kidney disease by eliminating pre-existing conditions exclusions. Thus, nephrology practices in the Dayton, Ohio Valley area witnessed an influx of new patients with acute kidney injuries and chronic kidney diseases (National Kidney Foundation, 2016). This new group of patients hitherto had no insurance because they had pre-existing conditions such as diabetes and hypertension that require frequent monitoring. The influx of patients has overburdened nephrologists when there is already a provider shortage. On average, there are between 65 to 103 patients per nephrologist (Harley, 2013). However, caseload of nephrologist influences her or his patients' outcomes. For example, with each 50 patients increase in caseload, there is an associated 2% increase in patient mortality (Harley, 2013). This reality has prompted the Renal Physicians Association (2014) and the American Association of Physician

Assistants to call for a joint model of patient care delivery that is cost effective and that addresses the complex care required by patients with renal disease. In general, there needs to be an increased number of competent clinicians to meet this call.

Currently for patients with CKD in the Dayton, Ohio area, there is approximately a 4 to 8 weeks wait for follow up visits and a 4 to 6 month wait for an appointment when referred to the practice. This excessive wait times complicates the care process as good clinical management and patient adherence are negatively impacted. The introduction of the advanced practice nurse (APN) or nephrology nurse practitioner into this care continuum can reduce the wait time from approximately a month to a week while cutting the follow up time of 4 to 6 months to 2 to 3 month's interval as recommended by the National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI guidelines. Earlier studies have suggested that an increased frequency of follow up visits can provide early detection and management of disease co-morbidities that accelerate the progression of CKD (Harley, 2013; Sarnak et al, 2003; Inker, 2014).

As CKD progresses to ESRD, limitations on functioning in society caused by progressing CKD becomes evident and makes it a public health and social problem since patients with end stage renal disease leave the workforce and claim social security and disability benefits. The nephrology nurse practitioner's contribution to the management of CKD which potentially helps slow down this progression will bring about a significant shift and social change in what is the norm of nephrology practice (Mack. et.al, 2010). Shifting the tasks of CKD education and co-morbidities management from the usual care with nephrologists to nephrology nurse practitioners do not imply delivering sub-standard

care; rather, it helps produce better results than specialists alone because APNs play an integral role in patient education and close monitoring of patient adherence through regular interactions to identify and address problems early (Mack, 2010). The World Health Organization (WHO) called for a departure from conventional models of healthcare delivery which depends on highly specialized professionals - to a public health approach which uses standardized, simplified and decentralized systems to maximize primary and specialized care (WHO, 2006). There is an increasing need for APNs in the care continuum for CKD management given the 2012 recommendation by the Kidney Disease Improving Global Outcome (KDIGO, 2012) work group for a multidisciplinary approach to managing CKD. The goal is to improve the outcomes of people living with kideny disease.

Problem Statement

Without close monitoring, CKD progresses rapidly in adults with diabetes and/or hypertension. What is the impact of a nephrology nurse practitioner led CKD class on preventing disease progression as evidenced by stable or improved serum creatinine (Scr), estimated glomerular filtration rate(eGFR), mean arterial pressure (MAP), microalbumin(Alb) and hemoglobin A1C(hgbA1c) levels? According to the Centers for Disease Control and Prevention (CDC), there are greater than 20 million Americans living with CKD which is greater than 10% of adults (CDC, 2014). With increasing new CKD diagnosis and high patient-to-nephrologist ratios, delayed follow-up visits and disease awareness have been identified as a gap in the care for CKD patients (Harley (2014). According to Harley (2014), these patients need close and constant monitoring

for signs of progression to prevent cardiovascular events due to hypertension, hyperlipidemia and diabetes. Among the competencies identified in the ANNA core curriculum edited by Counts (2008), the nephrology APN has the ability to independently assess, conceptualize and diagnose complex health problems; manage acute and chronic renal disease in a variety of healthcare settings; prescribe, administer, and evaluate pharmacologic and therapeutic treatment regimens while being able to identify, study, and solve complex problems in the areas of nephrology. The CKD class led by the NNP stresses the elements that are important for managing CKD. These include understanding the disease process, strict monitoring of diabetes and blood pressure trends, strict adherence to medication regime, dietary and lifestyle changes that stress exercise and weight loss, smoking cessation (if relevant) and planning for the future treatment. NNPs education process involves development of competencies in managing these co-morbid disease processes.

According to the Institute of Medicine (IOM, 2011), the APN should be able to practice to the fullest extent of training and education while becoming full partners with physicians and other health professionals in redesigning healthcare in the United States. But there are cultural barriers in healthcare limiting APN scope of practice, including physicians' limited knowledge about APN competencies and the potential for an expanded APN clinical role. Physicians' professional organizations such as the American Medical Association (AMA) states that 'APNs are not capable of providing quality, safe care at the same levels as physicians because physicians have longer and more rigorous training' (AMA, 2010, pg1). However, the American College of Physicians (2009)

published a position statement that identified the important role APNs play in care delivery and in meeting the growing demand for primary care in chronic disease management. The need to support collaborative practices of nephrologists and APNs as health care providers in a multi-disciplinary team approach to management of CKD stages III and IV cannot be overemphasized (Physicians Association and American Association of Physician Assistants, 2014).

Purpose

The purpose of this project was to validate the need for an APN role in the continuum care for managing CKD. The idea was to evaluate the impact of the NNP led CKD education class on disease progression. This was a quality improvement project implemented in a nephrology practice aimed at improving patient outcomes and preventing rapid disease progression. Data were collected from January 2014 to December 2016. This evaluation was completed using the case control method with retrospective secondary data obtained from the patients' electronic health record. The desired outcome was delayed disease progression as evidenced by stable or improved serum creatinine (Scr), estimated glomerular filtration rate(eGFR), mean arterial pressure (MAP), microalbumin(Alb) and hemoglobin A1C (hgbA1c) levels.

The framework for the CKD education class in this nephrology practice drew from Corbin and Strauss's (1991) chronic illness trajectory nursing model. The framework also includes aspects of Wagner's patient self-management chronic disease model (Wagner, 1998) and the 2010 University of North Carolina nursing model of care for the patient with CKD (Neyhart et al, 2010). These models were incorporated in the

CKD education. This quality improvement project addressed the need for ongoing, active, patient participation in monitoring and controlling of risk factors for CKD progression including serum creatinine, glomerular filtration rate, hemoglobin A1C, mean arterial blood pressures, diet and exercise, hyperlipidemia with lifestyle changes – an identified gap in practice for managing CKD.

The guiding question (practice-focused) for this scholarly project was as follows:

In adults with advanced chronic kidney disease, diabetes and/or hypertension, what is the impact of a NNP- led CKD class on preventing disease progression as evidenced by stable or improved serum creatinine (Scr), estimated glomerular filtration rate(eGFR), mean arterial pressure (MAP), microalbumin(Alb) and hemoglobin A1C(hgbA1c) levels?

CKD patients in this practice are seen in follow up every 4 - 6 months, which is inadequate for effective monitoring of this disease process (National kidney Foundation, 2012). APNs working in nephrology practices are used for dialysis rounds for the three out of four visits per month required by Medicare and other payers and as scribes in the hospital settings. The education and wealth of knowledge APNs acquired in training as managers of chronic and acute illness are not put to good use when working in a nephrology service. By presenting research evidence of APNs management of chronic illness, this doctoral project could close this gap in practice about the need for APNs as team members in managing CKD.

Nature of Doctoral Project

This program evaluation of a quality improvement project used the case control method with retrospective secondary data collected from health records to evaluate the impact and effectiveness of NNP-led CKD classes on CKD disease progression. Quality indicators related to measured disease progression includes serum creatinine (Scr), estimated glomerular filtration rate(eGFR), mean arterial pressure (MAP), microalbumin(Alb) and hemoglobin A1C(hgbA1c) levels. Inference was drawn from the result to justify the need for including the APN in the continuum of care for the CKD patient. Secondary data were collected from a nephrology group practice's routine laboratory results in Dayton, Ohio. This practice employs 11 nephrologists, one physician's assistant, and three nurse practitioners. It has four satellite offices with admitting privileges to the four major hospitals in the Dayton metropolis area. Retrospective secondary data was collected from adult CKD Stages III and IV patients with diabetes and/or hypertension over a period of one year. Data were analyzed and subjected to comparisons between patients who received usual care and those who in addition, attended the NNP-led CKD class. Although attendance was not mandated but strongly suggested for new patient, some patients choose not to attend. Reasons for not attending these free classes have ranged from transportation issues to timing of the classes that are usually held in the evening and patients' unawareness of the role of the multi-disciplinary team effort in managing CKD.

Significance

The major stakeholders for this project are the people diagnosed with CKD who benefitted from attending the CKD class as evidenced by delayed disease progression. Other stakeholders who benefitted included referring primary care physicians, insurance payer's (Medicare / Medicaid and private insurers); nephrology practices – which will have access to new revenue source even though it is paid at only 80% of the current specialist pay rate per visit in addition to improved follow up; nurses and nursing in particular, ANNA advocates and policy makers. With the APN role at the apex of clinical nursing practice, there has been a renewed interest in, and debate about, expanding the APN roles worldwide in assessing and managing of chronic illness using nursing knowledge and skills in an autonomous or collaborative setting (Spiteri, 2008). The dissemination of findings are expected to support the innovative management of chronic diseases in the primary care setting and thus enable the emergence of other practice patterns.

The results of this project could have national implications for CKD patients: A decrease in the rate of new ESRD cases and better inclusive management of CKD have far reaching clinical, social and public health implications. With the extensive burden of CKD disease in the United States and an economic impact of an estimated nearly $1 trillion, CKD has potentially devastating effects on the socio-economic welfare of the population and, as such, any effort made to limit the impact of this disease would be welcomed. The potential for positive social change is apparent.

Summary

CKD is a devastating and expensive chronic disease that currently is undermanaged. The Patient Protection and Affordable Care Act of 2010 provided insurance coverage for many uninsured, but it had an unexpected consequence in the Dayton Ohio area: an influx of new CKD diagnosis that overwhelmed the few area nephrology practices. These nephrology practices employ APNs, but use them as scribes. However, it is counterproductive to alienate nurse practitioners who have been validated as exceptional providers of care for the chronically ill CKD patients. Stakeholders in the CKD management will each benefit from the addition of the APN to the care continuum.

Section 2, the literature review, covers the following topics: background, and concepts, models and theories supporting the identified gap in practice and the role of the DNP in the project.

Section 2: Background and Context

Introduction

Chronic Kidney Disease (CKD) is a condition characterized by the gradual loss of kidney function. It is described as a progressive decrease in GFR or a progressive increase in albuminuria that raises a patient's risk of developing several life threatening conditions including end stage renal disease (ESRD) and cardiovascular disease (CVD) (UMHS, 2014). Patients who are in the progressive Stages III and IV CKD which is estimated glomerular filtration rate between 15 to 60 ml/min/1.73m^2 are known to experience a higher rate of cardiovascular events that lead to death than those in the earlier stages of CKD (Allen et al, 2011). In managing the CKD patient, including an APN in the continuum is an identified gap in practice that could help delay the progression of this deadly condition (Easom & Allbritton, 2000). Current practices in the target nephrology group practice call for the management of CKD by the nephrologist alone. However, given the number of CKD patients, there are not enough nephrologists available in the Dayton Ohio area population of 801,259 (USA, 2016). The aavailable nephrology groups schedule follow up visits with CKD patients every 4-6 months, which is grossly insufficient to purposefully manage and prevent the progression of CKD to ESRD. The purpose of this doctoral project was to evaluate the impact of a NNP-led CKD education class on preventing disease progression. Evidence of impact will be stable or improved serum creatinine (Scr), estimated glomerular filtration rate(eGFR), mean arterial pressure (MAP), microalbumin(Alb) and hemoglobin A1C(hgbA1c) levels in adults CKD Stages III and IV patients with hypertension and /or diabetes. In section 2,

I will name, describe and provide rationale for the use of all concepts, models and / or theories that inform the project. I will be highlighting the role of the DNP and its relevance to nursing, the local background and context.

Concepts, Models, and Theories

The conceptual framework for this scholarly project was based on the chronic illness trajectory nursing model of Corbin and Strauss (1991). Here, the model guides the CKD education goals: it identifies the phases of chronic illness, identifying the problems associated with it; it establishes goals for management and implementing interventions. Not only does this helps the APN become familiar with the patients' point of view of his or her illness, but it can become a management instrument for chronic illness. This was echoed by Orem's self-care deficits theory (Orem, 1995), whose key concepts are self-care, self-management and self-maintenance. These three concepts were addressed by Riegel, Jaarsma and Stromberg (2012) who posited that the important intended outcomes of self-care in chronic illness are illness stability, health and wellbeing, decreased anxiety and good quality of life with perceived control over illness.

CKD education in its current state draws from the chronic illness trajectory nursing model of Corbin and Strauss (1991). CKD education was developed to promote holistic nursing process in chronic illness stressing supportive assistance in the absence of cure that would allow the individual to participate in shaping the course of the illness while maintaining independence and some form of normalcy. It focuses on the ever-changing role of patients in managing symptoms, disability and outcomes that will impact disease management (Corbin & Strauss, 1991). The linking factors that influence

self-care include support from others and access to care, motivation, experience, skill, cultures, confidence and cognition. In the initial definition of nursing concerns, Orem (1995) stated that in order to sustain life and health recover from injury or disease and cope with their effects, individuals need the provision and management of self-care action on a continuous basis. Orem identified self-care as a human regulatory function that individuals must with deliberation perform themselves or have performed for them to maintain life, health, development and wellbeing.

Self-care management taught in the CKD classes encompasses human needs and interventions meant to assist in recovering or maintaining health (Taylor, Lillis, LeMone, and Lynn (2011). Riegel, et al. (2012) posited that self-care maintenance, self-care monitoring and self-care management are core elements of the self-care of chronic illness of which self-care monitoring is a distinct concept and remains a bridge between self-care maintenance and self-care management. The above-mentioned concept and theoretical framework support the premise of establishing the CKD class - the chosen model for evaluating the impact of the NNP in managing CKD. Another framework that the CKD class draws from is the chronic care model (CCM). Fiandt (2006) argued that the Chronic Care Model (CCM) arose from the need for an organizing framework that seeks to improve chronic illness care at both the individual and population level. It is based on the assumption that improvement in care requires an approach that incorporates the patient, the provider and system level interactions. The NNP is ideally suited for intervention through the CCM based CKD class. Although the CCM was developed two decades ago, this approach has been widely adopted to improve care in the ambulatory

setting and to guide quality clinical initiatives. Evidence supports the use of CCM in guiding the designation of care to improve health outcomes (Mattke, Seid, & Ma, 2007). Evidence suggests reduced cost of total healthcare resulting from improved disease control interventions although early practices that redesigned along the lines of CCM lost money in the short term, the reduction of the risks of ESRD, Coronary artery disease, blindness, loss of body parts and increase in quality adjusted life years (QALYS) is considered cost effective for society (Mattke, et al, 2007). Evidence from studies have suggested that implementation of any or all the CCM based guideline and principles in practices results in improved quality outcomes in people with chronic conditions (Wagner, Davis, Schaefer, Von Korff, & Austin, 2002; Bonomi, Wagner, Glasgow, & Von Korff, 2002; Coleman, Austin, Brach, & Wagner, (2009). For a practice redesign like CKD education class to be defined as CCM based, it has to embrace the six areas stipulated by the model – self-management support, a delivery system design, decision support , use of community resources, healthcare organizations and clinical information systems(Coleman, Austin, Brach, & Wagner, 2009). The ability to address the multifactorial nature of chronic problems in chronic disease management places the nurse practitioner in a position to address the complex sets of actions that address psychosocial, physical and lifestyle issues affecting patients. In a study by Asch et al. (2005), congestive heart failure patients who participated in a chronic disease care based management class visited the emergency room less and experienced fewer hospitalizations.

The CCM based CKD class defines self-management as the decisions and behaviors that patients with chronic illness engage in that affect their health (Fiandt, 2006). The goal of self-management support is to empower and prepare patients to manage their health and healthcare (Bodenheimer, Lorig, Holman, & Grumbach, 2002; Norris, Lau, Smith, Schmid, & Engelgau, 2002). Research suggests that developing self-management skills can have a significant positive effect on health outcomes of people with chronic illnesses. It is the role of the APN using the self-management support tool to help patients understand their central role in managing their illness, making informed decisions about care, and engaging in healthy behaviors.

In a study that examined the impact of the role of the APN in chronic disease management, the Canadian Prevention of Renal and Cardiovascular Endpoints Trial (canPREVENT) studied a nurse coordinated model of care versus usual care in stages III and IV CKD patients. The study conducted by Barretts et, al. (2011) posited that chronic disease care by a nurse practitioner can substitute for specialist care as evidenced in the use of cost effective strict evidence based guidelines for disease management with or without supervision. The impact of the cost effective quality care provided by the APN in chronic disease management has been echoed in several studies (Coresh et al, 2007; Parker, Ibrahim, Shaffer, Rosner, & Molitoris, 2011). In the above mentioned studies, the common set of challenges presented to chronic illness sufferers that include death and disability, emotional and financial devastation, complex medication regime, and difficult lifestyles adjustments were successfully addressed by the APN. These common set of challenges are addressed by APN supervised and managed CKD education since a

majority of new CKD patients are unprepared to self-manage their illness. For a successful management of a chronic illness, the patient needs to be equipped to be in control with carefully followed plan in conjunction with their treatment team. A recent Cochrane collaboration review suggested that busy practices can redesign their care system to incorporate the CCM values for quality healthcare delivery stating that the greater and more complex an intervention for chronic illness, the greater chance of success (Renders et al., 2001). The NNP-led CKD class is a good example of this quality improvement effort.

Project Relevance to Nursing Practice

APNs plays a vital role in CKD management by educating patients on the importance of maintaining good glycemic control, blood pressure control and lifestyle modifications – three key factors in preventing progression of kidney disease. In the past, prior to the introduction of the APN role, nursing management of CKD using the nursing process has been limited to assessment phase and documentation of cardiovascular, respiratory, gastrointestinal, neurological, integumentary, musculoskeletal, immunological, hematological symptoms of CKD. This leaves out the diagnosing, planning, implementing and evaluation phases of the nursing process to complete the scientific method that ensures quality patient care. Virginia Henderson while questioning the nursing process title as to whether problem solving is all there is to nursing noted that the nursing role should include collaboration with healthcare professionals and the development of the clients self-reliance rather than just learning what a patient‘s immediate needs are and how to meet them (Henderson, 1982). Evidence has suggested

that APNs can improve chronic illness care by communicating effectively with patients in understanding their illness and treatments (Bodenheimer, MacGregor, & Stothart, 2005). Management of CKD requires a multidisciplinary approach comprising of nephrologists, primary care providers, advance practice nurses, pharmacists, nurses, dietitians, and social workers but current practice barriers to optimal management of CKD abound. The NKF – Kidney Disease Outcomes Quality Initiative (NKF-KDOQI) guidelines that have become the basis for the management of CKD were based on a systematic review of literature recommendations, however , there was emphasis directed towards drug therapies to be managed by internists and nephrologists. The KDOQI guidelines failed to integrate nursing care in the care continuum for CKD. The guidelines for evaluation, classification and stratification of CKD defined CKD as an abnormality of kidney structure or function present for greater than three months, with implications to health irrespective of cause or specific clinical presentation (Inker, Isakova, & Peralta, 2014). The above mentioned guideline proposed a staging system based on the glomerular filtration rate (GFR) progressing naturally from stage I to stage V. The GFR is the best measure of overall kidney function as a normal GFR in young adults is approximately 120 -130 mL/min per 1.73 m^2 and declines with age (Inker et al., 2014).

The current state of nursing practice in the management of CKD which is almost non-existent in the Dayton, Ohio area as APNs working in nephrology practices been relegated to assessment of hospitalized patients and making dialysis rounds which negates the quality management skills APNs have acquired in the continuum of chronic disease management. Although the role and scope of practice for the dialysis APN has

been defined in North America, unfortunately the focus should be in the pre-dialysis CKD care as the disease progresses through the stages where individuals are at risk of cardiovascular disease and death. With an increasing risk of disease progression to end stage renal disease (ESRD), patients with CKD are faced with considerable morbidity, mortality, diminished quality of life, and high health care costs (Ruggenenti, Schieppati & Remuzzi, 2001). Fortunately, there is growing evidence in literature that supports the idea that early recognition, intervention and treatment of CKD can help to slow down or prevent the devastating progression of this disease. Studies have suggested that development of ESRD from CKD can be stemmed by patient awareness by CKD education and a multifactorial treatment approach following earlier detection through weight reduction, blood pressure control, improved glycemic control, reduction of proteinuria, smoking cessation, lipid lowering therapy and intensified follow up interventions (Hsu, McCulloch, Iribarren, Darbinian & Go, 2006). The roles of hypertension and diabetes in progressive decline of renal function have been established by previous research and nurse practitioners are well trained to manage these risk factors.

In a quality improvement report, Spiteri (2008) stated that strategies have been put in place in Victoria, Australia to stem the gap in practice caused by inadequate practicing nephrologists by creating the renal nurse practitioner position. This strategy calls for a hospitalist based APN who conducts office follow up visits, for acute/chronic care and post-transplant CKD stages III and IV management. There is a community based renal nurse practitioner for CKD V and ESRD patients working in home and satellite

dialysis centers. This process ensures continuity of care, education and sustainable nursing role.

Delaying the progression of CKD and preventing new cases with its attendant complications, disabilities, associated morbidity (death) and economic costs are the key goals of the Healthy People (HP) 2020 CKD objectives (HP 2020, 2015). A revised Healthy People 2020 CKD -8 objective called for reducing the number of new cases of ESRD, reducing the kidney disease burden, removing the disparities among kidney disease patients and improving the quality of life while promoting longer lives in order to meet the objectives for CKD Healthy People 2020 initiative. This will involve a modest reduction in new cases of ESRD in the region from a baseline of 382.6 new cases per a million, which was reported in 2007 and adjusted to race, age and sex to about 344.3 new cases per million populations – a 10 percent improvement (HP, 2015). Currently, 14 of the 24 HP2020 CKD targets and objectives have been met or moved towards the 2020 target. Using about 25% of Medicare budget, CKD and ESRD are cost intensive (Friedman & Friedman. 2006). The financial burden of CKD and ESRD on Medicare CKD/ESRD expenditures for 2014 totaled $49.3 billion (CDC, 2014).

This project evaluated the role of the NNP as an educator in the management of CKD. Inference was drawn from the success of the CKD education class to address the need to include APNs in the care of the CKD patient to advance nursing practice.

Local Background and Context

Although the number of individuals with GFR <15 ml/min/1.73m^2 who do not receive hemodialysis or peritoneal dialysis treatments has not been estimated reliably,

the ratio of CKD patients to ESRD patients has been noted to be about 9:1 (Levey, 2012). To gain insight about the extent of kidney disease pandemic in the greater Dayton, Ohio area, an overview of the increasing number of new hemodialysis and peritoneal centers is important. These centers are offering hemodialysis and peritoneal dialysis services to ESRD patients and follow up with kidney transplant recipients. Majority of these centers offer three to four shifts a day for patients and seats about 25 to 35 patients per shift. The population of the greater Dayton area in 2011 was placed at 801,259 (USA, 2016) with 51.1 % females and 48.9% male. The average estimated median household income in 2013 was $47,162. The metropolitan area boasts of two major groups of nephrologists and fifteen hemodialysis centers. Following the closing of General Motors plants in Dayton, the local economy suffered a setback with majority loosing health insurance. 41.2 % of the Greater Dayton population is of African American descent (USA, 2016) that has a greater tendency to have diabetes and hypertension diagnosis. They are responsible for the rapid increase in patients with newly diagnosed CKD. Delaying the progression of CKD in this group is of paramount importance. The passing of the Affordable Care Act (ACA) healthcare law of 2011 provided previously uninsured persons with health insurance and a fall out was an increased number of new diagnoses of CKD in patients who previously did not seek primary care. With a handful of nephrologists in practice and the influx of new referrals, the average wait time for a nephrology consult and follow up has doubled (Osinski, 2012). The majority of referrals come from post-hospital admissions follow ups and physician office referrals. The Ohio Valley and the Greater Dayton area do not have

enough nephrologists to adequately care for the rising number of CKD patients. In the global burden of death study (2013), CKD related death increased from 409.000 in 1990 to 956, 000 in 2013. For patients who are living with CKD, the daily chore and burden of managing other chronic conditions such as diabetes or hypertension usually requires substantive changes in way of life. The socio-economic, emotional and medical aspects of the disease process leads to challenges for the community. These are currently being addressed by the many awareness rallies and social group's intervention for early diagnosis and prevention of diseases like diabetes and hypertension. Partnerships with the healthcare providers have been forged with organizations like the American Diabetes Association (ADA) and the National Kidney Foundations who have programs geared towards enlightenment of the public to symptoms.

NNPs are trained to help patients navigate the tortuous terrain of chronic kidney disease that is frightening with strategies that are tailored to the stages of the disease (Thomas-Hawkins & Zazworsky, 2005). In a research conducted on the impact of socio economic factors on quality of life of patients with CKD, Ikonomou, et al (2015) posited that people with CKD present with a poor quality of life and added to their burden of the renal disease are social and economic factors (divorce, financial difficulties) which seem to worsen their financial status since health care costs at baseline and follow-up are higher for patients with CKD. CKD is a public health problem in the Dayton, Ohio area. According to the United Network for Organ Sharing (UNOS), there have been 2,495 new patients placed on the Kidney transplant waiting list in Ohio since January 2016 (UNOS, 2016). With six outpatient clinics for the uninsured and underserved inner city dwellers in

the Dayton area, the rate of referrals for management of CKD and application rates for Medicaid coverage of ESRD has doubled in this area as well as waited patients on the kidney transplant list for the two major transplant centers in the region (UNOS , 2016). Added to this list are the high intake numbers from the 15 hemodialysis centers in the Dayton metropolis that run 3-4 treatment shifts of approximately 32 patients per center per shift.

While the International Society of Nephrology (2006) has opined that the preservation of renal function and prevention of progression to end stage renal disease is the most essential goal of nephrology care, the NKF (2002) stressed the importance of early identification and treatment of people with chronic kidney disease. Inker, et al (2014) argued that the evaluation and treatment of CKD patients requires an intricate understanding of the separate but related concepts of the diagnosis, comorbid conditions, severity of disease, complications of disease, and risks for loss of kidney function and CVD. While advocating for a coordinated multifactorial and multidisciplinary approach to improve the management of CKD, Valderrabano et al., (2001) observed that with a higher than normal morbidity and mortality rates associated with CKD and subsequent ESRD, several factors continue to mitigate optimal and coordinated management of CKD that includes uncoordinated care plans, attitudes of available nephrologists, late identification and referral of CKD patients, poor follow-up visits arrangement.

While justifying the need for the NNP role in management of CKD, the American Society of Nephrology (ASN) in a recent report noted a decline in the number of medical residents filling nephrology fellowships from 91% in 2012 to 69 % in 2015 which

translates to a dire shortage of nephrologists in the next decade (Charnow, 2016). Data from the Renal Physician Association 2003 benchmark survey shows a patient – nephrologist ratio of 68:1. This number has doubled in the past year with the Health Insurance Portability and Accountability Act (affordable health care insurance) accounting for new diagnosis of CKD / ESRD estimated at over seven million (Osinski, 2012). The growing incidence and prevalence of kidney disease have raised concerns about the sufficiency of available nephrologists and other kidney care specialists.

Role of the DNP Student

The role of the DNP student in this project included identifying the project, engaging and recruiting the client, setting measurable objectives for the project, defining the problem, participating in the CKD class instructions, collecting data needed for evaluating the project performance and producing a written report on the findings. As a DNP student undergoing the practicum project in a nephrology group setting, the author had opportunities to participate CKD education to patients with stage III and IV who have both diabetes and hypertension and as such it is a great setting to evaluate the impact of the CKD class on disease progression. Quality skills acquired in the DNP program imbue the student with the managerial and leadership skills as change agents in the ever changing landscape of healthcare (Gillam & Siriwardena, 2013). Change agents assess the suitability of the environment in handling the implementation of change. In this project, the DNP student role was to measure the impact of the CKD education on disease progression by reviewing patients serum creatinine levels, estimated glomerular filtration rates, mean arterial pressures, hemoglobinA1C and urine protein.

Quality healthcare has been described by the IOM (2013) as the degree to which healthcare services for individuals increase the likelihood of desired health outcome consistent with current professional knowledge. This opinion was echoed by Stevens (2013) who sees a solution to the 'Crossing of the Chasm' issue in evidence-based practice (EBP) - an integration of the best research evidence with clinical expertise and patient values to provide the ultimate care for the patient. Doctor of Nursing Practice (DNP) and Advance Practice Nurses (APNs) training is geared towards providing evidence based care. In this era of reformation in healthcare delivery, the focus has been on the concept of Triple Aim – reducing costs, better population health, and an improved patient experience. The context of this project and the DNP role involved using evidence based CKD education in CKD patients in a nephrology practice clinic to deliver quality care that is measurable as part of a high-functioning health care team (IHI, 2016). As part of the requirement of a DNP graduate, translating research into practice by evaluating, analyzing and extrapolating practice data to improve the reliability of the healthcare practice and outcome, My plan was to integrate applied scholarship through evidence based generated guidelines and to evaluate clinical outcomes with the chronic care model approach to CKD management based on an interprofessional collaboration that will ensure nursing has equal representation in the care team.

Standardized guidelines generated from the synthesis of major studies like the Multifactorial Approach and Superior Treatment Efficacy in Renal Patients with the Aid of Nurse Practitioner (MASTERRPLAN) (Peeters et al., 2012) and the canPREVENT trials (Coresh et al., 2007) are being used by nurse practitioners in managing CKD risk

factors in nephrology practice setting or stand-alone clinics in Australia and New Zealand (Spiteri, 2008). With the goals of defining CKD and its stages, stratifying risk for kidney loss, evaluating laboratory measurements and cardiovascular disease prevention, the KDOQI report recommended an evidence based action plan for CKD patients. - A Level B recommendation of the KDOQI guidelines states that patients with CKD should be referred to a specialist for consultation and co-management if the person's personal physician cannot adequately evaluate and treat the patient. It went on to call for a nephrologist to participate in the care of the patient with a GFR less than 30 ml/min per 1.73 m2 (Inker, et al., 2014). This has been the biggest criticism of the report so far - the failure to involve the patient and allied health professionals in the management of this chronic illness whose effects are far reaching and transcends healthcare. The use of evidence based guidelines is the standard of practice for an APN and as a DNP student, my role is to implement and translate research generated evidence to improve quality of healthcare services to the patient.

The Updated Guidelines (KDOQI, 2012) endorsed a model of shared responsibility between primary care physician's pharmacists, social workers, dieticians, physician assistants and nurse practitioners and specialists (nephrologist) of patients diagnosed with CKD in a multidisciplinary model. Peeters et al (2014) surmised in the renal endpoints of the Multifactorial Approach and Superior Treatment Efficacy in Renal patients with the aid of Nurse Practitioners (MASTERPLAN) study that additional support by nurse practitioners attenuated the decline of kidney function and improved renal outcome in patients with CKD. In that study which randomized 788 patients with

severe CKD to receive nurse practitioner support added to physician care (intervention group) or physician care alone (control group), significant differences were observed with improvement in the intervention groups blood pressure, serum creatinine, proteinuria, and use of antihypertensive thereby reducing the composite renal endpoint incidence by 20% (Peeters et al., 2014 (Pg. 391)

Motivations for this doctoral project came from witnessing delayed care given to CKD patients whose current care is aligned to preparing them for dialysis in a disease process that can be delayed. The co-morbidities that hasten the rapid transition from CKD to ESRD are disease processes that the APN is trained to manage with proven success. Another motivation for this doctoral project is to justify the need for the inclusion of NNP in direct management of both CKD and ESRD patients rather than using their services only for dialysis rounds and hospital scribe duties when they are employed by nephrology groups. This goes against the IOM recommendation # 1 that APNs should be able to practice to the full extent of their education and training by urging the removal of scope – of – practice barriers. This APN was motivated by the successes of APNs in clinical and randomized trials that evaluated a nurse led disease management program for CKD. Wong, Chan and Chow (2009) posited that the study which employed an innovative model of skills mix by using specialists with general nurses demonstrated patient improvement in diet non adherence, aspects of quality of life and satisfaction with care. Peeters et al (2014) further clarified that nurse practitioners on the average spent 26 minutes per visit on patient care while physicians spent the usual 10-15 minutes.

Studies have suggested that patients' outcome in the primary and ambulatory care setting where they were treated by a nurse practitioner and physician were comparable. In a randomized trial Mundinger et al. (2000) posited that there were no significant differences found in self-reported patients' health status with regards to physiologic test results for patients with diabetes and hypertension following treatments over 6 months by nurse practitioners versus physicians, for patients with hypertension, the diastolic value was statistically significantly lower for nurse practitioner patients (82 vs 85 mm Hg; P = .04). It can thus be argued that in the traditional medical model of primary care, patient outcomes for nurse practitioner and physician delivery of primary care do not differ (Mundinger et al., 2000). Similarly, in a systematic review by Anderson, Salisbury and Horrocks (2002) of whether nurse practitioners working in primary care can provide first point of contact care equivalent to doctors, it was concluded that nurse practitioners provide longer consultations and carry out more investigations than doctors leading to higher levels of patient satisfaction and high quality care.

Potentials for bias exist in every project or research study especially when the researcher has vested interest. In this case I am a certified Advance Practice Nurse investigating the effects of adding the APN role to the CKD care continuum. In order to mediate tendencies for bias in this project, I have chosen to use the case controlled research method by creating a project design that uses set criteria for recruiting the population, randomizing participants to groups, employing the services of medical assistants who are blinded to the different groups for data collection, avoiding surveys, using new CKD patient referrals to the clinic. In my role as an advocate for the IOM

recommendation for the removal of scope of practice barriers, the above mentioned biases are expected, but steps are being taken to mitigate them by adhering strictly to available data within the time frame of study.

Summary

CKD is a progressive disease in patients with hypertension and diabetes. The nurse practitioner led CKD classes is based on Corbin and Strauss's (1991) chronic illness trajectory nursing model. The concept of self-management was explored based on the self-care theories of Orem as a working framework that involves applying the chronic illness trajectory model for disease management to CKD management by the nurse practitioner in collaboration with a nephrologist. This line of thought is supported by evidence of APN measurable success in management of CKD co-morbidities. This evidence can be translated into practice by using evidence generated guidelines in the management of the CKD patient. The results of success or not can be surmised from evidence gathered from patients through laboratory reports on serum creatinine, estimated glomerular filtration rate (GFR) interval change, microalbumin levels, mean arterial pressures and hemoglobin A1C collated with permission by Medical assistants in a nephrology office on new CKD patients at onset and 3, 6 and 9 months. During this interval, project participants would have undergone the CKD class or did not participate. The DNP student's role in the project involved identifying the project and client, evaluating the outcomes of the implemented CKD class and producing a report on findings.

Section 3 will address the methods of collection, sources of evidence, data analysis and synthesis.

Section 3: Collection and Analysis of Evidence

Introduction

The purpose of this project was to evaluate the impact of the nephrology nurse practitioner led chronic kidney disease class on patient outcomes. This evaluation followed a quality improvement project implemented in a nephrology practice aimed at preventing rapid disease progression for the period extending from January 2014 to December 2016. The key elements of the CKD education class (see Appendix C) included understanding disease process, strict diabetes and blood pressure monitoring and management (BP and RAAS interruption) (Glycemic Control), salt restriction, medication adherence, dietary and lifestyle changes - exercise and weight loss, smoking cessation and planning for the future – treatment options for dialysis/transplantation. This evaluation was completed using the case control method with retrospective secondary data collection from the electronic health record.

Practice-focused Question(s)

In the Dayton Ohio area, there has been a disproportionate increase in end stage renal disease patients and a new wave of recently diagnosed CKD patients. A question has arisen as to what needs to be done to stem this rapid progression from CKD to ESRD. Current practice amongst the nephrology groups who get referrals for these CKD patients is to have APNs in their practice cover dialysis rounds or assist as scribes in hospital rounds. It has been argued that APNs who have received extensive training in managing CKD co-morbid conditions should be involved in the management of CKD. The delay in care of the CKD patient determined mostly by the long-time interval from referral to

initial consults and extended follow ups is an identified gap in practice for the care of the CKD patient. A guiding practice focused question for this scholarly project was "In adults with advanced chronic kidney disease, diabetes and/or hypertension, what is the impact of a nephrology nurse practitioner led CKD class on preventing disease progression as evidenced by stable or improved serum creatinine (Scr), estimated glomerular filtration rate (eGFR), mean arterial pressure (MAP), microalbumin (Alb) and hemoglobin A1C (hgbA1c) levels.

Sources of Evidence

To evaluate this quality improvement project implemented in a nephrology practice from January 2014 to December 2016, a case-control method with retrospective secondary data collected from the electronic health record was used. The patient population was made up of adult CKD stages III and IV patients with hypertension and Diabetes in a nephrology practice in Dayton, Ohio. The evidence for this project was based on secondary data made up of baseline measurements of mean arterial blood pressure(MAP) obtained at scheduled office visits and documented in the electronic medical record (EMR). Data was collected and documented on each office visit by medical assistants. Laboratory data pertaining to hemoglobin A1C, eGFR, microalbumin, serum creatinine was extracted from electronic health record. Each patient in the nephrology practice has scheduled labs prior to visit. According to Friss and Sellers (2014), a case control study is designed to help determine if an exposure is associated with an outcome. Case control studies compare two groups – the case and the control. These are CKD patients who were randomized into two groups. One group - the case –

was made up of advanced CKD patients with hypertension and/or diabetes who received routine office visit instructions and participated in the nephrology nurse practitioner led CKD education class, while the control group were CKD patients who received usual care instructions within the nephrology office visit. Patients who fitted the inclusive criteria are advanced CKD stage III and IV patients with hypertension and/or diabetes who have received the CKD education class that addressed understanding disease process, strict diabetes and blood pressure monitoring and management (BP and RAAS interruption) (Glycemic Control), salt restriction, medication adherence, dietary and lifestyle changes - exercise and weight loss, smoking cessation and planning for the future – treatment options for dialysis/transplantation (see appendix C). Excluded from the project were patients diagnosed with acute renal failure (ARF), renal transplant recipients, patients with progressive glomerular-nephritis (GN), and patients with HIV or any oncological diagnosis. Informed consent from the participants was not needed as this was an evaluation of a quality improvement program using retrospective secondary data; the IRB (Ethics) committee approval was obtained prior to data collection.

Analysis and Synthesis

To obtain a robust quality data, a patient chart review to determine eligibility for inclusion or exclusion was conducted. Supportive secondary data from electronic health record of routine laboratory results was collected about estimated glomerular filtration rate (eGFR), serum creatinine, micro albumin and protein-creatinine ratio and blood pressures by medical assistants (MA) employed at the nephrology practice office. Retrieving baseline clinical data from the electrical medical records and

paper charts will be done by medical assistants in the practice under close supervision and blinded to group allocation. Data extracted by the medical assistants was cross-checked prior to finalizing documentation and analysis. Data as collected from first visit or consult served as baseline, at the six months visit after attending the class or not and one year after visit. Desired outcomes measured was improved or stable renal function in the case group as exemplified by stable or decreased serum creatinine, improved eGFR, improved blood pressure readings and MAP, decreased proteinuria and hemoglobin A1c especially in the case group. The KDIGO guideline did not address screening for CKD among specific populations, but recommended assessment of the risk for developing CKD for all individuals, with measurement of blood pressure, albuminuria, and serum creatinine to estimate the GFR among those at higher risk (Inker et al., 2014). Data was analyzed using the mean and standard deviation for the measured variables in the groups. In comparing the mean scores of each outcome measure amongst the two groups at each period, the independent *t*-test was used. The researcher used the SPSS$^{(S)}$ statistical program 21.1 for windows in the calculation of mean creatinine, hga1c, map, eGFR and microalbumin for patients who participated in the CKD education class and those that did not participate. Patients with incomplete data – laboratory results at the starting point, midway or at the end were excluded from the report.

Summary

This doctoral project addressed the need to include the nurse practitioner in the continuum of care for the CKD patient. It addressed the question – In adults with advanced chronic kidney disease, diabetes and/or hypertension, what is the impact of a

nephrology nurse practitioner led CKD class on preventing disease progression as evidenced by stable or improved serum creatinine (Scr), estimated glomerular filtration rate(eGFR), mean arterial pressure (MAP), microalbumin(Alb) and hemoglobin A1C(hgbA1c) levels? Will the addition of the APN in the continuum of care stem the progression of CKD to ESRD. Evidence from retrospective secondary data from the EHR at the nephrology practice were collected and analyzed. Collated data was analyzed using the descriptive statistics data with means, standard deviation, Independent *t*-test for comparison of outcomes.

Section 4: Findings and Recommendations

Introduction

With increasing new CKD diagnosis and high patient to nephrologist ratios, Harley (2014) stated that delayed follow-up visits and disease awareness are an identified gap in care for the CKD patient. The problem statement guiding the project is the impact of a NNP led CKD class on preventing disease progression in adults advanced CKD patients with diabetes and/or hypertension.

The purpose of this project was to evaluate a quality improvement program – an NNP led CKD education class, from 2014 to 2016, in a nephrology practice in Dayton, Ohio. The CKD education program was initiated for newly diagnosed CKD patients in the practice to teach them about the disease process along with the nephrologist's routine instructions during routine visits. The objective was to delay disease progression. The results justified the need for including the APN in the continuum of care for CKD patients.

This evaluation was completed using the case control research method with retrospective secondary data collected from the patient's electronic health record. The desired outcome was delayed disease progression measured by decreased serum creatinine levels, decreased estimated glomerular filtration rate (using the chronic kidney disease epidemiology collaboration equation); decreased mean arterial pressures, hemoglobin A1C, and microalbumin. Data collected was from documented laboratory records obtained at each patient's office visit by medical assistants during the initial visit, six months later and at 1-year mark. Inclusion criteria was CKD stage III and IV patients

with hypertension and/or diabetes and eGFR of 59 to 15 ml;/min per 1.73 m^2. Excluded from the project were patients with acute renal failure, renal transplant recipients, patients with progressive glomerular-nephritis, and patients with any hematological /oncological diagnosis. Data from patients who fit the inclusion criteria were assigned to two groups – the case and control groups. The case group was made up of CKD stage III and IV patients with hypertension and/or diabetes who received routine office visit instructions and participated in the NNP- led CKD education class, while the control group was made up of CKD patients who received usual care within the nephrology office visit.

Findings and Implications

Approval for this scholarly project was received from the Institutional review board (IRB) committee at Walden University (Approval No. 10-24-17-0425539) and the Nephrology practice office. The measurements and laboratory results for creatinine, estimated glomerular filtration rate (eGFR), microalbumin, mean arterial pressure (map) and hemoglobin A1C which were routinely obtained at first CKD office visit was treated as baseline and entered SPSS statistical program. Subsequent data collected from six months and one-year visits were added into the program. The analysis of data was completed using the SPSS 21.0 for Windows 7 (SPSS Inc. Chicago, IL, USA). Descriptive statistics and relationship of the characteristics were analyzed using the group mean and standard deviation for participants in the CKD class and non-participants. .

A total of 322 patients with CKD III and IV were identified as admitted to the nephrology practice from January 2014 to December 2015. Of this group, fifty-two (n=52) patients fitted the criteria of CKD stages III and IV with hypertension and/or

diabetes. Twelve (n=12) CKD stage III and IV patients out of the 52 (23.1%) were identified as did not attend the NNP led CKD class and are designated as 'Parti-n' for analysis, while the remainder 40 CKD patients (76.9%) who attended the nurse practitioner led CKD education class were designated as 'Parti-y'. (see table 1)

Table 1.

Total participants

Parti		Frequency CKD Pts.	Percent	Valid Percent	Cumulative Percent
Valid	n	12	23.1	23.1	23.1
	y	40	76.9	76.9	100.0
	Total	52	100.0	100.0	

The mean creatinine at admission for Parti-n group was 2.5583 mg/dl and at one-year visit was 2.7417mg/dl – an increase of 0.1834mg/dl or 7% and a standard deviation of 0.80829. In contrast, the mean creatinine of the Parti-y group on admission was 2.8025 mg/dl. At the end of one year, the mean creatinine in this group was 1.9550mg/dl – a decrease of 0.8475 mg/dl or 30.2% and a standard deviation of 0.37168 (see Table 2).

Table 2.

Group statistics

Group Statistics

	parti	*N*	Mean	Std. Deviation	Std. Error Mean
creat1	n	12	2.5583	.78214	.22578
	y	40	2.8025	.70000	.11068

creat3	n	12	2.8333	.80829	.23333
	y	40	1.9075	.37168	.05877

There was a concomitant decrease in eGFR in the Parti-n group from 25.5833 mL/min/1.73m^2 to 24.4167 mL/min/1.73m$^{2.}$ This contrasts with a rise in eGFR in the Parti-y group from 24.0962 mL/min/1.73m^2 to 33.4250 mL/min/1.73m$^{2.}$ (see Table 3). The difference is better illustrated by a bar chart in Appendix E

Table 3.

Report

Mean

parti	creat1	creat3	hga1c1	hga1c3	egfr1	egfr3
n	2.5583	2.7417	6.9571	8.1000	25.5833	24.4167
y	2.8025	1.9550	4.8727	4.1455	23.6500	33.4250
Total	2.7462	2.1365	5.2375	4.8375	24.0962	31.3462

Patients in the Parti -y group had an eGFR increase by about 32%, ($p<0.05$) while the patients in the Parti-n group had an eGFR reduction of 11%. Across the board, there was a marked decrease in mean arterial pressure in Parti-y group than in Parti-n group. Same results were noted with microalbumin and hemoglobin A1c levels. (See figure 1 in Appendix B)

In the diabetic patients, the significant measures of control were the hemoglobin A1c and microalbumin. Results from data collected of the Albumin and hgbA1c reflect a decrease in both hgbA1c and albumin in the Parti-y group. The mean hgbA1c in the Parti-n group rose from 6.9571 to 8.1000 over a 1-year period. In contrast, the mean hgA1c in the Parti-y group decreased from 4.8727 to 4.1455 over the same period (see Appendix D).

This same pattern was observed in measured mean albumin over one year in the two groups with decreasing microalbumin in the participating group and an increase in mean microalbumin in the non-participating group suggesting worsening renal function. A bar chart comparison further illustrates this observed pattern. (See Appendix C).

A significant finding was the relatively large standard deviation of mean arterial pressure in Parti-n that ranged from group mean of 9.243 at first visit reading to 17.113 at 1-year mark reading. This indicates a large amount of variation in the group that is affected by outliers. In contrast, Parti-y had a small mean standard deviation from 14.373 at first visit reading to 14.968 at 1-year mark reading. (See Table 4)

Table 4.

General report

parti		egfr1	egfr3	alb1	alb3	creat1	creat3	map1	map3	hga1c1	hga1c3
n	Mean	25.5833	24.4167	363.1429	541.1429	2.5583	2.7417	99.5000	108.0000	6.9571	8.1000
	Std. Deviation	7.65694	7.27959	402.34621	442.24708	.78214	.74889	9.24276	17.11307	1.25414	2.14321
y	Mean	23.6500	33.4250	283.3333	109.3939	2.8025	1.9550	104.0294	85.8788	4.8727	4.1455
	Std. Deviation	6.17501	6.28750	335.77026	187.88193	.70000	.40570	14.37271	14.96821	3.78701	2.87903
Total	Mean	24.0962	31.3462	297.3000	184.9500	2.7462	2.1365	103.1667	90.1951	5.2375	4.8375
	Std. Deviation	6.51773	7.50656	344.02640	294.37391	.71933	.59903	13.56811	17.58582	3.55706	3.13424

Implications

The results of this evaluation of a quality improvement program using the case control method with retrospective secondary data collected from the nephrology practice patient health record suggests that participation in a NNP led CKD class in addition to

education by nephrologists during a routine office visit could effectively lead to decrease in progression of CKD disease as evidenced by decreased mean serum creatinine levels, microalbumin, mean arterial pressures, hemoglobin A1c and a rise in eGFR in the group that participated. A principal finding in this evaluation is that more information and knowledge about self-management of CKD seems to be a key factor in slowing the progression of disease. Further studies could eventually reveal the actual roles played by the individual patients that contributed to the improvement of renal functions. The CKD education classes focused on understanding CKD disease process, strict diabetes and blood pressure monitoring and management (BP and RAAS interruption) (Glycemic Control), salt restriction, medication adherence, dietary and lifestyle changes - exercise and weight loss, smoking cessation and planning for the future – treatment options for dialysis/transplantation.

Patients who participated in the CKD class seem to be better equipped to achieve a better control of their blood glucose and blood pressures, better adherence to medications, strict diet restrictions and weight loss programs. It seems that these core lifestyle changes may have played a role in the observed improvement in the clinical measurement outcomes of improving renal functions as evidenced by better serum creatinine levels and eGFR. Patient participation in their care essentially helps to improve relations with clinicians and patients leading to a situation where patient will embrace CKD treatment to maximize positive outcomes (Sue-Hsien et al,, 2011). These results suggest that multidisciplinary care and reinforcement of information is very important and effective in halting the progression of CKD disease. This study echoes recent studies

that confirm the significant role of CKD education and knowledge in delaying progression of CKD disease. The role of the NNP cannot be underestimated as improving patient outcomes benefits from team efforts in a multidisciplinary setting. It can be surmised that patient's interaction with the nurse practitioner in this setting leads to improved overall outcome.

Recommendations

A known fact is that with or without care – CKD progresses and with close and good management, the rapidity of this process could be delayed. In this evaluation of a quality improvement program in a nephrology practice in Dayton Ohio, the guiding practice focused question has been " what is the impact of a NNP led CKD education class on preventing disease progression advanced CKD patients with diabetes and/or hypertension? The CKD education focuses on the ever-changing role of patients in managing symptoms, disability and outcomes that will impact disease management (Corbin & Strauss, 1991) while stressing active patient participation in monitoring of risk factors for CKD like hypertension, diabetes and proteinuria - an identified gap in practice.

Slowing down the progression rate of CKD disease will help reduce the devastating outcomes of end stage renal disease and help reduce mortality and morbidity with this disease. Financially, it will reduce societal costs to treating ESRD estimated at about $42 billion with $34 billion absorbed through Medicare budget (U.S. Renal Data System, 2013). While the project focused on evaluating the outcome of CKD education, the intended inference to be drawn centered on the involvement of the NNP in the

management of CKD disease. The NNP's contribution to the management of CKD will bring about a significant shift and social change in what is the norm of nephrology practice (Mack. et.al, 2010). Among the competencies identified by ANNA, the nephrology APN can independently assess, conceptualize and diagnose complex health problems; manage acute and chronic renal disease in a variety of healthcare settings; prescribe, administer, and evaluate pharmacologic and therapeutic treatment regimens while being able to identify, study, and solve complex problems in the areas of nephrology (Counts, 2008).

A recommended solution that will potentially address this gap-in-practice as informed by the findings discussed above will be developing and implementing protocols that will mandate NNP involvement in CKD management in all States of the Union. Organizations like ANNA and the ANA need to strongly voice their opinions and come up with a nephrology nurse practitioner pathway in the NP programs that will guarantee the training of nurse practitioners in the nephrology sub-specialty. There is a need to develop guidelines that will broaden the scope of practice of the NNP and compensate them accordingly as in other specialties.

It may seem like an over reach but mandating CKD education for all patients by healthcare policy makers will eventually benefit the patients, insurance companies and payors like Medicare and Medicaid. The gains of involving an NNP in the care continuum of CKD management can not be overemphasized. Final recommendations will be made to the nephrology practice where the scholarly project was conducted.

Contribution of the Doctoral Project Team

In this study, the team consisted of the Project Chair and committee members, the URR, the investigator and the medical assistants at the nephrology practice. I was the principal investigator and my role included identifying the project, engaging and recruiting medical assistants that collected the data from the electronic health records, developing and identifying patients that met the criteria for inclusion and exclusion from the project, setting measurable objectives for the project, identifying the gap-in-practice, defining the problem, participating in the actual CKD education class, collecting data needed for evaluating the project performance and producing a written report on the findings. As a DNP student undergoing the practicum project in a nephrology group setting, I had the opportunity of participating in the CKD education class for patients with stage III and IV who have both diabetes and hypertension and as such it was a great setting to evaluate the impact of the CKD class on disease progression

Strengths and Limitations of the Project

This project is limited by its sample size of 52 patients and duration of 1 year follow up. Consideration was not given to other variables such as the level of education, age, co-morbidities, economic/financial status, sex, religious affiliation, lifestyle, and insurance coverage. Another limitation was that I was not able to identify the specific behavioral changes or individual self-management skills that contributed to the improvement of renal function for the participating patient group due to the retrospective project design and time constraints. It is my belief that given the significant association

between participating in CKD education and slowing the progression of CKD, a larger population study over a period may produce same results.

Summary

This project evaluated a nurse practitioner led CKD education class - a quality improvement program in a nephrology practice in Dayton Ohio by examining the impact on disease progression as evidenced by stable or improved serum creatinine (Scr), estimated glomerular filtration rate(eGFR), mean arterial pressure (MAP), microalbumin(Alb) and hemoglobin A1C(hgbA1c) levels using the case control research method with retrospective secondary data. There was a significant finding of group mean improved renal function across board in the case group who received routine office visit instructions and participated in the nephrology nurse practitioner led CKD education class than the control group who received usual care instructions within the nephrology office visit.

Section 5: Dissemination Plan

Introduction

With broad goals of increasing the reach of evidence to increase people's motivation and ability to use and apply evidence, dissemination is the targeted distribution of information and intervention materials to a specific public health or clinical practice audience aimed at spreading knowledge (Glasgow et al., 2012). Dissemination strategies aim to spread knowledge and the associated evidence based interventions on a wide scale within and across geographical locations, practice settings, social or other networks of end users such as patients and health care providers. An excellent example that I feel is a great dissemination tool for this project is a policy brief. Policy briefs are short documents that present the findings and recommendations of a research project to both a specialized and non-specialized audience. It is usually a stand-alone document, focused on a single topic and no more than 2–4 pages (~1500 words). Jones and Walsh (2008) have observed that when policy briefs are carefully designed, they can be a powerful tool for communicating research findings to development policy audiences since policy-makers are constrained by time and overwhelmed by various sources of information, they are likely to make quick decision by selecting the evidence most appropriate to their political leanings. It is usually limited to a problem at hand, promotional and understandable in clear concise language focused on achieving the intended goal of convincing the target audience (Young & Quinn, 2002).

Analysis of Self

My role is that of a scholar-practitioner who is in the process of mastering an academic discipline and practicing a profession. As a scholar-practitioner, I desire to learn while actively engaging in my profession – Nursing. While studying with my preceptor in my role as a Doctor of Nursing Practice student and principal investigator, I took time to reflect on available data and feedback about my profession, best practices, beliefs and have formed a vision of my future professional role after spending time in collaborative conversations with my preceptor. My experience with this study and the results convince me that APNs have a great wealth of knowledge to offer in the management of CKD and other chronic illnesses. Insights gained from this experience include the need to develop curricular for specialties like the NNP in the State of Ohio to cultivate the work force for this role as obtain in some states. The role of the APN –NNP in managing CKD needs to be escalated from dialysis rounds to intense follow up for CKD early stages. This will in turn reduce the waiting time for referrals and follow ups of new and old patients with CKD disease. The present state of using APNs in the employment of nephrology groups for hospital rounds as scribes and dialysis rounds is obsolete. As a long term professional goal for me, I plan to work closely with the ANNA and American Nurses Association (ANA) to continue to develop a pathway for an APN specialty in nephrology by taking ideas from the critical care model that is conducting residency program for APNs in critical care services.

Establishing a family practice center within the inner city limits is another professional goal. Walden's social change drive has been an important guide for my

academic endeavor to be competent in my abilities to provide comprehensive care of patients with a broad range of medical conditions across the spectrum of acute illness in an office setting by applying evidence based, cost conscious strategies to diagnosis and disease management in patients in the clinic setting. I will strive to transfer knowledge acquired during the long Practicum experience into practice by continuing to precept novice APNs in this clinic in a city that lacks enough preceptors for family practice practitioners.

Summary

CKD is a devastating diagnosis for any patient. With and without close monitoring, CKD progresses to ESRD. A CKD education program with emphasis on strict blood pressure and blood glucose control, diet and exercise, medication adherence, lifestyle changes and smoking cessation was found to have a positive effect in delaying the progress of CKD in patients who participated in the process. The rate of disease progression and associated co-morbidities can be delayed or reversed as evidenced by the above scholarly project. Evidence strongly suggest that participation in a NNP directed CKD education classes is associated with improved renal function and delaying CKD progression.

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Appendix A. Stages of CKD

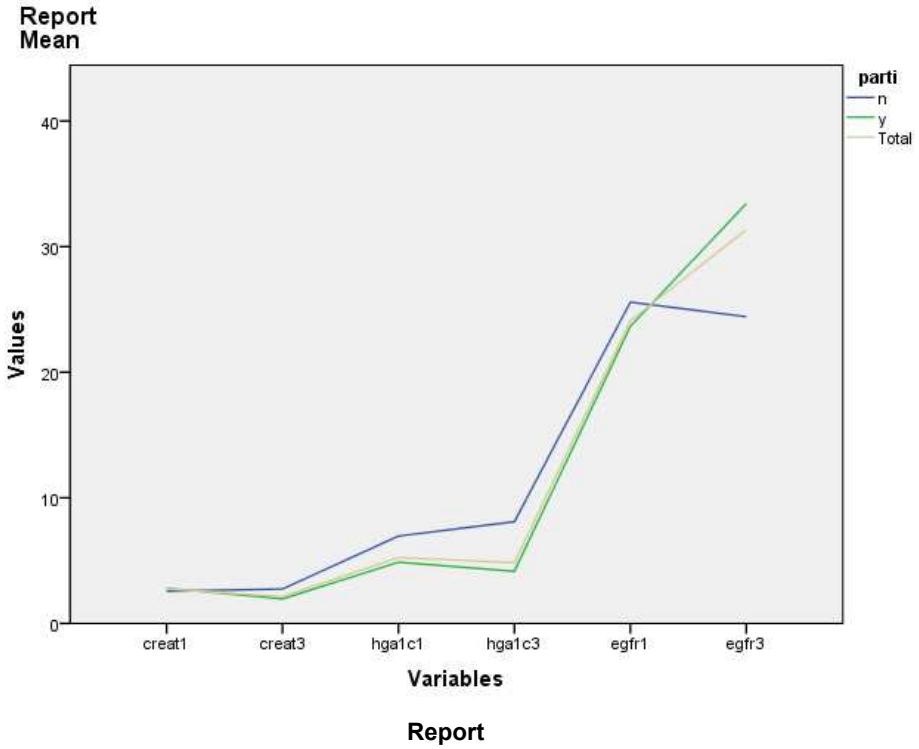
Stage	Clinical features	GFR (mL/min/1.7 m²)
I	Damage with normal or increased GFR	≥90
II	Damage with a mild decrease in GFR	60-89
III	Moderate decrease in GFR	30-59
IV	Severe decrease in GFR	15-29
V	Kidney failure	<15 or dialysis

GFR: Glomerular filtration rate

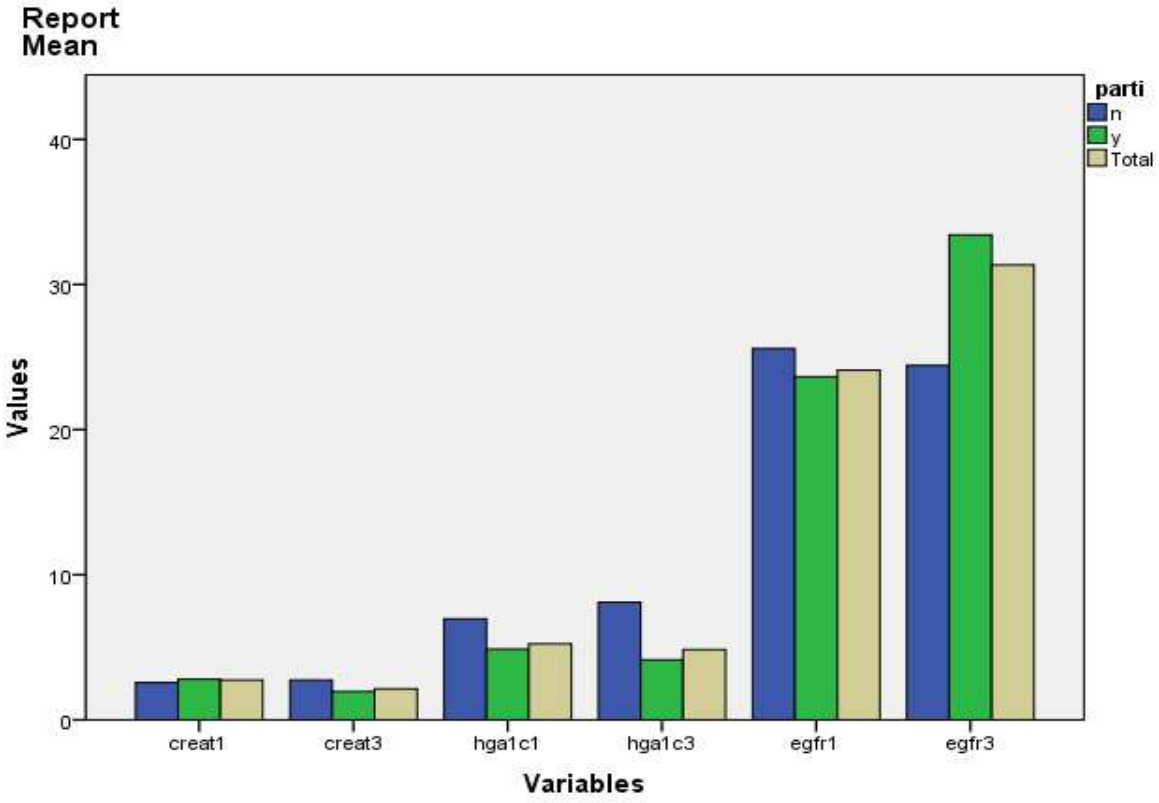
Source: National kidney Foundation. (2015). People like us - About chronic kidney disease. Retrieved from https://www.kidney.org/kidneydisease/aboutckd

Appendix B.

Figure 1. Graph mean report



Appendix C. Bar chart mean report

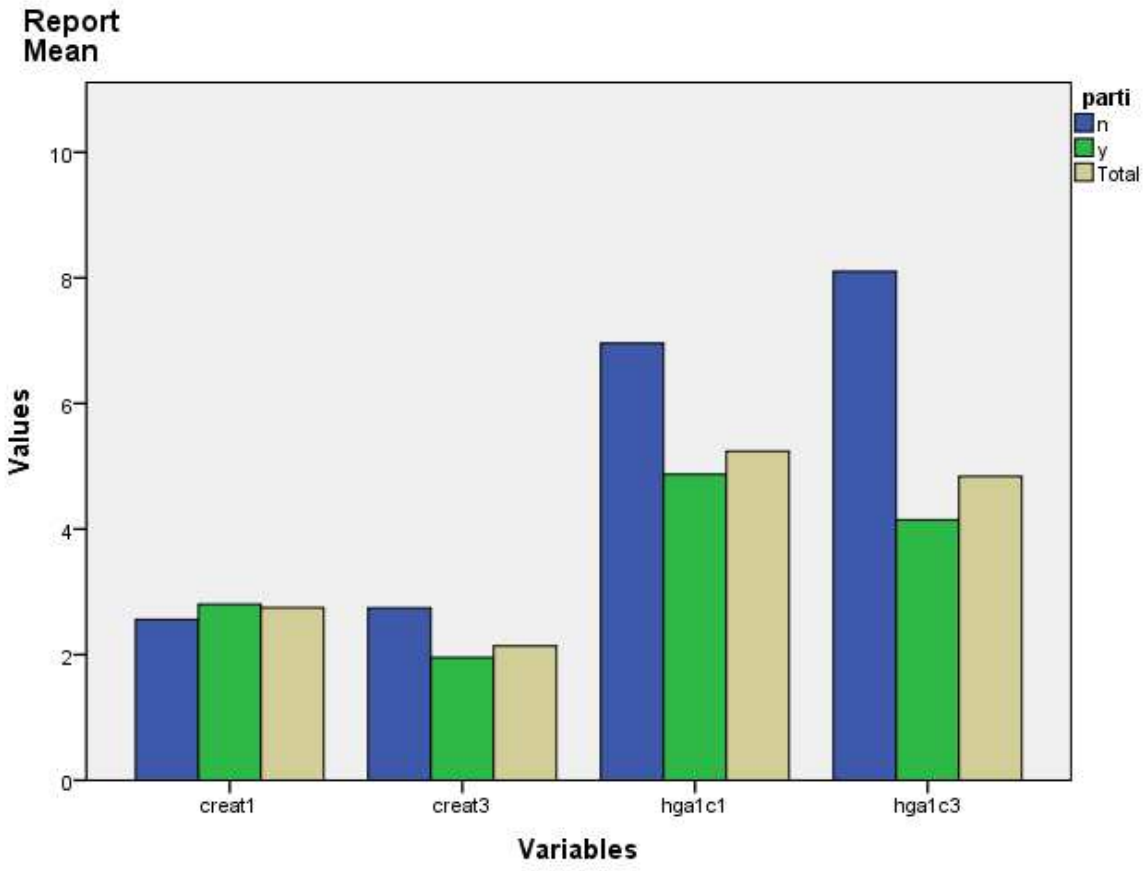


Appendix D. Table 3 *report*

Mean

parti	creat1	creat3	hga1c1	hga1c3	egfr1	egfr3
n	2.5583	2.7417	6.9571	8.1000	25.5833	24.4167
y	2.8025	1.9550	4.8727	4.1455	23.6500	33.4250
Total	2.7462	2.1365	5.2375	4.8375	24.0962	31.3462

Appendix E. Bar Chart mean report



Appendix F. Table 4 general report

parti		egfr1	egfr3	alb1	alb3	creat1	creat3	map1	map3	hga1c1	hga1c3
n	Mean	25.5833	24.4167	363.1429	541.1429	2.5583	2.7417	99.5000	108.0000	6.9571	8.1000
	Std. Deviation	7.65694	7.27959	402.34621	442.24708	.78214	.74889	9.24276	17.11307	1.25414	2.14321
y	Mean	23.6500	33.4250	283.3333	109.3939	2.8025	1.9550	104.0294	85.8788	4.8727	4.1455
	Std. Deviation	6.17501	6.28750	335.77026	187.88193	.70000	.40570	14.37271	14.96821	3.78701	2.87903
Total	Mean	24.0962	31.3462	297.3000	184.9500	2.7462	2.1365	103.1667	90.1951	5.2375	4.8375
	Std. Deviation	6.51773	7.50656	344.02640	294.37391	.71933	.59903	13.56811	17.58582	3.55706	3.13424

Appendix G. CKD Education Guideline

Objective: Educate the CKD patient and family on disease process, coping mechanisms, and lifestyle changes aimed at delaying disease progression

Highlights:

- **Chronic kidney disease – what you need to know**
    1. Anatomy of the kidney
    2. Function
    3. CKD – diagnosis, causes, stages, symptoms
    4. Understanding the complications
    5. Meaning of laboratory results – Creatinine, BUN, Phosphorous, Potassium, Sodium, Albumin, hemoglobin, hematocrit, platelets and hemoglobin A1c
    6. Finance
    7. CKD care team – Dietician, social worker, nephrologist, nurse practitioner
- **Chronic kidney disease – Effects on the patient**
    1. Heart and blood vessels
    2. Anemia
    3. Bone disorders
    4. Malnutrition
    5. Uremia
    6. Depression
- **Chronic kidney disease – Plan of care**
    1. Blood pressure management
    2. Diabetes management
    3. Cholesterol management
    4. Treating Anemia
    5. Lowering risk of bone disorders
    6. Preserving renal function
    7. Managing depression
    8. Eating healthy
    9. Exercise
- **Chronic kidney disease – Treatment options**
    1. Kidney transplantation
    2. Hemodialysis
    3. Peritoneal dialysis
    4. Choosing no treatment
- **CKD – Choosing transplantation**
    1. Understanding kidney transplantation – how it works
    2. Donors – Living, cadaver, paired exchange, Altruistic
    3. Matching and compatibility
    4. Immunosuppression and rejection

5. Living well with a transplant

- **CKD – Choosing the type (Hemodialysis vs. Peritoneal dialysis)**
  1. How dialysis works
  2. Accesses
  3. Equipment
  4. Home vs in-center options
  5. Travelling and working while on dialysis
  6. Nutrition
  7. Pros and cons
- **CKD – Living well with your choices**
  1. Psychosocial issues and well being
  2. Coping strategies
  3. Support
  4. Finances
  5. Exercise

(Source: National Kidney Foundation)