THE SHORTAGE OF EXPERT NEPHROLOGY NURSES AND PATIENT QUALITY CARE INDICATORS A QUANTITATIVE CROSS-SECTIONAL STUDY

by

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ABSTRACT

This quantitative cross-sectional study examined the problem regarding the shortage of expert nephrology nurses and potential consequences or outcomes on patient quality care indicators in the dialysis setting. The research study collected demographic data by survey method from 34 Ohio chronic dialysis units on nursing tenure, nephrology experience, education level, certification status and age. The corresponding Centers for Medicare and Medicaid Quality Incentive Program (CMS QIP) aggregate patient data for each unit was obtained for comparison. Chronic dialysis units with higher level of nursing experience and education were compared to chronic dialysis units with less experienced and educated registered nursing staff. A simple linear regression analysis was conducted on the patient quality care indicators and was used to predict outcomes on the shortage of nursing experts on the collected convenience sample. The analyzed data research has three areas of statistical significance; hemoglobin level less than 10.2 g/dl, Kt/V of 1.2 or greater, and facility mortality rate. Units with higher levels of experience had fewer hemodialysis patients with lower percentage of anemia and a higher percentage of patients meeting dialysis adequacy levels. Units with higher level of education had a lower facility mortality rate. This study noted the need to measure the level of experience and education of the expert nephrology and how those aspects affect patient quality care indicators for the renal patient.
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Chapter 1

Introduction

The nephrology nursing expert provides significant contributions to the nursing quality, nursing care, and patient quality outcomes. Developing nephrology nursing specialists requires extensive time, budgetary investment, and commitment (Ulrich & Kear, 2015). It is a specialty that requires an average of three to six months of initial training to qualify as an entry-level nephrology nurse competent to provide care to the medically complex renal patient. Expertise in this discipline takes years of learning, advancing education, and clinical practice in the field of nephrology care. These nephrology nurses provide care for a vast age range extending from the neonatal through the geriatric population. The nephrology nurse experts providing care for the renal patient exhibit complexity of thought and care for this unique patient population. The shortage of these leaders and experts in care does dramatically impact renal patient quality outcomes (Hayes, Douglas, & Bonner, 2015).

The experienced nurse possesses a high level of knowledge, experience, and critical thinking skills (Benner, 1984). The expert is familiar and comfortable in providing care through the art and science of nursing (Watson, 2008). Both nursing art and nursing science play a pivotal role in the development of new competent nurses. This transfer of information occurs through time, education, and interaction with other nurses (Benner, 2015). The lack of this knowledge base negatively impacts the nursing profession, the organization, and the patient population (Bonner, 2008). This greater impact specialty practices such as nephrology due to the length of training and education required to reach a level of expertise (Gardner & Walton, 2011).
Additional concerns for nephrology specialty nursing practice are reflected in the absence of available nurses. The American Association of Colleges of Nurses anticipates an increasing need of 19% for registered nurses by the year 2022 (Rosseter, 2014). This presents an immense challenge to meet patient needs and provide quality care. Now is the time to validate the worth of the expert nephrology nurse, to promote thoughts about specialty nursing education, and to keep those experts in the nephrology field. This mindset of validation and promotion is frequently written by leadership within the American Nephrology Nurses Association (Kear, 2016; Rosenstock, 2015; Ulrich, 2003).

This quantitative cross-sectional study focused on the shortage of the expert nephrology nurse. The purpose of this research study was to predict consequences or outcomes of the shortage of the expert nurse on patient quality indicators. The proposal used regression analysis to predict the consequences and the outcomes of the lack of expert nephrology nurses on patient quality care indicators. Publicly reported data available through the Centers for Medicaid and Medicare Quality Incentive Program was used as the measurement for patient quality indicators. Information regarding expert nephrology nursing was obtained through a direct survey of chronic dialysis administrators and publicly reported data.

**Background**

The shortage of expert nephrology nurses starts with the lack of available nurses to provide care at all levels within healthcare. The Ohio Action Coalition (2015) report collected data on all registered nurses renewing licenses for 2013. The number of renewals was 182,589; including approximately 14% not currently working as a registered nurse, 60% working in the hospital setting, and with an average age of 48 years
old (Ohio Action Coalition, 2015). Mature nurses, 50 years old or more, reported working in areas such as education and clinics; chronic dialysis clinics would fall into the clinic category reported (Ohio Action Coalition, 2015).

The need to obtain and maintain the expert nephrology nurse in the care of renal patients is ever present in the clinical setting. Administration and institutions seek to hire experience for the nephrology units through intense recruitment and promotion of current staff referrals. Units with more experienced staff are considered a stable environment for the complicated renal disease process (Hayes et al., 2015). Concerns look towards the limited number of experienced nephrology nurses and the movement of those nurses within the specialty. It is important to not only look at the experienced nurse, but how to keep the expert clinician to provide a mechanism to share their knowledge and skill. Shortage of the expert nephrology nurse slows the movement of information to new less experienced nurses.

Another reason for having expert nephrology clinicians looks to the reporting process for the Centers for Medicare and Medicaid. This oversight agency collects information and identifies the performance of each dialysis unit within the United States of America. Patient quality indicators of: (a) anemia management, (b) bone and mineral metabolism, (c) albumin level, and (d) access type (central venous catheter verses arteriovenous fistula and graft) are the focus of the data collection. These results are then publicly reported on the Centers for Medicare and Medicaid website and include a star rating system for the clinic’s overall performance. The attention to consistently provide quality care is imperative for the renal setting due to the high level of transparency demanded by the government agency and healthcare community.
Providing the best care, the optimal outcomes and attracting the patients is all part of the ever-changing expert’s job role. They maintain the balance to be the expert nurse, share that knowledge, and promote best practices in the nursing discipline. This transpires at the same time the expert nephrology nurse is building trust and relationships with the renal patients, the support systems, and the community. This type of skill in nursing diplomacy comes in the form of the expert nurse (Benner, 2015).

Providing a nursing team blended with expert clinicians grows the new nurses’ skills toward improved observation and clinical excellence (Spirvak, Smith, & Logsdon, 2011). Without the expert nurses in the unit; new nurses will struggle to learn, improve skills, and thrive in the healthcare environment. Mature nursing professionals provided real-time feedback and needed support for the novice nurses (McHugh & Lake, 2010). The experts’ insights into nursing practice and patient care is an extremely valuable asset in healthcare.

Expert nurses have the ability and expertise to provide excellent patient care (Hill, 2010). There is a strong need to obtain and keep these experts in the field at the bedside providing quality care. The mere presence of these expert nephrology nurses is viewed by physicians, paraprofessionals, and administration as a stabilizing agent in the units. Less experienced nurses look to the expert for direction and input throughout orientation and beyond when entering into specialized practice. These expert nurses do make a difference in the patient outcomes including safety and quality of life components (Clayton, 2014).

Many thoughts surround keeping expert nurses in place. Velencia and Raingruber (2010) identified older expert workers needed to feel the importance of their work in the
nursing profession. The effective use of expert nurses’ skills, the appreciation of their knowledge base and the ability of the employer to accommodate older nurses’ needs gave employees a sense of loyalty to the healthcare team (Velencia & Raingruber, 2010). The strategy to retain experienced nurses will require multiple ideas and participation on a national level (Ulrich & Kear, 2015). Recognition of the importance of the nursing profession at any age is required to anticipate needs of the unit and succession planning of expert nurses.

It is important to seek out and appeal to the novice nursing professional. Kear (2015) expressed key components of recruitment should include a well-developed training modules, use of a nurse residency program, and incorporation of mentorship at every stage of training and skill acquisition. Reaching out, pursing, and promotion of the nephrology specialty practice will aid in the growth of available nurses for the complicated renal population. Another avenue is the recruitment of nurses by other nurses already in nephrology nursing practice. When peers see nurses satisfied with their work, with their promotion within the unit, and the appreciation of other paraprofessionals, it creates a positive feeling towards renal care (Ulrich, 2003).

Additionally, nephrology nursing experts are leaving the specialty (Wolfe, 2014). Nurses feel underappreciated, face work pressures, and note the reduced pay when compared to other specialty nursing practice (Rosenstock, 2015). Kear (2016) wrote of the need for mentorship and support for the renal nurse to bolster the retention into the specialty practice. Improving the conditions, work satisfaction, and pay may encourage expert nurses to remain in dialysis (Gardner & Walton, 2011). The nephrology nurse
strives to be heard, recognized, and supported to provide ongoing care to the renal patient.

Expert nurses and novice nurses do not assess, care or provide interventions at the same level of competency and skill (Ulrich & Kear, 2015). The novice nurse lacks the background filled with experience and practice to consistent process and act upon patient assessment information. Hill (2010) noted novice level nurses lack the skills to tie in small changes to the larger clinical picture for the patient’s overall health and safety. Nurses at the beginning of their careers require assistance and support from the more experienced staff to optimize learning. Pairing the nephrology nursing expert with the novice nurse provides support and growth opportunity in a safe learning environment.

The increased loss of expert nurses nearing retirement will escalate the vacancy rate at institutions (Tellez & Seago, 2013). In a survey conducted by Nurse Week Publishing and the American Organization of Nurse Executives, 95% of nurses identified that staffing shortages had been a major source of stress on nurses (Ulrich, 2003). The effect on quality of nursing care was believed to be strong with 80% of the respondents linking it to a decrease in their ability to provide the best care (Ulrich, 2003). The retention of nursing experts will maintain a resource for other nurses entering the profession and provide a sounding board for ideas and creativity. In specialty nursing areas like nephrology, they provide direction and comprehension beyond the books and theory (Bonner, 2007). Expertise allows for the holistic approach of nursing art and nursing science that provides seamless patient care.

The aging of the general nursing population is in alignment with the shortage of nephrology nurses. Nurses are aging and retiring from healthcare at an alarming rate.
The number of nurses ages 50 or older is currently 55% (Rosseter, 2014). This finding coincides with Ohio’s average age of registered nurses at 49 years old (Ohio Action Coalition, 2015). This group of expert clinicians will reach retirement age in 10-15 years. This reduction in force includes specialty practice areas such as renal and dialysis units (Counts, 2015). Accommodations to aid nurses working later in life are required to sustain their continued employment within specialty practice. Action must be swift to understand the nephrology nursing professionals to maintain and retain this highly skilled and valued workforce (Kear, 2015).

**Statement of the Problem**

The problem is the shortage of expert nephrology nurses and the potential consequences or outcomes to patient quality care indicators. Expert nurses provide comprehensive assessment, provision of quality care, and direction for the unlicensed personnel working in the units. The expert nurses perform exceptionally well and are able to identify potential errors either before they happened or very early thus avoiding adverse events for the patient (Wilkinson, Cauble, & Patel, 2011). Keeping expert nephrology nurses at the bedside places the knowledge where it is needed, with the renal patients managing crucial laboratory values, providing early identification of complications, and reducing adverse occurrences (Ulrich & Kear, 2015).

The increase complexity of this population is in need of expert nephrology nurse’s ability to manage multiple tasks and initiatives meant to improve patient outcomes and promote patient safety (Bednar & Latham, 2014). Dialysis treatments received by renal patients is an invasive procedure requiring competency and skill to maintain safe quality care (Bonner, 2011). The quantitative cross-sectional method is descriptive and enabled
the collection of measurable data to predict outcomes based on past or current data. The research of expert nephrology nurses and patient quality care indicator can advance current kidney care practices and push current clinical outcomes to higher levels.

**Purpose of Study**

The purpose of this quantitative cross-sectional study was to predict the consequences and outcomes of the shortage of expert nephrology nurses on patient quality care indicators. This focused on the experience level of the nurse not the formal educational level. The goal was to collect data on patient quality care indicators, which are publicly reported, through the Centers for Medicare and Medicaid Quality Incentive Program. Every chronic dialysis unit is required to submit data for the Quality Incentive Program. The measurements focused on the: (a) anemia management, (b) dialysis adequacy, (c) access type, (d) readmission rate, and (e) mineral bone metabolism data (Appendix F). The level of nephrology nursing expertise and nursing skill mix in the dialysis units was collected through direct survey method of the administrators. The units with a low percentage of nephrology nursing experience were compared with units possessing a higher percentage of nephrology nursing experience.

This study included a convenience sample of chronic dialysis units in Ohio. The units were assessed for: (a) the years of experience as a registered nurse, (b) years in nephrology nursing, (c) the level of formal education, (d) certification status, and (e) whether the nurse was 50 years old or older. This division in expert status, tenure, and age group noted trending in patient data based not only on the expertise of the nephrology nurse but the years of active nursing practice and skill. Publicly reported data for patient outcomes provided through the Centers for Medicare and Medicaid Quality Incentive
Program was included for each participating unit. These patient measurements include: (a) adequacy of dialysis, (b) dialysis access type, (c) hypercalcemia, (d) readmission rate, (e) phosphorus control, and (f) anemia management (Centers for Medicare and Medicaid, 2015). Through this combination of data collection, the statistical analysis occurred.

Aims of this study included: 1) identified the potential consequences or outcomes of the shortage of nephrology nursing experts on patient quality care indicators and 2) identified the need to retain nephrology nursing experts to teach novice nephrology nurses to provide high quality patient care. Physicians, administration, leadership, and the community need to realize the value and full potential of the expert nephrology nurse. These professionals improve the quality of life in renal patients through their therapeutic and highly skilled care. The expert nurse makes the difference between people merely living on dialysis verses thriving on dialysis.

**Significance of the Study**

The research study on the shortage of expert nephrology nurses investigated the consequences and outcomes in relationship to patient quality care indicators. The role expert nurses play in the patient outcomes is viewed as significant, however there lacks an agreement on defining the expert, measuring their patient care outcomes, and what the skill mix in a unit should incorporate (Currie & Watterson, 2009; Ding, 2014). Further thoughts stem from direct observations of multiple dialysis units struggling to staff, hiring nurses with limited experience, and seeing few if any experienced professionals within the unit. New inexperienced nurses need direction and guidance from more experienced nurses to grow in knowledge and skill.
The nephrology nursing specialty has experienced multiple changes over the last few decades. The availability of renal replacement therapies and transplant has increased demand for nursing in the renal field. There have also been advancements in care, technology, and need for services. Patients depend on the dialysis staff to maintain safety during treatments and identify problems or concerns before it becomes an adverse event. The need to have nurses with the expertise to read subtle changes in patient condition is imperative. Expert clinicians recognize variation from expected treatment response and to act without hesitation. These abilities maintain a high level of patient safety and build a foundation of trust within the dialysis unit.

**Significance of the Study on Leadership**

The leadership within the nephrology community looks to multiple metrics and measurements to prove consistency and excellence in patient care and quality outcomes. There is also focus on the fiscal, social, and political climate within the unit, facility, and organization. Managers of dialysis units look to fill their ranks with nurses with and without experience to balance the budget. The dialysis companies work to limit overtime, expenses related to care and training, and keep a healthy profit margin (Rosenstock, 2015). The approach is used in multiple dialysis settings including home dialysis, acute dialysis, and in center dialysis units.

The estimated cost to replace registered nurses in the hemodialysis setting is quoted between $82,000 and $88,000 (Gardner & Walton, 2011). This varies based on experience level and the competition in the healthcare market. The increased cost associated with experienced nephrology nurses does affect the rate or percentage of tenured hires within the group. This practice must be viewed with the proper
understanding. The expert nephrology nurse will not require the same amount of training when starting a new position within the dialysis setting. The reduction in training and education time will offset the increased hourly rate dictated by the skills set possessed by this professional (Staggs & Dunton, 2012). Leaders need to identify the need for balance and understand the overall cost of time, training, turnover, and patient outcomes when viewing the expert nephrology nurses impact on the budgetary constraints of the unit and organization.

Significance of the Problem

There are insufficient numbers of expert nephrology nurses in the renal care setting (Bonner, 2008). Specialty nursing departments, such as nephrology, have been hardest hit due to the additional training required to achieve competency (Counts, 2015). Veteran professionals instill their expertise and experiences into the next generation of nurses and without their direction new nurses struggle to reach comfort in the nursing role (Benner, 1984). The lack of nurses experienced in the art and science of nursing could detrimentally affect the specialty for years to come.

The nephrology nursing specialty requires extensive orientation and training to obtain competency level and years before expertise is realized (Gunasekara et al., 2010). Shortage of nephrology nursing experts prevents transference of knowledge to the next generation of nurses and it slows the development of new experts in the field. Nephrology patients require the healthcare professional’s adept at managing the complexity of kidney care and the skill to complete needed interventions, treatments and care planning (Hayes et al., 2015).
The American Association of College of Nurses identified the nursing shortage and the aging nursing population (Rosseter, 2014). The American Nephrology Nurses Association recognizes the need to find a solution to the nursing shortage (Ulrich, 2003). This is of great concern with the expected rise in the need for nephrology nurses on the rise due to aging of the population (Centers for Medicare and Medicaid, 2012). Renal care and dialysis treatments are invasive and complex processes that require the registered nurse to be present and maintain high quality and safe patient care. There is no substitute for knowledge and skill when providing patient care in the dialysis units. The lack of nephrology nursing experts through shortages and aging does impact the specialty (Harwood, Downing, & Ridley, 2013).

**Overview of the research method.** The quantitative cross-sectional study was used for this research study. The quantitative method enabled the collection of measurable data from the surveyed dialysis units and publicly reported patient outcomes. The quantitative cross-sectional design is a descriptive approach useful to predict outcomes based on past or current data (Cody, 2013). It takes a selected moment in time and uses the information to assess potentials for future or anticipated results. This identification provided additional ideas and thoughts regarding the loss of expert nephrology nurses and encourage steps to address problems or gaps within the nephrology specialty.

Demographic surveys were completed by administrators of dialysis units in the state of Ohio. These were distributed through the completed nursing specialty organizations via an email focused toward Ohio dialysis unit administrators. The units were assessed for nurses’ skill mix by identifying: (a) differing experience levels as a
registered nurse, (b) experience as a nephrology nurse, (c) education, (d) certification status, and (e) age (50 years or older). The experience level for years working in the nephrology setting was the main focus. Additional questions asked for the years working as a registered nurse and the number of nurses aged 50 years or older. Formal education level was asked, including all college degrees, not just nursing. While this study did not focus on the educational level of the registered nurses nor the nephrology nursing certification status of the individuals it was included for comparison purposes. Educational levels and experience levels are not one in the same and thus were kept separate for the research study on the shortage of expert nephrology nurses.

The publicly reported data on patient outcomes was retrieved on the ESRD Quality Incentive Program (QIP) Centers for Medicare and Medicaid website (Centers for Medicare and Medicaid, 2016). These measurements are required to be publicly reported on a monthly basis by all chronic dialysis units. The nurse demographic survey sent to the dialysis unit administrator requested identification of the dialysis unit for comparison purposes. This allowed for identification of the correct chronic dialysis facilities, incorporation of the collected survey data, and comparison of dialysis units based on presence or percentage of nephrology nurse experts. During the analysis phase unit names were then removed to maintain anonymity of the participating facilities and administrators. Data collected through a quantitative cross-sectional study were analyzed through statistical tests and attempt to prove or disprove hypotheses (O’Dwyer & Bernauer, 2014).

**Overview of design appropriateness.** The design was appropriate to find the relationship of the expert nephrology nurse to patient quality care indicators. This study
intended to predict the impact of the shortage of nephrology nursing experts, and the consequences and outcomes, on patient quality care indicators. The quantitative cross-sectional study was used to develop a forecast type model to find a relationship between the expert nephrology nurse and patient care outcomes (Leone et al., 2015). Identification now on the relevance of expert nephrology nurses helps determine future concerns and struggles as the nursing shortages increase and the specialty nursing units see further decline in the percentage of nursing experts.

Surveys provided basic demographic information, tenure, experience, and educational level. The data were used to conduct a regression analysis to predict the consequences of the shortage of nephrology nursing experts on patient quality care indicators. Data were then placed in table form to provide visualization of relationships between data.

**Research Questions**

The purpose of this quantitative cross-sectional study was to predict the consequences and outcomes of the shortage of expert nephrology nurses on quality patient care indicators. The expert nephrology nurse and years of experience were coupled with patient quality care measurements currently reported by the Centers for Medicare and Medicaid (2016). These are considered indictors of quality dialysis care. Study of the shortage of expertise in nephrology nursing and its impact on patients is warranted due to the increased focus on quality care and reimbursement based on patient outcomes. The reduction of experienced nurses takes with it the knowledge and skills of specialty practice (Benner, 2015). The following sought to understand the impact of the shortage of expert nephrology nurses, its consequences or outcomes on patient quality
care indicators, and encourage thoughts about aging nursing experts. Two questions guided this study.

1) What is the relationship between the shortage of expert nephrology nurses and patient quality care indicators?
2) What is the relationship between the skill mix in the dialysis unit (lack or percentage of expert nephrology nurses) and the effect on patient quality care indicators?

**Hypotheses**

The null hypothesis for R1 and R2 identify no statistically significant relationship related to the shortage of expert nephrology nurses.

\( H_01 \): There is no statistically significant relationship between the shortage of expert nurses in nephrology and the effect on patient quality care indicators.

\( H_{A1} \): There is a statistically significant relationship between the shortage of expert nurses in nephrology and the effect on patient quality care indicators.

\( H_02 \): There is no statistically significant relationship between the skill mix in the dialysis unit (lack or percentage of expert nephrology nurses) and the effect on patient quality care indicators.

\( H_{A2} \): There is a statistically significant relationship between the skill mix in the dialysis unit (lack or percentage of expert nephrology nurses) and the effect on patient quality care indicators.

**Theoretical Framework**

Benner and Watson’s nursing theories help support the study of expert nurses’ shortages. The theoretical framework from Patricia Benner is applied to the phenomena
of interest and it was used as the central framework for this research. Benner’s Novice to Expert is often viewed as a philosophy in addition to a nursing theory (Fawcett, 2013). The approach identifies the definition of an expert nurse as skilled and competent both in the art and science of nursing (Benner, 1984). The expert clinician applies both the practical and theoretical knowledge basing that care on evidenced based practice (Benner, 2015).

Benner’s further definition of the expert nurse guides this study to identify nurses working in specialty practice a minimum of ten years, exhibit advanced skill and understanding of patient conditions, and manage the complexity of nursing care with little or no difficulty (Benner, 1984). The expert is also able to move past foundational knowledge, seeks additional education, and applies those pieces to abstract concepts within the nursing discipline. It is an extension of theoretical knowledge and practical knowledge to the real world application of new situations and patient events. This ability to translate information readily is essential during dialysis care and treatment. Patient status changes throughout the process and interventions must occur prior to adverse patient outcomes or injury. A novice nurse does not possess the skill, knowledge, or realize what he or she does not know to provide safe quality care.

Jean Watson’s Caring Science theory looks to the expert nurse using both intrinsic and extrinsic factors to provide holistic care to the patient (Sitzman & Watson, 2013). The theory encourages nurses to embrace both qualitative and quantitative properties of nursing care allowing for an expansive realization that all factors affect patient outcomes. The expert nephrology nurse provides the caring aspect of nursing in addition to the theoretical knowledge and practical knowledge obtained in nursing schools and entry into
practice. It a level of nursing to aspire to and once obtained shared with the less experienced nurse (Wilson, Harwood, & Oudshoorn, 2013).

Watson’s theory promotes the respect of all human beings and for nurses to enable the patient to return to an optimum level of health. It stresses the need to look at the larger picture as nursing care impacts are seen beyond the individual patient touching the family and the community. This approach is essential in the care of renal disease patients due to the complex nature of the disease process and multiple comorbidities encountered by this group (Wiseman, 2013). Watson’s and Benner’s theories blend to create the ideal nephrology nursing expert to provide patient-centered care.

Fawcett (2013) metaparadigm of nursing consists of health, environment, human being, and nursing. The metaparadigm is included to guide and validate the intent and purpose of a discipline. In nursing, the reference to health, environment, human being, and nursing provides a structural way to measure nursing theory and models. Fawcett’s explanation of the metaparadigm purpose is to provide the scientific structure and rigor dictated by other science-based disciplines. It is a way to solidify the nursing world as a scientifically based discipline independent of other disciplines (Fawcett, 2013). It is a model promoting the worth of the two nursing theorists Benner and Watson.

In her work on the nursing metaparadigm Fawcett has promoted Benner and Watson’s work as true nursing theory. In Fawcett’s interview with Watson both discuss the need for nursing knowledge to improve the human experience (Fawcett, 2013). Benner’s work is viewed as foundational for advanced practice nurses providing support for their level of education and expertise in the field (Fawcett, 2013). Together Benner,
Watson, and Fawcett bolster the need to study relationships between expert nurses and patient quality indicators or outcomes.

**Conceptual Framework**

The conceptual framework for this research study stemmed from Watson’s Theory of Human Caring (Wilson et al., 2013). In Jean Watson’s pursuit of nursing theory development, a conceptual model was emerging; one beyond theory and encompasses the ontological aspect of nursing (Fawcett, 2013). Watson’s work chose to focus in on the structure and framework associated with caring and healing for the patient. Ideas within this thought process can be associated with the nephrology professional community. Renal patients experience a myriad of complications, symptoms, and experiences within the nephrology care structure. Managing care, healing and caring are part of the treatment regime in the dialysis units. Incorporation beyond the theoretical aspects of nursing brings in the use of other paraprofessionals such as dietary, social workers, physicians, case managers, and certified dialysis technicians. This conceptual framework of healing and care for the patients reinforces the need to use measurable patient data information to assess the loss of the expert nephrology nurse and its consequences to the renal population.

**Definition of Terms**

The definition of the following terms conveys an understanding of each term’s specific meaning in the use of this research study proposal. Information displayed here is to lessen confusion for the reader and bolster understanding for unfamiliar terms, parameters, and explanations. This transparency further enhances the merits of the research study. The following definitions are:
Acute (in-hospital) dialysis unit. Dialysis services provided within the hospital setting. Care provided may include (but not limited to) infants through geriatric patients, acute kidney injury, chronic renal care, renal replacement therapies (hemodialysis, peritoneal dialysis, CRRT) and transplant services (Counts, 2015). Patients within this setting may be provided services within an acute unit or at bedside for those patients located in the intensive care units.

Advanced practice nurse (APN). Nurses that have pursued and achieved graduate level education including master degrees and doctoral degrees. It includes nurse practitioners, clinical nurse specialists, nurse anesthetists, and nurse midwives (Ohio Board of Nursing, 2016).

Chronic (In-Center) dialysis unit. A clinic that provides dialysis care for end stage renal disease (ESRD) patients on a routine basis. The unit is staffed by a mix of healthcare workers including registered nurses, licensed practical nurses, certified dialysis technicians, social workers, dieticians, and biomedical technicians (Counts, 2015).

Dialysis. Also referred to as renal replacement therapy (RRT) is defined as the removal of toxins or fluid built up due to damage of the renal organ (kidney) through a process of osmosis, diffusion, and filtration. It can be achieved through a process of hemodialysis, peritoneal dialysis, or continuous renal replacement therapy (CRRT). A dialysis machine and artificial membrane are used in this process for hemodialysis (Counts, 2015).
**Expert nurse.** The expert nurse uses experience, analysis, and intuition to accurately provide care to patients. The expert nurse appears to have an innate ability to assess the situation, act, and provide interventions in a seamless approach (Benner, 1984).

**Home hemodialysis.** Hemodialysis is completed at home by the patient and a care partner. The patient is trained by a Home Hemodialysis nurse to safely provide care and monitor treatments. Patients visit the clinic once a month to meet with nephrologist and interdisciplinary team (nurse, social worker, and dietitian) and have lab work processed (Counts, 2015). The patient often performs dialysis for 5/6 days a week, shorter in duration than the chronic dialysis unit setting.

**Nephrology nurse.** The nephrology nurse provides specialized care for patients diagnosed with chronic kidney disease. Practice settings include hospitals, community clinics, physician offices and home environment. The age range includes neonatal care to elderly with sub-specialization in transplant, hemodialysis, peritoneal dialysis, continuous renal replacement therapy (CRRT), and apheresis. Job roles encompass direct caregiver, educator, coordinator, consultant, administrator, and researcher (Gomez, 2017).

**Novice nurse.** A nurse entering into clinical practice with little or no experience with the patient population which he or she will provide care (Benner, 1984).

**Nursing art.** Nursing art is the holistic understanding of the emotional, spiritual, and intellectual needs of the person. It encompasses the intangible subjective aspects of nursing (Cody, 2013).

**Nursing science.** Nursing science is objective, fact-based, measurable, and focuses on concrete aspects of nursing. It is foundational to providing understanding the human body and conditions (Cody, 2013).
**Patient quality care indicators.** The Centers for Medicare and Medicaid Quality Incentive Program (QIP) identifies the following as key quality care indicators in the dialysis setting: adequacy of dialysis (Kt/V), access type, hypercalcemia, infections, hospitalization rate, phosphorus control, and anemia management (Center for Medicare and Medicaid, 2015). These metrics are required to be reported on a monthly basis by all in-center (chronic) and home dialysis centers.

**Peritoneal dialysis.** Peritoneal dialysis uses the patient’s own peritoneal membrane to act as the dialyzer. This modality option involves using a surgically placed catheter in the abdomen and the instillation of a sterile solution through this catheter. The process can be performed at home during the day or with use of a cycler overnight. The patient visits the clinic once or twice a month to meet with the nephrologist and interdisciplinary team (nurse, social worker, and dietitian) and have lab work processed. The peritoneal dialysis process is noted to promote flexibility for working individuals and preserve residual renal function.

**Registered nurse.** A graduate nurse that has completed an accredited school of nursing program and licensed by the state after passing an examination (Ohio Board of Nursing, 2016).

**Assumptions**

The first assumption was the voluntary participation of respondents. This aspect was managed by use of the nursing specialty’s email communication asking for participation in the research. This study presumed participants were given sufficient time to complete surveys for the research. The identification of time line was present in the survey process to improve timely responses. It also presumed respondents answered
questions with accurate demographic information regarding the nephrology nurses employed at the unit. Clear directions within the survey were included with examples of how to list demographic information. This study presumed the use of a survey focused on demographic information reduced the inclusion of bias in the survey responses. This was achieved through use of demographic questions asking specific information on education, years of nursing, and certification. This study assumed the participants would answer honestly. To promote this aspect participant identification was concealed and confidentiality was maintained throughout the survey set up and process. This study assumed a survey response rate of more than 25% and less than 75% completed to provide an adequate sample size (Steinberg, 2011). Surveys were sent to an adequate number of participants. The last assumption was the surveys and publicly reported data measured appropriate data for the study. The use of consistently reported public data from Centers of Medicare and Medicaid and appropriate survey was used to collect all data to support this last assumption.

Scope

The scope of this study focused on the expert nephrology nurse, their experience level, education level, and certification within the chronic dialysis unit. The intention was to view the outcomes or consequences of the shortage of expert nephrology nurses on the patient quality care indicators. The Centers for Medicare and Medicaid Quality Incentive Program patient quality care indicators were used as the measurement at the surveyed units. The participating dialysis units in Ohio were the target population. Additionally, the convenience sample limited the results on the target population and may not be used to generalize findings further threatening internal and external validity of
findings. The ability to capture all data in this respect were accompanied with the following limitations and delimitations.

Limitations

The limitation of the study included the chronic dialysis units meeting the criteria and the willingness of those unit administrators to complete the required surveys. The use of the nursing specialty’s organization email data base improved ability to reach target audience and lent credibility to the survey. Time frame also limited the number of respondents required to reply within four weeks of receiving the survey link notification. Email notification provided timeline disclosure. The survey was limited to dialysis units in the state of Ohio. Additionally, there was no control on which chronic dialysis units responded. Units owned by a one company, or smaller sized, rural location, or one geographic region within the state of Ohio may have responded in higher numbers causing altered findings for the data analysis. The use of the nursing specialty’s organization for communication was specifically used to reduce likelihood of bias for one dialysis company’s participation over another dialysis company.

Administrators were contacted via a specialty organization email process to participate in the survey. Maintenance of confidentiality was limited on the participants’ end if browsers or email are not password protected or on unsecured servers. At the end of the survey, the Survey Monkey website does direct participants to close out browsers. Administrators unskilled in online survey or computer technology may not have participated, thus missing data from chronic unit and nephrology nurses. This includes nephrology nurses at various tenure, multiple skill levels and age ranges. However, this
capture of nursing variation was not guaranteed and was dependent upon the transparency of the participant survey response.

**Delimitations**

Surveys were sent via a specialty nursing database email from the organization. The survey method may not have captured all variables surrounding the shortage of nephrology nursing experts or unit skill mix. Administrators may not have chosen to participate due to a multitude of reasons including time constraints, lack of interest, and forgetting to complete the survey. Some surveys may have been returned with inaccurate information. Other aspects included the exclusion criteria used to narrow the study’s focus and influenced the scope of the study.

The quantitative cross-sectional study also had limited findings related to changing work environments in the dialysis units related to retention, staffing challenges, and patient census. Descriptive statistics provided the data for the group studied and may have lacked the applicability to the general nephrology nursing community. In this case the findings for the state of Ohio may not be readily transferred to another state or country and is further discussed in chapter five. This may further complicate the relationship between variables and effect data analysis (Steinberg, 2011).

**Summary**

The purpose of this study was to identify the consequences or outcomes regarding the shortage of the expert nephrology nurse on the patient quality care indicators. The need to obtain and keep expert nephrology nurses in the workforce focused on the benefit to renal patients. The examination of the experience level of nurses may reduce the loss of this knowledge base and expertise within the dialysis unit. Exploration of nurses’
experience level, age, and skill mix did bring out further topics for study. Understanding the consequences of the shortage of expert nurses should support the need to stop or slow those choosing to leave the nephrology nursing role.

Chapter two reviews literature relevant to the concerns regarding the shortage of nursing experts. It includes an in-depth review of literature pertaining to the historical background, social climate, and political impact surrounding nursing and nephrology. Literature regarding nursing expertise, retention/vacancy rates in nursing, older nurses, patient quality care indicators, and the expert nephrology nurses domain is included in the chapter. Information regarding gaps in peer-reviewed literature identifies areas of further research and study. The theoretical framework used for the study will be incorporated into the literature review to provide the foundation of thoughts surrounding the expert nephrology nurse.
Chapter 2

Review of the Literature

The goals of this quantitative cross-sectional study were to look at the relationship between the shortage of the expert nephrology nurse and patient quality care indicators. Chapter two begins with the reflection of historical, social, and political perspectives of nephrology nursing and the dialysis setting. The review incorporates the problem, purpose, and context of the expert nephrology nurse and the research study. It incorporates the literature framework in the nephrology nursing field of study. The systematic review of the literature supports the need for the study regarding the shortage of expert nephrology nurses and its relationship to the patient quality care indicators. The review also bolstered support and understanding from the reader on the topic of the nephrology nursing expert and the relevance of knowledgeable care for the renal patient.

The American Association of College of Nurses identified the nursing shortage and the aging nursing population (Rosseter, 2014). The American Nephrology Nurses Association recognized the need to find a solution to the nursing shortage (Ulrich & Kear, 2015). Boolean searches for peer-reviewed articles elicited results for retention and results for nursing shortages. Many articles cited data on age, anticipated retirement, vacancy rates and the cost of nursing replacements. There were limited articles that explored retention of the older expert nurse or if the loss of their expertise would affect patient care. The search for nephrology nursing specific concerns surrounding expert nurses was extremely limited generating fewer than 30 related articles.

The shortage of expert nephrology nurses is worthy of a dissertation topic. This nursing specialty requires extensive education and training to obtain competency level
and years before the realization of expertise (Gunasekara et al., 2010). Insufficient numbers of nephrology nursing experts prevents transference of knowledge to the next generation of nurses and it slows the development of new experts in the field.

Nephrology patients require healthcare professional adept at managing the complexity of kidney care and the skill to complete needed interventions, treatments and care planning (Hayes et al., 2015).

**Title Searches, Articles, Research Documents, and Journals**

The purpose of this literature review was to identify previous research surrounding the shortage of experts in nephrology nursing and its consequences or outcomes on patient quality care indicators. Experience level of the nephrology nurse was the focus of the research. Additional information on formal educational level and certification of the registered nurse was collected via survey. Benner (1984; 2015) and Watson (Sitzman & Watson, 2013) did not correlate the level of formal education, bachelor, masters, or doctorate, as an essential component in identification of expert nursing status. It was noted that registered nurses with advanced degrees need time, effort, and experience within a discipline to develop expert status within specialty practice. The additional information on education level may further decipher the relationship of practical knowledge and theoretical knowledge gained as a nursing professional.

The concern surrounding nursing shortages is not a new topic. Nurses have continuously been in high demand because of their skills, abilities and limited trained nurse supply (Rosseter, 2014). Institutions compete to bring in this workforce; often providing incentives for experience and advanced education. Shortages and retention of
nurses vary among location, organizations, type of unit and specialty (Juraschek, Zhang, Ranganathan, & Lin, 2012). The focus of most organizations is to control costs and manage the care of the patient population through retention and the anticipating need for new nursing personnel (Gardner & Walton, 2011).

The search strategy and focus began with the expert nephrology nurse. The following key terms were used in the Boolean search: (a) expert nurse, (b) nephrology expert, (c) nursing shortage, (d) nursing retention, (e) older nurses, (f) experience in nursing, (g) education, (h) patient quality indicators/measurements, (i) patient outcomes, (j) older workers and safety, and (k) skill acquisition. The four computerized databases used included EBSCOhost, ProQuest, CINAHLComplete, and Nursing@Ovid. The search resulted in 140 articles dated from 1984 through 2016. The selection inclusion criteria were: (a) all research method types, (b) article available in English, and (c) contained original research. Seminal works were included regardless of the age. Articles published in the last decade were the majority of articles with older articles included if from a seminal work. The exclusion criteria were: (a) article not peer reviewed, (b) article not in English, or (c) no longer available through the online database. Twenty articles were excluded due to inability to validate research as original or journal lacked evidence as peer reviewed. Ten articles were excluded because they were not in English, three were in Chinese, four in Arabic, and three in Japanese. Ten articles were excluded due to inability to obtain full article. After full review of inclusion and exclusion criteria, a total of 65 articles remained (Figure 1).
**Historical Perspective of Nephrology Nursing and Dialysis**

Nephrology nursing is considered a young specialty. Physicians and nurses agree that while dialysis nursing started in 1915, it did not become prevalent until approximately 1962. The change was due to the advancements in treatment for renal disease and dialysis access option of arteriovenous vascular access (Molzahn & Butera, 2006). Physicians no longer had the time to remain at the bedside for time intensive and complicated dialysis procedures due to the increased volume of patients and nurses were recruited to provide the hemodialysis treatments (Hoffart, 2009). Intensive care nurses looking for a challenge were the first to take on this complex treatment and work side by side with physicians caring for those with renal failure. The field has expanded as the need grew with over 31 million people in the Unites States having some degree of chronic kidney disease (United States Renal Data System, 2011).
Historically nephrology nurses were critical care nurses cross trained into acute dialysis care because of the level of intricacy (Bednar & Latham, 2014). Nursing expertise takes time, energy, and effort. It takes cooperation between the learner, the teacher, and the environment to grow the nursing expert. Specialty nursing, such as nephrology, requires additional time due to the complexity of the renal disease patient (Ulrich & Kear, 2015). Initial training for new dialysis nurses lasts three months for most dialysis providers. Additional training is required to learn specific modalities like peritoneal dialysis, chronic renal replacement therapy (CRRT), or apheresis adding an additional three to six months to the orientation period. Nurses spend years developing the needed skills and theoretical understanding to manage acute and chronic kidney care and dialysis needs (Bednar & Latham, 2014). Once an expert nurse, they teach those around them including physicians, nurses, patients and families while providing skilled hands on care.

The nephrology nursing specialty has not always been recognized as an individual specialty. Through countless hours of ANNA’s leadership, in 2005 the American Nurses Association officially recognized the nephrology nursing specialty (Counts & Ulrich, 2005). Nephrology nurses pursue and obtain certification as proof of their additional training and education. The current number of certified nephrology nurses as reported by the American Nurses Association leadership is approximately 8,000 (American Nephrology Nurses Association, 2016). This is a fraction of the 50,000 nurses of practicing within the nephrology setting (Keyser, 2011). The certification opportunity is afforded to all levels of education including licensed practical nurses and registered nurses holding associates, bachelors, masters, and doctoral degrees. Each are designated
by differing abbreviations dependent on degree at time of certification and monitored by the American Nephrology Nursing Association (2016).

The nephrology nurse works in multiple areas within this specialty. This includes: (a) home hemodialysis, (b) home peritoneal dialysis, (c) inpatient acute kidney injury on kidney replacement therapy, (d) inpatient critical care on kidney replacement therapy, (e) chronic kidney disease (CKD) management not on kidney replacement therapy, (f) kidney transplant, and (g) apheresis (Hoffart, 2009). Nephrology nurses often subspecialize in neonatal, pediatric, and adult renal care areas both in the hospital setting and outpatient settings (Counts & Ulrich, 2005). It is an expansive specialty encompassing patients from birth until death.

**Social Perspective of Nephrology Nursing and Dialysis**

Florence Nightingale, recognized founder of nursing, believed that nurses had a moral and social obligation to serve people and maintain the highest level of health for the population (Melnyk & Fineout-Overholt, 2011). Nightingale was a highly educated individual with immense knowledge, scientific training, and persistence that nurses receive formal training and education moved nurses toward a respected discipline and directly impacted the mortality and morbidity rate of soldiers during the Crimean War (Cody, 2013). The work and drive of Nightingale promoted excellence in the nursing discipline and healthcare institutions started recognizing the importance of the well-educated nurse.

Ms. Nightingale looked past accepted social conventions and pushed the limits. Most notable was the immense amount of research conducted by Nightingale regarding best-demonstrated practices, cleanliness as a means of obtaining health, and hand
washing as a means of reducing infections. Florence Nightingale enabled nursing to be recognized as a noble profession versus the role assigned to prisoners and prostitutes thus changing the social climate of the time (Cody, 2013). The nephrology nursing specialty continues this advancement of nurses’ role within the community. Through education, skill, and advancement in evidenced based practice nephrology nurses are promoting and providing the best care possible for the renal patient.

Social responsibility of the nursing profession continues to grow past the local area and looks to include the global community. The initiatives of Healthy People 2020 reinforce the need to look at the world as a whole encouraging access and care for all human beings throughout life including those with renal disease (Rollins, 2011). There is a discrepancy within the world’s healthcare community blocking those without money or means to receive even basic healthcare support. In many countries renal disease is viewed as a death sentence and access to care options such as dialysis treatment or transplant are not realistic options.

The needs of the world renal population and society as a whole are constantly changing. Lee, Fitzpatrick, and Baik (2013) wrote the need for nurses to be adept at management for persons from many cultures and backgrounds. This is a pressing need for expected population changes of a growth of minorities to 40% by 2020 (Lee et al., 2013). The professional nurse knows and respects his or her own limits and reaches out to understand that there are many subcultures within minority groups. It is a complicated issue requiring a holistic and flexible approach to improve outcomes for all patients. The renal patient population is no different and requires understanding and skills to manage the culturally complex group.
Nephrology nurses address the needs of those afflicted with renal disease. Due to the End Stage Renal Disease Program (ESRD) enacted in 1972 in the United States of America, many patients treated for kidney disorders are insured through the Medicare and Medicaid programs (Centers for Medicare and Medicaid, 2015). Originally these government instituted programs were designed to provide needed medical care and coverage for those aged 65 or older and the disabled. Through these expanded programs end stage renal disease (ESRD) receives coverage and access to life-sustaining treatment through dialysis, medication, and transplant coverage (Center for Medicare and Medicaid, 2015). Nephrology nursing care and treatment is provided across cultures, belief systems, and communities. Nightingale’s vision is enmeshed in the expert nephrology nurses pursuit of education and training to achieve high-quality patient care.

**Political History and Perspective of Dialysis Accessibility**

In 1972, a groundbreaking law, the National End Stage Renal Disease (ESRD) program was approved at the federal level in the United States of America (Centers for Medicare and Medicaid, 2012). Through this new legislation, Medicare coverage was extended to include many individuals needing renal replacement therapy. The Centers for Medicare and Medicaid (CMS) established standards and monitors compliance within the nephrology setting. One of the most notable requirements is the need for registered nurses in the care of renal disease. CMS is specific in requirements stating that registered nurses are required to be present and in charge while patients are receiving in center or hospital dialysis treatments (Department of Health and Human Services, 2009). Additional federal requirements state that the registered nurse must have greater than one
year experience prior to working in dialysis or be supervised until that criteria is met (Department of Health and Human Services, 2009).

At present legislation dictates reimbursement rates and incentives based on patient care outcomes. The quality indicators used to guide care include focus on anemia management, dialysis adequacy, albumin management, and type of dialysis access (Centers for Medicare and Medicaid, 2015). Facilities that score poorly on patient outcomes are penalized thus reducing payment received from the Centers for Medicare and Medicaid (2015). Registered nurses managing this patient population use their knowledge base and experience to improve measured dialysis quality indicators and work to improve patient quality of life.

**Current Literature**

**Shortages and vacancy rates.** Those coming into the profession are slowed due to the lack of faculty at the schools of nursing thus limiting the number of students admitted to the programs. Colleges struggle to find adequate numbers of qualified faculty to manage the classroom and clinical sites for the nursing programs. These concerns were revealed in the American Association of Colleges of Nurses (AACN) 2012-2013 Enrollment and Graduations in Baccalaureate and Graduate Programs in Nursing survey that nearly 80,000 qualified students were not admitted to nursing school programs due to insufficient numbers of class rooms, clinical sites, and nursing faculty (Rosseter, 2014). This lack of expert nurses at the faculty level effects the entire process of gaining qualified applicants, providing a quality nursing education, and graduating the students to achieve a role as a registered nurse.
Aging is another factor affecting the number of able-bodied nurses to provide for the healthcare needs of the patient population. Older nurses may encounter greater physical challenges and find the demands of the nursing profession causing pain, discomfort, or undue stress on the body or mind. Institutional settings are not always equipped with labor-saving devices such as the newest patient lifts or lighter carts. Size and weight of devices, the size of the unit, and use of ergonomics should be considered to enable older nurses to remain in patient care. Due to the current retirement structure over the next 10-15 years will see large numbers of nurses leaving the profession. The retirement of that age group of nursing experts is concerning and requires a harder look at the need to retain many nurses past traditional retirement age.

Registered nurse (RN) vacancies of 8.1% nationally reported by the American Association of College Nurses demonstrate the lack of available nursing professionals (Rosseter, 2014). The location also affects supply and demand of nurses as western states are projected to have the highest increase in open positions (Juraschek et al., 2012). Current vacancy rates in specialty areas, such as nephrology nursing and dialysis, are higher ranging from 9%-17% depending on location (Juraschek et al., 2012). Shortage of experienced professions means a loss of knowledge to pass onto the next generation of nurses. Nephrology nursing must look at options to reduce the loss of experts vital to the field.

Retaining the nurses currently in the profession is thought to decrease the anticipated shortfall of nurses. Retention of nurses is noted through positive correlation between job satisfaction and staffing levels (Hairr, Salisbury, Johannsson, & Redfern, 2014). This quantitative correlational method study was conducted at a Magnet hospital.
Hairr et al. (2014) investigated the relationship between nurse staffing, job satisfaction and retention of nurses in the acute setting. The sample size of n=70 were aged 36-45, experience level of six months to 16 years, and majority female (Hairr et al., 2014). The positive link between workload and job satisfaction existed; also noted was the link between job dissatisfaction and increased the chance of nurses leaving the position (Hairr et al., 2014).

Positive work experiences are noted to keep nurses at their current employer and reducing turnover. Negative work environments are associated with burnout or loss of valued nurses. Aiken, Clarke, Sloane, Sochalski, and Silber (2002) cross-sectional analysis of 10,184 nurses working at hospitals across Pennsylvania had increased odds of burnout and job dissatisfaction related to higher patient loads. Patient data trends from the study identified an increase in 30-day mortality and failure to rescue rate in situations resulting in high patient to nurse ratios (Aiken et al., 2002). Lack of stability in staffing contributes to higher patient nurse ratios and can contribute to higher patient mortality and morbidity rates (Aiken et al., 2002). Job dissatisfaction contributes to staff turnover and continues the cycle of high patient to nurse ratios.

The teams the nurse works in also contributes to the retention or loss of individuals. A cross-sectional study of hospital nurses in the Netherlands noted the responses of 1108 participants linking relationships with peers, physicians, and leadership as key reasons for remaining in their job role (Van Bogaert et al., 2013). Additional high responses surrounded the perception of quality patient care and experience among the nursing unit bolstering the feeling of providing the recognition of the nurse enjoying current job role. Another study revealed the feeling of family-like relationships within
the team and the patient population served (Gillian, Strodl, & Hamernik, 2012). Reduction of stressors and promotion of nursing retention was seen in the renal nursing population due to the connections made within the nephrology field. The researchers theorized this promoted resilience within the nursing specialty and provided satisfaction for the individual (Gillian et al., 2012).

The economic environment also plays a factor in the shortage of nurses. Muller and Karsten (2012) found that nurse turnover is lowest during times of high unemployment rates and market instability. The economic environment directly affects the nurse’s choice to remain in current nursing role with more employee movement identified in times of economic growth (Hairr et al., 2014). Nurse Managers and organizations must be keenly aware of turnover increase potential during economic growth (Muller & Karsten, 2012). The promotion of positive experiences and engaged leadership will improve the retention of nurses during the changes in the economic environment. The improvement of nursing staffing must occur as the economy improves to prevent loss of nurses, including those experts within specialty practice areas like nephrology (Hairr et al., 2014).

The shortage of expert nephrology nurses has many avenues. The lack of nurses trained due to inadequate nursing faculty is one barrier. The number of nurses entering into the hospital setting, possessing the learning experiences needed to move into nephrology care is the second barrier. The third thing is the nurse enters into the nephrology setting learns the environment and role but leaves early into the specialty practice. And last concern is the shortage of the expert nephrology nurse to instill and share knowledge into the novice nephrology nurses in order to add to the ranks of
expertise within the unit. It is a cycle that needs a solution, the problem will only increase, as the population ages and demand for renal care surpasses the ability to meet patient needs.

**The older nurse.** Nurses are aging in place, choosing to remain working at the bedside and providing patient care, in many healthcare settings. Their anticipated retirement will increase the number of vacancies for healthcare organizations. The older nurses are often viewed as an expert in their nursing unit or specialty practice. Diligence to understand the older nurse and their impact within nursing practice must be reviewed.

There is often ageist attitudes toward the older worker and the nursing field is no exception. This negative stereotype of the older nurse was researched though a study conducted with nurse recruiters. The researcher noted that even with the likelihood of recruiters hiring older nurses, it did not outweigh the probability of a younger nurse being hired, if the candidates seemed of equal quality (Gringart et al., 2012). Additional data linked the perceived thoughts of older workers being highly experienced yet continued negative stereotypes persisted even after positive experiences employing older nurses (Gringart et al., 2012). The need to maintain and retain the older nurse will need to include the changing of attitudes toward the older individual as inferior to the younger nurse.

Letvak (2005) study of 308 registered nurses, majority (96%) female, and all over the age of 50, reported an alarming 30.5% dissatisfaction rate among nurses. The time worked varied greatly with shifts ranging from 5-16 hours and hours worked ranging 3-68 hours a week. Nurses reporting more control over their practice showed a higher level of physical and emotional health (Letvak, 2005). No increase of injuries among older
nurses when compared with their younger counterparts in the setting. The overall findings identified older nurses with more control over job demands and a higher level of job satisfaction influenced the registered nurses’ overall health enabling continued employment and productivity (Letvak, 2005).

The value in retaining older nurses in an aging workforce is a deeply rooted in understanding the value of older workers. The aging process affects all human beings physical, mental, and emotional abilities (Collins-McNeil, Sharpe, & Benbow, 2012). Concerns surround the ideas of nurses able to practice safe care and maintain pace with technology as they age. Gough, Ballardie, & Brewer (2014) conducted a qualitative interview study with 125 nurses related to adaptation of new technology among nurses. It was identified that older nurses did express concerns about the loss in skills due to technology but older nurses adapted to new devices as well as the younger nurses (Gough et al., 2014). The age of the person, while a consideration in training, does not predict the adaptability of the expert nephrology nurse to use new technology in the dialysis setting.

There is also a noted relationship between keeping the older nurse and the relationship and treatment of the older nurses by their leadership. Research in mixed methods evaluation by Bishop (2013) explored the leadership connection with older workers as a means to promote a healthy work environment. The sample size of n=17 were female, ranged in age from 45-65, and had 14-42 years’ experience as registered nurses. Results of the study identified the opportunity to build a sense of community within the unit through positive interactions with peers improved the retention of older nurses (Bishop, 2013). Additionally, the use of team nursing approach and relationships for retention of aging nurses was identified in Sorrell (2010). These articles provide
identification for the need to support the older nurse to continue to work in the healthcare setting.

Active involvement by leadership with aging nurses ensured a safe and supportive environment was a recurrent theme in multiple studies (Bishop, 2013; Collins et al., 2012; Gough et al., 2014; Sorrell, 2010). One unexpected result was the concern of older nurses working 12-hour shifts or longer bringing back the thought of a need for flexibility in work schedule for the older worker (Bishop, 2013). Nurses working in dialysis do experience long work hours, unpredictable schedules, and if in the acute setting on call rotations. All these aspects may not work for the aging nurse or meet their personal life or professional goals.

The need for flexibility, part-time hours, improved pay for experience, and opportunities for continued development of older nurses to increase retention (Andrews, Manthorpe, & Watson, 2004). The inclusion of 18 stakeholders coincided with the nurses’ concerns regarding the need for flexibility and reduction in stress for the older worker but extended past that, looking at the pace of change within the setting (Andrews et al., 2004). The identification of career paths to be used with retention and recruitment would improve the connection with skills, changes within the organization, and aligning with the nurse’s goals (Andrews et al., 2004). The additional need to reevaluate workloads and stress for the older nurse requires further study and understanding.

Maintaining productivity as a professional nurse is highly valued in the nephrology setting. Nurses often define their lives through their professional success and achievements. A peer-reviewed article using a longitudinal panel study focusing on older nurse retention identified the nurses desire to improve skill sets, learn new skills and
technology, and be supported through professional development (Armstrong & Stassen, 2013). This study of n=422 hospital-based registered nurses aged 45-64, expressed the desire to remain productive and relevant to the nursing profession relating the nursing as part of his or her identity (Armstrong & Stassen, 2013). Satisfaction was a key component of the nurse’s intent to remain at his or her current employer coupled with the support of professional development by leadership (Armstrong & Stassen, 2013).

Despite all the positive aspects of employing older nurses thoughts surrounding safety cannot be ignored. Letvak, Ruhm, and Gupta (2013) cross-sectional survey of 1171 participants included nurses over the age of 50 as 26% of the respondents. The older nurses identified higher body mass index, higher pain score, and higher health-related complications than younger workers (Letvak et al., 2013). Concerns emerged regarding acuity levels given to the older more experienced nurses resulting in higher physical, emotional and mental demands placed on the worker (Letvak et al., 2013). There needs to be a balance between the demands placed on the older worker and the needs of the patient. The opportunity to use the older nurses’ critical thinking skills and expertise is seen as a better option that placing the older nurse in roles requiring higher physical strength (Letvak et al., 2013). The potential to pair younger nurses with older nurses using a team approach may alleviate the excess demands on the older expert nurse.

The awareness of potential work-related injuries in older nurses is another area of examination. Cameron, Armstrong-Stassen, Kane, and Moro (2008) conducted a cross-sectional descriptive field study of 303 registered nurses aged 45-63 looking at the types of musculoskeletal problems occurring in that demographic. The researcher found older nurses had increased musculoskeletal problems with the job and related lower back pain
being the most prevalent (Cameron et al., 2008). The most significant finding was a lack of control at work followed closely by nurses working longer shifts (12 hours or more), rotating shifts, increased patient contact, and poor sleep recovery (Cameron et al., 2008). All participants within these categories were more likely to experience musculoskeletal pain or injury (Cameron et al., 2008). Any injury on the job places the older nurse at risk and impacts present and future ability to continue working in the nursing discipline.

All of these articles promoted the need to keep experienced nurses in the nursing profession and provide the ability to maintain employment. Older clinicians are worth keeping at the bedside and enhance the healthcare environment. Their level of expertise, their ease in approach, and ingenuity is unsurpassed. The older expert nurse often possesses the patience and skill set to manage the complicated client, the difficult physicians, precept and mentor the new nurse. It is a priceless asset to have these expert nurses in the unit and every effort needs to be made to maintain a conducive work environment.

**Education level.** The promotion of Magnet level hospitals and accreditation from organizations has been the current trend in healthcare. This move has required institutions to hire more bachelor and master prepared nursing professionals to fill the healthcare teams. The bachelor of nursing education was found to be related to the nurses self-reporting of possessing advanced clinical expertise (McHugh & Lake, 2010). This idea could vary based on perceived support, preceptor, and mentoring relationship within the nurse’s institution. The goal of hiring what is viewed as a ‘better nurse’ is driven by the need to balance both clinical outcomes and fiscal solvency (Carmel & Baker-McClearn, 2011). Watson’s nursing theory promotes both formal and informal
educational pursuits by the nursing professional to provide a well-balanced patient care approach.

Discussion continues to debate on whether it is the educational level or the experience that moves the nursing professional toward better clinical skills and clinical knowledge. Encouragement of continued education, formal or informal, should always be encouraged to promote best practice and use of evidenced based nursing (Melnyk & Fineout-Overholt, 2011). It is more important that the nurse gains information and skill than to remain in place or uninformed. Advancing educational degrees can help promote the nursing profession. The need to encourage nursing degrees past the initial associate level or diploma level can be seen as an extension of Benner’s Novice to Expert model.

The ability to work in the nephrology nursing setting with various degree levels may be noted as a strength within the specialty. All levels of nursing degrees are used including: the licensed practical nurse, associate degree registered nurse, bachelor’s degree registered nurse, master’s degree registered nurse, and doctorate level registered nurse. In the nephrology setting each degree holder is eligible to pursue and obtain certification and a signal of their expertise within the specialty (Counts, 2015). Additional key personnel in the nephrology setting include dialysis technicians, social workers, dieticians, administrators, and biomedical technicians. It is a diverse group of professionals coming together to provide patient care in the nephrology unit.

The question of skill mix, experience level, and educational level on patient outcomes has been explored in some areas of nursing. Most notable at the advanced practice level is the nephrology nurse practitioner and the influence they are noted to
have on the quality of life and outcomes. Research conducted by Douglas and Bonner (2011) noted the multiple areas of practice available to the nephrology nurse practitioner and that not only education, but years of experience played an important part in the positive patient results. Additional data results identified the importance of a strong mentor, a reputable degree program, and the promotion of critical thinking ability (Douglas & Bonner, 2011). The nephrology nurse practitioner often spends more time with the patient and provides consistent direction and care for the entire renal care team.

**Clinical expertise.** The clinical expertise of the expert nephrology nurse was the focus of this research study. Defining the expert is best achieved through Benner’s work which defined the clinical nursing expert. The nursing theorist, Patricia Benner (2015), described the nursing expert as one with the ability to competently and reliably provide the highest level of quality patient care. The novice to expert model identified key components of the nursing expert and includes: novice, advanced beginner, competent, proficient, and expert. Benner’s theory is used in nursing research to support thoughts on education, training advancement of degrees and pursuit in nursing leadership. Nursing experts appear nearly flawless in their approach and care.

The Institute of Medicine provides and establishes criteria for the roles of nurses in healthcare practice. The Quality and Safety Education for Nurses project lists foundational competencies to provide safe quality care (Sherwood & Zomorodi, 2014). The need to involve expert clinicians with the newer staff promotes the integration within nursing practice of the Institute of Medicines recommendations. These core competencies include: patient-centered care, teamwork and collaboration, evidenced-based practice, quality improvement, safety, and informatics. Discussion touted the need
for transforming priorities from fiscal based to clinical based providing promotion and support for nurses. Critical thinking, inquiry, and experience are to be encouraged and retained.

Advancing in clinical skill, knowledge, and critical thinking is often related to time and practice. The ability to learn the skill, practice nursing, and then relate information is often demonstrated in the nephrology nursing expert. Lyneham, Parkinson, and Denholm (2008) phenomenological study placed Benner’s expert stage into three distinct phases: cognitive intuition, transitional intuition, and embodied intuition. Benner’s model was illustrated through a three-dimensional representation of the complexity of expert nursing practice in a second paper by the group (Lyneham et al., 2009). Expertise in nursing is multifaceted with every experience influencing the nurse’s abilities.

The defining of clinical expertise is continuously being examined and redefined as the nursing profession grows. Mannix, Wilkes, and Jackson (2013) identified the ideal expert nurse as a combination of clinical expert, clinical leader, and clinical scholar. The study used a descriptive interpretative qualitative approach using 18 nurses from Australia, Canada, and England (Mannix et al., 2013). These participants relayed the belief that expert clinicians are role models providing encouragement and direction for others and viewed this as highly important in the every changing role of nurses within healthcare (Mannix et al., 2013). The nephrology nursing expert should be encouraged to be a role model to other nurses, to promote best practices, and maintain knowledge on the latest research in healthcare.
The expert nurse can be defined through continued study and exploration of the role of the clinical expert. Christensen and Hewitt-Taylor (2006) critical review looked at evidence related to the expert nurse and sought to define its key concepts. Noted in this review was the desire to develop and reward expert nurses in the field. A problem identified was a clear definition and formal plan within the organization to establish criteria regarding expert status (Christensen & Hewitt-Taylor, 2006). Nurses within the study also believed patient care and quality outcomes were improved when clinical experts were working in the unit (Christensen & Hewitt-Taylor, 2006). The thoughts supported the need for clear definition of expert nurse’s role, the road map for progression as a clinical expert, and how to recognize the contribution to the discipline. Institutions would benefit by establishing such ideas as part of the recruitment and retention process.

The combination of nursing art and nursing science is used to guide the expert nurse. Further discussion stressed the need to understand using the expert to his or her full potential and not be limited by the standardization of care and practice occurring in many healthcare settings (Christensen & Hewitt-Taylor, 2006). The conclusion of the paper noted expert clinicians use experience, insights, and critical thinking to guide them seamlessly through the decision-making process. This reinforces the need for the expert nurse to maintain autonomy, have good communication with leadership, and feel a sense of fulfillment in the role as a clinical expert. Professional nurses view their work as a calling, not just a job and seek to make their roles positive for the larger community.

Expert nurses are often viewed as using insights or intuition as the basis for decision making in the care of patients. This idea was identified in a hermeneutic
phenomenological qualitative research study on 14 expert emergency room nurses in Australia (Lyneham et al., 2008). Experience in emergency ranged 4-30 years and included in-depth interviews asking specifically when intuition played a part in his or her work. Review of the interviews revealed that description of intuition varied while its use was increasingly present as the nurse’s knowledge and experience grew within the specialty (Lyneham et al., 2008). Additional findings relate back to Benner’s Novice to Expert model and expectation that as knowledge and skill grow so does the naturalistic behavior of the clinical expert. It is time, effort, exposure to new ideas, sharing of ideas, interaction with others that impact the ability of the expert nurse to impose their thoughts into patient care situations.

A second paper by Lyneham et al. (2009) explained the need to expose new nurses and students to a multitude of environments thus promoting growth toward the intuitive practice of clinical experts. Lyneham et al. viewed phenomenological research from 2000-2003 and Benner’s works. Through the use of a graph, clinical expertise becomes a three-dimensional representation of the intricacies related to the growth into an expert. Visualization of the learning curve relates Benner’s thoughts discussed in her work; it is a process to become the expert, not an instant transition. The expert nurse uses all their education, training, and experience to synthesize an appropriate plan for each situation. Through this demonstration, the new nurse can observe the expert nephrology nurse and gain insight into renal care and practices.

The expert nurse was noted to contribute to patient outcomes when a dedicated unit supporting the patient with specific disease processes. Clayton’s (2014) study focused on the use of stroke units to improve outcomes patient outcomes, yet noted the
impracticality of smaller or rural hospitals being able to offer the same type of care. Conclusion of the paper noted the need to properly educate nurses working medical surgical in acute stroke care including early recognition for improvement of patient outcomes (Clayton, 2014). The need for expert nurses to provide quality care for those with acute processes is corroborated within Clayton’s work.

Discharge planning for patients also improves when the expert clinician is involved with the plan of action. Advanced practice nurses (APN), expert-by-experience, and novice nurses are often combined within the units to provide care for the soon to be discharged patient. The continuity of care is comprised of this plan of care and subsequent follow up by healthcare providers after discharge from the acute care setting. Researchers identified the family and patient perception of better comprehensive care, improved patient interaction, and professional collaboration with the involvement of the advanced practice nurses (Jeangsawang, Malatham, Panpakdee, Brooten, & Nityasuddhi, 2012). The overall functional status of the patient was not found to have significant differences and the researchers theorized the advanced practice nurses and expert-by-experienced cared for higher acuity and complex patient conditions (Jeangsawang et al., 2012). The need for expertise for the multiple comorbidities and highly complex patient is noted within many of the studies reviewed.

Skill mix also comes into focus when reviewing the expert nurse. Nursing units often staff with varying levels of nursing tenure and abilities. Esparza (2010) conducted a research project exploring nurse staffing and skill mix patterns and the effect on patient outcomes. The observational cross-sectional study concluded that the skill mix used in the medical-surgical units in California had an effect on two patient outcomes the urinary
tract infection rates and patient length of stay in the hospital unit (Esparza, 2010). A second cross-sectional study conducted by Staggs and Dunton (2012) further reviewed the impact of skill mix at the hospital and unit levels on retention of nurses. The researchers noted with higher skill levels the hospitals experienced less turnover and greater stability within the specialty units (Staggs & Dunton, 2012). The positive impact of the expert clinician within the skill mix of the nursing units in both studies noted the importance to have those expert nurses available to improve patient and staff experiences.

In the clinical setting, it is frequently expected that older nurses obtain expertise in nursing care. Professionals often view the years of experience being paired with the educational level of expert nurses. It is not necessary that the expert nurse obtains formal advanced degrees as part of the educational component. McHugh and Lake (2010) cross-sectional study identified nurses perceptions of expertise were related to the years of service and educational level. McHugh and Lake conducted an analysis of data obtained using the Practice Environment Scale of Nursing Index (PES-NWI). In the results, 8,611 respondents linked the hospital environment to the level of nursing expertise demonstrated by its nurses (McHugh & Lake, 2010). Nurses held the belief that education provided the foundation while experience provided the advanced skills required to care for complex patient conditions. Fawcett (2013) wrote that nursing expertise manages to orchestrate and demonstrate the nursing paradigm of nursing, patient, environment, and health in everyday actions. The research links back to the thoughts of Benner and Watson regarding the movement of the novice to a status of an expert through the years spent learning the art and science in nursing.
Nursing experts know the need to understand the human condition, the nursing theory, and complete nursing tasks with confidence making the work seamless. Morrison and Symes (2011) conducted an integrative review of expert nursing practice literature. The findings suggested that the understanding of expert knowledge allowed nursing experts to transfer from themselves to those with less experience (Morrison & Symes, 2011). They are able to instill in others their insights, the passion, and love for the nursing profession. The realization that information should be and can be shared from one professional to another reinforces the need to have expert nephrology nurses within the units to improve patient care.

Leadership including administration and managers rely on the expert nurse to solidify the unit, mentor newer nurses and staff. Onishi, Sasaki, Nagata, and Kanda (2008) viewed nursing specialization from the administrators’ perspective. The use of qualitative content analysis technique was applied in three focus group discussions with nine nurse administrators in Japan (Onishi et al., 2008). Nurses were identified as a resource that required career development, in-service education, and planned processes to reach an expert status (Onishi et al., 2008). Nursing management identified the need for affirmation of clinical expertise and frequent contact showing the value of all nurses in the unit (Onishi et al., 2008). The support for growth as the expert nurse should be recognized as a potential strategy to reduce the shortage of expert nephrology nurses.

Through use of flexibility and encouragement expert nurses see an increase in use for their roles. Carmel and Baker-McClearn (2011) conducted 115 in-depth interviews and analyzed them using qualitative software. Those interviews noted the strong interconnectedness within the hospital environment in the country of England. Nursing
experts, also called critical care outreach services (CCOSs), were used to train medical, nursing, therapy, and social disciplines and improve consistency in care (Carmel & Baker-McClearn, 2011). This evidenced that expertise transcends nursing flowing over to other disciplines to improve coordination of care creating a team of experts providing the highest level of care. The nephrology specialty practice often uses a multidisciplinary approach to bolster patient care and train staff in many professional disciplines.

A supportive environment was identified by McHugh and Lake (2010), and Benner (1984) as the most frequently cited reason for nursing success in acquisition of expertise. Carmel and Baker-McClearn (2011) recognize the need of a community and collaboration bolstering the use of expert nurses. Onishi et al. (2008) administrators’ acknowledged their role in providing clarification, direction, and support for nurses of expert status level. The nurse expert does not merely emerge one day as the clinical expert, but grows everyday through interactions and human experiences.

Expert nurses may leave specialty practice contributing to additional shortages for the specialty nursing units. Commonly identified reasons for changing positions included leadership support, not being valued or challenged in current position, and limited flexibility in the nursing role (Spivak, Smith, & Logsdon, 2011). Spirvak et al. (2011) described three case studies relating the nursing leader’s decision making and retention of expert nurses. The findings reinforced the belief of nursing leaders directly impacting the nursing expert’s decision to leave the unit or organization. Further exploration determined nursing leaders with advanced interpersonal skills and motivational ability was more likely to retain nursing experts within the unit (Spirvak, et al., 2011).
In Cioffi’s (2012) discussion paper, the author examined the concerns surrounding the loss of experts. The retention of nursing expertise benefits the less experienced staff and improves clinical outcomes (Cioffi, 2012). The goal of nursing expertise according to Cioffi (2012) is to promote clinical excellence, promote health, and maintain well-being for all patients. Cioffi raises concerns regarding the loss of clinical experts due to retirement and attrition within the nursing profession. This loss raises concerns across all specialties and is supported by works of Ann Bonner.

Expert nurses need to be supported, encouraged, and retained to promote the best nursing has to offer the healthcare community. Recognition of the expert clinician begins at the unit level, advances throughout the leadership, and encompasses the institutional setting. Nursing experts advance the discipline through their practice and transference of expertise to the novice nurses. These experts provide for continuity of care and nursing practice.

**Expert nephrology nurses.** Expert nephrology nurses are placed in many roles throughout renal care. They are often placed in roles of leadership, administration, education, and clinical oversight. However many chose to remain at the bedside providing much needed care to the most complex of patient conditions. These nursing experts are sought out by physicians, peers, and leadership to bridge the gap between healthcare disciplines. Expert nephrology clinicians seek to maintain the utmost patient care and safety standards in the renal care setting.

The nephrology nurse practices care within its scope and standard of practice from the level of novice through the level of expert. These standards are established by the American Nephrology Nursing Association in conjunction with subject matter experts
The standards are put into place through distribution and integration within policy, procedures, and best demonstrated practices at the unit level. Gomez et al. (2011) identified the need for leadership to monitor and promote these practices through the use of demonstration and direct observation of the nursing staff. In these instances the need for complex understanding and advanced skills within nephrology are needed to lead from within the unit. Expertise in specialty nursing is obtained through the transference of knowledge and promotion of exceptional care.

Bonner (2008) examined nephrology nurses expertise and noted that recognition of expert status by others was an essential piece. The trust given to expert clinicians was verbalized through the study aligning with the feelings of making a difference in the patients’ lives. Bonner and Greenwood (2006) identified a three-step process for developing expertise: non-expert, experienced non-expert, and expert. The characteristics of knowledge, skill, focus, and experience effected the placement within the stages. Another study used metaphors to add depth and imagery toward the understanding of nephrology nurses journey to expert clinician (Bonner & Greenwood, 2005). The visual representation promotes the thoughts of expert nursing status being a continuous growth process of learning, discovery, and actualization. It is a role of growth and development and is continuously redefined by the nurse expert’s thoughts and ideas.

Expert nephrology nurses readily translate situations and patient conditions based on their vast background of formal and informal education. Bonner (2007) delved into the role knowledge played in developing the expert nephrology nurse. The link between extensive nephrology nursing knowledge and expert status was closely aligned within this grounded study. It was recognized that nurse experts maintained up to date on
nephrology care practices and chose to use evidenced based or best-demonstrated practices (Bonner, 2007).

Specialty certification is considered an outward sign of increased experience and education. Wiseman (2013) discussed the certification in nephrology nursing as the formal recognition of experience but identified the need for research to recognize any relationship between certification and outcomes. However at this time certification is still not pursued by many within the nephrology specialty (American Nephrology Nursing Association, 2016). Wiseman (2013) theorized the lack of recognition of certifications importance within institutions may be a deterrent.

Cote and Burwell (2007) discussed the use of a nephrology nurses’ clinical ladder. Benner’s model of novice to expert would be used to delineate the four levels, Nephrology Nursing 1 (NN1) through Nephrology Nursing 4 (NN4), enabling formal recognition for the level of expertise (Cote & Burwell, 2007). Each level recognized a set level of skills and knowledge level with correlation to expectations of the nurse performance to obtain and maintain the level rankings.

Due to the autonomous nature of expert nephrology nurses, there may be confusion of where nursing practice ends and medicine begins. There is a recognized drawback of expert nurses working beyond their scope of practice. Bonner and Walker (2004) studied the blurring of the nurses’ job and the medical doctors’ responsibilities. Nephrology nurse experts were found to act as prescribers by holding, stopping, or reducing medications without physician direction or approval (Bonner & Walker, 2004). The overall belief within the study was the expert clinician’s ability to know and advise patients regarding medication and treatments requiring frequent adjustment (Bonner &
Walker, 2004). While this is reflective of current practice occurrences within the nephrology nursing specialty it is evident that clear direction and adherence to scope of nursing practice be reinforced for all nurses regardless of experience status. The expert clinician must respect and follow nursing practice guidelines while working with physicians to make medical and prescription changes.

The differences between an expert nephrology nurse and a novice or inexperienced nephrology nurse are readily identified. Bonner (2006) studied the differences between expert and non-expert nurses. The non-experts lacked efficiency, fluidity, did not complete tasks in order and often backtracked to things they forgot to complete (Bonner, 2006). This is observed within the dialysis units staffing multiple skill mixes to meet patient care demands. The experts often needed to direct the care, refocus the non-expert nurses, and ensure the safety of patient care and environment (Bonner, 2006). Consistent vigilance is required by the expert nephrology nurses to ensure novice nurses learn how the renal patient’s disease process and comorbidities effect dialysis treatment and subsequent care.

The toll on the expert nephrology nurse can go beyond the walls of the nursing unit. Expert nurses are often asked to work additional shifts and feel pulled between family and work life (Bonner & Walker, 2004). These clinicians know without their expertise the inexperienced nurses fail to provide competent renal care. This situation can lead to burnout among expert nephrology clinicians and potential exiting of the specialty practice. Balance to meet the needs of the patients, as well as the needs of the nurses, should be viewed as a priority to retain expert staff.
Advanced practice registered nurses (APRN) are a group of experts within the nephrology specialty. Over the last decade, this group has increased their presence in the nephrology discipline working with nephrologists to meet the needs of the renal disease population. Gomez (2017) identified the vast differences in practice ability from state to state. There needs to be improved consistency in the scope of practice within this advanced nursing group to further drive the nephrology specialty. The American Nephrology Nursing Association agrees with the need to improve legal scope and roles in nephrology nursing practitioners (Gomez, 2017).

In nephrology care, the APRN provides direction and assistance with nursing and medical care. The practitioner also impacts choices made by patients for dialysis care and treatment. Watson (2008) noted an increased number of dialysis patients choosing home dialysis when advanced practice nurses were involved in the pre-dialysis clinics. The additional time APRN’s spend in the education and communication with patients early in care resulted in the movement towards the home dialysis option versus the in-center hemodialysis choice. Watson (2008) also identified the reduction of emergent starts on hemodialysis in the hospital setting. In nephrology, the use of APRN’s with the nephrologist can provide the best of medicine and nursing for the renal patient.

Nephrology Nurse Practitioners (NNP) are on the front lines of specialty care. Bonner and Douglas (2011) identified that in order to advance the nephrology nursing discipline the Nephrology Nurse Practitioner needed to have clear parameters and an extensively defined scope of practice. The desire to provide best practices, influence care, and look towards new research and discoveries is a fundamental part of this group of advanced nurse practitioners. Additionally, Bonner and Douglas (2011) noted the
need for support of the healthcare team to provide the greatest number of positive patient clinical indicators. Again the time with the patient was well rewarded with the nurse practitioner being present and invested in the nephrology world.

**Obtaining expert nephrology status.** Training and support for the current and future of nephrology nursing are of utmost importance. The inclusion of informal and formal education provides additional tools to obtain expert status. The investment in the present nephrology nursing specialty will provide consistency in patient care, promotion of best practices, and encourage high-quality patient outcomes. It is a time intensive process and requires the nurse’s desire to work towards expert status. The institution’s promotion of continuing education, training, and the use of clinical ladders bolster the support of developing clinicians into nephrology nursing experts.

The plan to obtain expert nephrology nurse status is not consistent or clear. There is agreement on the strong need to develop the next generation of renal nurses, provide structure for success, and expand the appreciation for the nursing specialty (Harwood, Downing, & Ridley, 2013). These researchers proposed use of the Renal Nursing Professional Practice Model previously developed and instituted at their dialysis units in Canada (Harwood et al., 2013). It was found the practice model to be useful in consistent training, education, and advancement of skill in the units. Having a consistent approach has the potential to bolster the transition of a novice nurse towards the expert nurse status in the nephrology setting. This consistency allows the novice to take previous knowledge and apply it to new situations in the nephrology setting and improves self-confidence in the nurse. This creation of positive feedback for the new nurses promotes a sense of teamwork and common goals caring for the renal patient.
Time, training, and education do move nurses toward expert status. The need to move the novice nurse in nephrology towards expert status is important for many reasons. One priority focuses on the dialysis access of the arteriovenous fistula (AVF). Wilson et al. (2013) noted both intrinsic and extrinsic factors affecting the acquisition of skill for cannulation of the arteriovenous fistula in the dialysis setting. The nurse’s ability to become competent and then advanced to expert improves the patient’s hemodialysis treatment and care. Nurses struggling to achieve advanced skills increase the chances of access related complications due to infiltration, failure to cannulate, or reduction in adequate blood flow for hemodialysis treatment (Wilson et al., 2013). The researchers identified the need for novice nurses to practice cannulation skill, not to avoid opportunities for training, and to seek out assistance from more skilled dialysis nurses or technicians (Wilson et al., 2013). Support from the expert nephrology nurse during this learning process is insurmountable is the goal of becoming an expert cannulator in the dialysis setting.

Another way to improve the attainment of expertise is through the use of technology. Many programs, institutions, and clinics provide training through online learning systems. The provision of theory, policies, and procedures are often introduced through this media as a resource to be used at the nurse’s pace. It can often be customized to meet the learning style of the nurse and identify foundational knowledge to build specialty practice. It is an entry level step to introduce the novice nurse into the world of nephrology care and practices.

The use of computer-assisted learning options for the novice nephrology nurse was an idea explored by Dennison (2011). The use of technology in the acquisition of
skills can improve competency by successful completion of tasks without the risk of patient injury. Dennison (2011) chose to focus on non-expert nurses and show how an online learning module on hemodialysis complications inclusive of scenarios would improve overall thought and understanding. The pre-test versus post test results noted a 21% improvement in scoring. Nurses also commented on the educational improvement, interactions with the scenarios, and improved feeling of competence in their abilities (Dennison, 2011). Through repeated exposure to scenarios, working with a preceptor, and choosing to follow up with learning modules the novice nurse gains valuable experience to achieve competency in renal care. It is one tool on a journey to become an expert nephrology nurse.

**Quality outcome indicators for dialysis patients.** Patient care is under consistent monitoring in the nephrology setting. The Centers for Medicare and Medicaid (CMS) (2015) require a series of patient quality measurements be obtained on a monthly basis for all hemodialysis and peritoneal dialysis patients. The quality indicators most often monitored include: (a) anemia level, (b) access type, (c) albumin level, (d) phosphorus control, (e) infection rate, (f) hospitalization rate, (g) calcium, and (h) potassium levels. In the outpatient chronic dialysis units attaining the CMS goals for each measurement is a requirement to achieve the maximum reimbursement rate and missing key metrics can reduce reimbursement rates for the following fiscal year. Units understand the need to meet the government set requirements and strive to maintain quality care, enhance patient experience, and balance staffing to meet the needs of the facility.
The approach used by the Centers for Medicare and Medicaid was previously labeled a Pay for Performance approach. Hirth et al., (2009) studied two clinical outcomes, the anemia management, and dialysis treatment adequacy levels. While the expectation with a pay for performance type scenario is that all facilities, physicians, and staff are of equal caliber the researchers did not find this to be the case. In Hirth et al. (2009) the findings of collaboration level between physicians and other professionals as well as the culture within the dialysis facility impacted patient quality outcomes. Higher functioning units produced an increased percentage of established metrics in relation to anemia management and dialysis adequacy. Hirth et al. (2009) theorized that focus on the metrics at the unit or organizational level produced more consistent results than focusing at the physician level. It was also noted that the inclusion of comorbidities is taken into account for expected patient results or outcomes. At present the Centers for Medicare and Medicaid do not include this in their measurements for dialysis quality patient indicators.

Infection control in the dialysis setting is under constant scrutiny and surveillance. The renal patient is at heightened risk to develop bacterial, viral, and fungal infections. Patients receiving hemodialysis treatments via a central venous catheter are at the greatest risk to develop infections and subsequent septicemia (Counts, 2005). Wise and Lovell (2013) reviewed the ability to track and obtain accurate infection rate data from dialysis units within the United States. The belief was the use of electronic health records would bolster the ability to provide timely reporting of patient infections and identify units with a higher than expected infection rate. Concerns were noted on the need for accurate reporting at the unit level to validate clinic performance and improve patient outcomes
through systematic validation (Wise & Lovell, 2013). Expert nephrology nurses understand the need for accurate reporting and transparency for infection rates. It is through accuracy that trending and needed changes can be noted and promoted.

In recent years other key aspects of nephrology care have been studied to identify patient quality care in the dialysis setting. Lindberg and Ludvigsen (2012) identified ultrafiltration rate a nursing sensitive quality indicator for hemodialysis patients receiving care in Sweden. During the hemodialysis treatment, a target fluid removal goal is set to reduce the patient’s fluid volume based on the physician orders, nurse’s patient assessment, and weight history. The researchers noted the complication of intradialytic hypotension is reduced or avoided with the accurate assessment completed by a skilled nephrology nurse (Lindberg & Ludvigsen, 2012). The monitoring of patient condition and prevention of hypotension, cramping, and syncope can be tracked and measured. The adjustment of ultrafiltration rate, the length of treatment, use of profile programs, or need for more frequent treatments are also considerations to be linked to the level of nephrology nursing experience needed to guide dialysis care. Lindberg and Ludvigsen (2012) concluded the use of ultrafiltration as an indicator to guide safer, more effective dialysis care and treatments.

The nephrology nurse must maintain vigilance during hemodialysis treatment to monitor for episodes of hypotension and hypovolemia. The measurement and monitoring of hypotension are explored by Bradshaw, Ockerby, and Bennett (2015). Defining hypotension as a decrease in systolic blood pressure by greater than 20 mmHg or a decrease in mean arterial pressure (MAP) greater than 10 mmHg is the first step in consistently reporting this quality metric. Bradshaw et al. (2015) additionally cited
hypotension presents with symptomatic and asymptomatic episodes that an experienced nurse demonstrated higher recognition and intervention rates. The significance of hypotensive events is noted in the increased episodes causing organ stunning, increase in tissue hypoxia, and increased incidence of death (Bradshaw et al., 2015). The researchers theorized using reduction of hypotensive episodes as a quality indicator would also decrease complications experienced from hypotensive events (Bradshaw et al., 2015). Expert nephrology nurses do realize the incidence of any ill effects from dialysis treatment will impact the patient’s quality of treatment and adherence to dialysis prescriptions.

Patient safety is an important aspect of quality care. The goal of nephrology units and dialysis units is to maintain safe patient care while achieving high quality outcomes. This reflects the promotion noted with the National Patient Safety Goals (NPSG) established through the Joint Commission (2016). The safety culture in the unit is fostered by experienced leadership and expert nephrology nurses (Ulrich & Kear, 2015). The need to start at the unit level, provide consistent messaging, education, and support to the healthcare providers is essential to make goals into reality for dialysis patients.

**Quantitative cross-sectional research.** There were various methods and designs identified within the peer reviewed articles and dissertations. Quantitative research studies are preferred when measurable data is needed to recognize the effect between groups of data (Cody, 2013). The cross-sectional design method was used when because the independent variables could not be manipulated and view data at a specific time period (Gavin, 2008). The use of the cross-sectional method is also used as a predictive model. The cross-sectional design was identified as being able to manage large amount
of variables within a population group. This study and method approach was in alignment with the research of shortage of expert nephrology nurses and consequences or outcomes of patient quality care indicators.

Leone et al. (2015) used the quantitative cross-sectional study to develop a forecast type model to find a relationship between the expert nephrology nurse and patient care outcomes. The use of the research and method design supports the ability of managing multiple independent and dependent variables to conduct a study. Aiken et al. (2002) conducted another cross-sectional study exploring hospital nurses, odds of burnout and job dissatisfaction, and then relating it to higher patient loads. Both studies managed multiple participants, many variables, and conducted surveys to obtain data.

The quantitative cross-sectional study has the ability to identify relationship but not necessarily causality. A cross-sectional study of hospital nurses in the Netherlands noted linking relationships with peers, physicians, and leadership as key reasons for remaining in their job role (Van Bogaert et al., 2013). Thus a relationship was noted between the dependent and independent variables but was not able to verify it was the determining factor or causation for nurses remaining in their position. Another cross-sectional research study focused on the older nurse. Letvak et al. (2013) study noted older nurses with higher body mass index, higher pain score, and higher health related complications than younger nurses. The cross-sectional design promoted the ability to manage the data from over 1100 nurses, various ages, various hospital units, and specialty nursing practice. The review of the independent and dependent variables within the cross-sectional study made relevant connections to the target population.
Theories

Novice to expert nursing theory. This dissertation used Patricia Benner’s Novice to Expert Nursing theory to guide the definition and identification of the nursing expert. Patricia Benner’s theory classifies the various stages of nursing skill and experience. Novice is the first stage in the theory. The nurse’s thoughts are rule driven and ridged in the interpretation of patient data. The second stage is advanced beginner. In this stage, the nurse begins to notice and recognize the application of theory and prior experiences for use in new situations. Competent is the third stage occurring after two to three years in the same or similar nursing job. At this stage, the nurse is consciously aware of decisions and thinks of long term implications. The fourth stage is proficient and nurses at this level recognize whole situations and adjusts care based on past experience however they lack the intuitive ability of the expert. The fifth and final stage is expert and encompasses the immense and total understanding of the situation. This nursing theory was developed from the Dreyfus model (Benner, 1984).

The Dreyfus model of skill acquisition applied to nursing. The Dreyfus model was used for Benner’s theory, which is identified as both an inductive and deductive model (Meleis, 1991). Dreyfus (2004) five stages are novice, advanced beginner, competence, proficiency, and expertise. The Dreyfus model is a model providing detailed information on the development of a novice being transformed through time and education to the level of expert (Benner, 2004). This model will not be used to define expertise in nursing but is included to support and solidify the use of Benner’s nursing theory.
**Watson’s theory on caring.** While Benner’s work sought to focus in on the scientific aspects of nursing, it did seek to encompass the nursing caring demonstrated by the expert nurse. Jean Watson’s Theory on Caring provided a greater vision of what and how an expert clinician can impact the patient through a systematic approach combining the nursing art and nursing science. Watson views the human illness or disease process as a state of disharmony with the nurse’s job to assist the patient to return to a level of balance or equilibrium (Watson, 1996). The renal patient is often viewed in a constant of imbalance due to the lack of kidney function. Watson’s theory guides the practitioner to provide a foundation to manage the complex care and maintain a level of compassion for the human being.

**Gaps in Literature**

The current literature obtained through search engines and literature reviews has not provided sufficient information regarding expert nephrology nurses, the anticipated shortage, and its consequences or outcomes on patient quality care indicators. There is little discussion on the need to retain them in the clinical environment. Research was limited on statistical data and observations regarding the impact of the shortage of expert nurses, loss of nursing experts, and its relationship to patient outcomes. Current literature available does not reveal the cost of training nurses to become experts nor an agreed upon timeline needed to obtain expert status. The literature did not identify the ideal ratio of nurse expert to novice nurses, or if expert clinicians maintain their expert status as advancing age occurs (nurses over 70).
Summary

Chapter two reviewed the literature pertaining to the shortage of nursing experts in nephrology and if this shortage of experts in nephrology affects consequences or outcomes in patient care. Focus on the retention of expertise of nurses in nephrology, expert status description, skill mix effect, organizational thoughts about experts, accommodations that may be needed to keep older expert nurses, and management of older workers were included in the review.

Chapter three reviews the quantitative cross-sectional method planned for the study surrounding shortage of nephrology nursing experts and the consequences or outcomes on patient quality care indicators. The overview of the (a) research method, (b) appropriateness of the design, (c) research question, (d) sample, (e) informed consent, and (f) confidentiality. Additional topics include the data collection, validity, reliability, and data analysis of the collected research data.
Chapter 3

Methods

The purpose of this quantitative cross-sectional study was to predict the consequences and outcomes of the shortage of expert nephrology nurses on patient quality care indicators. This is a non-experimental observational quantitative design and was chosen because of its alignment with the proposed data studied. The cross-sectional design method is used when independent variables cannot or should not be manipulated (Gavin, 2008). The use of the cross-sectional method is also used as a predictive model. The review of the variables within the study group did make relevant connections to the target population (Vogt, 2007). When interpreted correctly the method provides a relevant contribution of data pertaining to the expert nephrology nurses consequences or outcomes on patient quality indicators.

The cross-sectional method is a descriptive approach and does not provide cause and effect only the degree of relationship between variables (Steinberg, 2011). For example, the relationship between years of experience in nephrology nursing often aligned with the level of expertise in the specialty; however, there are tenured nurses that do not attain expert status within the specialty. The establishment of variable relationships is not perfect (Gavin, 2008). Using this example, the researcher looked for observable data between years of experience and nursing expertise to prove or disprove the hypothesis. The data obtained through a convenience sample included all variables of interest to increase the accuracy of the data analysis (Gavin, 2008).

Chapter three includes an in-depth review of the research methodology and contains the following sections: research method and design appropriateness, research
questions, sampling, informed consent and confidentiality, data collection, internal and external validity, reliability, and data analysis. It begins with research method and design appropriateness for planned use of the quantitative cross-sectional research method. The planned population, sample size, and sample criteria are included within this section. Data analysis interpretation methods, survey use, and ethical considerations are also part of the Chapter three discussion. The planning and implementation of the well-designed research project enables future individuals to reproduce the study.

**Purpose and Research Questions**

The purpose of this quantitative cross-sectional research study was to look at the shortage of the expert nephrology nurse and the consequences and outcomes on patient quality indicators. The study focused on the expert nephrology nurse, years of experience, educational level, certification status, and age group coupled with patient quality care measurements currently reported by the Centers for Medicare and Medicaid (2016) as indicators of quality dialysis care. The study of the shortage of expertise in nephrology nursing and the consequences or outcomes on patient quality care indicators was warranted. The reduction of experienced nurses takes with it the knowledge and skills of specialty practice (Benner, 1984). The following questions assisted the understanding the impact of the shortage of expert nephrology nurses, its consequences or outcomes on patient quality care indicators, and encouraged thoughts about aging nephrology nursing professionals. Two research questions helped guide the study.

1) What is the relationship between the shortage of expert nephrology nurses and patient quality care indicators?
2) What is the relationship between the skill mix in the dialysis unit (lack or percentage of expert nephrology nurses) and the effect on patient quality care indicators?

**Hypotheses**

The null hypothesis for R1 and R2 identify no statistically significant relationship related to the shortage of expert nephrology nurses.

\[ H_0 \text{- There is no statistically significant relationship between the shortage of expert nurses in nephrology and the effect on patient quality care indicators.} \]

\[ H_{A1} \text{- There is a statistically significant relationship between the shortage of expert nurses in nephrology and the effect on patient quality care indicators.} \]

\[ H_0 \text{- There is no statistically significant relationship between the skill mix in the dialysis unit (lack or percentage of expert nephrology nurses) and the effect on patient quality care indicators.} \]

\[ H_{A2} \text{- There is a statistically significant relationship between the skill mix in the dialysis unit (lack or percentage of expert nephrology nurses) and the effect on patient quality care indicators.} \]

**Method Design and Appropriateness**

Quantitative cross-sectional research is used by researchers to view and interpret the data variables and avoid manipulation of the information. It is a method that identifies observed trends and examines data patterns (Steinberg, 2011). The quantitative cross-sectional method brings in data from nurses and leadership providing data regarding skill level of nurses (Roberts, 2010). The method drew data from publicly reported patient care quality indicators identifying the dependent variables: vascular access type, anemia management, mineral bone disease, hospitalization readmission rate,
and mortality rate. The completed surveys by administrators of chronic dialysis units provided the independent variable information: years of nursing experience, years of nephrology experience, level of education and certification status.

There is a noted shortcoming with non-experimental research methods. True causality relationships can only be obtained through an experimental approach (Gavin, 2008). It is more effective with data that is objective or represents quantity (years of service, age, money) and not for qualitative or subjective in nature (likes or dislikes) (Gavin, 2008). Correlational data is expected to be linear in nature relating changes in one variable to effect changes in another variable as shown through graphs (Gavin, 2008; Steinberg, 2011). Cross-sectional approach also is limited in the moment in time from which the data are collected. These potential problems are discussed upon review of the data and interpretation of the statistical information in chapter four.

Esparaza (2010) used the quantitative cross-sectional research study method and design in the dissertation. The study allowed an examination of the relationship between the leadership, the organization and the skill mix of nurses in the medical surgical setting. This ability to look at multiple data points within the quantitative study process is considered a strength of the cross-sectional study approach. In addition, Staggs and Dunton (2012) chose the method to conduct their own research relating to nurse job satisfaction, nurse turnover and the nurse’s decision to leave an organization.

The use of the quantitative cross-sectional method provides all researchers the ability to pull in multiple variables, maintain neutrality in data collection and review a large amount of information (O’Dwyer & Bernauer, 2014). McHugh and Lake (2010) investigated the clinical expertise and nursing education in their cross-sectional study.
The independent variables included individual nurse expertise including their educational background and experience level, paired with the dependent variable of practice environment. Through the use of logistic regression, the researchers determined a strong predictor between the level of education and experience influencing being viewed as an expert nurse (McHugh & Lake, 2010). The study provided substantiated data on the importance of nursing education and training within the healthcare environment.

The quantitative cross-sectional research method is a non-experimental design used to study phenomena (O'Dwyer & Bernauer, 2014). Keyser (2011) conducted a research project using the quantitative method to identify the rate of job satisfaction of dialysis nurses in the outpatient setting and their intent to remain in their jobs. The quantitative cross-sectional design enabled the data from the target population to be brought together. This research design allowed for the examination of relationships between the variables with no predetermined outcomes identified (Steinberg, 2011). The quantitative method was an appropriate choice for investigating the problem with the shortage of expert nurses in the nephrology specialty to provide measurable data on the relationship to patient quality care indicators.

This research study was intended to collect data regarding the expert nephrology nurse and patient quality care indicators. The establishment of relationships between independent and dependent variables, review of data trends, and testing of hypotheses did ensue. The quantitative methodology approach allowed the review of data, result in statistical correlations, and potentially identify areas of significance (Staggs & Dunton, 2012).
A qualitative design was not chosen because the method is meant to explore the lived experience, not provide statistical data, and does not test hypotheses (Bloomberg & Volpe, 2012). The qualitative approach is also more interpretive based on the subject studied, the participant’s responses, information collected, and the researcher’s proficiency in analysis. For example, in the area of nephrology nursing the participant’s knowledge, experience and potential bias regarding the expert nephrology nurse may impact results. The qualitative approach would not have statistical significant data on the potential consequences or outcomes between patient quality care indicators and the shortage of expert nephrology nurses in the chronic dialysis unit setting. This proposed research study did assist in identifying opportunities for future qualitative research focusing on loss of expert nephrology nurses phenomena discussed in chapter five.

**Population/ Geographical Location**

The accessible population for this study was 121 chronic dialysis clinics (also referred to as In-Center dialysis centers) within Ohio in the United States. These units employ registered nurses of all ages, skill level, and years in the nephrology currently working in the dialysis specialty. Nurses working within the chronic dialysis unit, often provide dialysis care in the hospital dialysis unit and the home dialysis units. The unit administrators were surveyed to identify the nursing skill mix and demographics of the unit and the information was included in the sample study protocol (Appendix A).

**Sample**

This was a convenience sample of chronic dialysis units in the state of Ohio. It included information on currently employed nephrology nurses working in the specialty. Data were obtained through survey method of the Ohio dialysis unit administrators
through an email notification from a nursing specialty organization. The target population had a total available Ohio chronic dialysis units for this quantitative cross-sectional study estimated at approximately 197 dialysis units within the state. This number of chronic dialysis units was obtained through the Centers for Medicare and Medicaid listing. The sampling frame was chronic dialysis units in the state of Ohio. Those accessible for survey were reduced to 121 dialysis units based on inclusion and exclusion criteria.

**Inclusion and exclusion criteria.** Inclusion criteria for the purposes of this research study include the following:

1. Active dialysis unit.
2. Unit has been in operation minimum two years (for CMS QIP historical data to be available).
3. Unit employs a minimum of two registered nurses.
4. Unit has publicly reported data on the ESRD Quality Incentive Program website.
5. Administrator or manager has access to email.
6. Unit is within the state of Ohio in the United States (Williams, 2014).
7. Administrator has the ability and desire to complete surveys for project (Keyser, 2011).

Exclusion criteria for the purposes of this research study:

1. Less than two registered nurses working at the unit.
2. Administrator not interested.
3. Administrator not able to complete survey.
4. Unit not in the state of Ohio.
5. Units have not been in existence for two or more years.
6. Patient outcomes not reported to the ESRD Quality Incentive Program website.

**Sample size calculation.** The Centers for Medicare and Medicaid (2015) identified 197 chronic dialysis units in the state of Ohio. This was the target population for the research study. The accessible population was reduced to 121 chronic dialysis units in the state of Ohio based on exclusion criteria established for unit participation in the study.

Sample size relevance is important for research studies. Hairre et al. (2014) correlational research study involved 70 participants in the convenience sample of registered nurses that identified sample size concerns based on the estimation of over 3 million registered nurses. Williams (2014) used a convenience sample of 215 special education teachers from a local Alabama school system resulting in 65 participants. Bates (2013) sample size of 96 with a 95% confidence level was calculated based off a population of 185,000 but resulted in only 60 participants. Gabriel, Erickson, Moran, Diefendorff, and Bromley (2013) study distributed the Practice Environment Scale of the Nursing Work Index (PES-NWI) to 1,702 participants and received 762 responses (44%). Calculation of correct sample size is achieved through analysis.
A power analysis using G*Power3 software was conducted to determine the appropriate sample size for the study. With F tests, linear multiple regression fixed model statistical test, a priori power analysis, a medium effect size (f=0.15) based on Cohen’s standard (Cohen, 1998), alpha 0.05, and 121 as the number of predictors, the result of the power analysis indicated a total sample size of 34 chronic dialysis centers was required to achieve a power of 0.95. This was determined by using the following input parameters: One tail test, effect size (p) 0.5, α err prob 0.05, Power (1-β err prob) 0.95. Output parameters resulted Noncentrality parameter δ 3.3665016, Critical t 1.6938887, Df 32, total sample size 34, and actual power 0.9504455. This provided for adequate data in the descriptive or observational study method. Therefore, at least 34 chronic dialysis centers were sought for the study.

Adequate planning for survey response rate was built into the needed sample size. Wray, Aspland, Gibson, Stimpson, and Watson (2008) study distributed 2610 surveys and 510 were returned resulting in a 20% response rate. Williams (2014) correlational study among special education teachers focused on burnout and retention yielded a 30% survey response rate. The average rate of survey response will reduce most sample sizes to less than 50% of those contacted (Baruch & Holtom, 2008).

In order to assure a minimum of 34 chronic dialysis units the initial planned surveys were sent to over 121 dialysis unit administrators via the nursing specialty organization email communication and planned for a response rate of 30% or better. Additionally, there was potential for sampling error with the convenience sample not providing a true representation of the chronic dialysis units within the state of Ohio. For
example, if only units owned by a one company, or smaller sized, rural location, or one region within the state of Ohio responded it would alter the findings associated with the research of expert nephrology nurses consequences or outcomes on patient outcome quality indicators.

Eaton-Spiva et al. (2010) research study on nursing practice environment and the aging nursing population used the PES-NWI survey method. In this study, the standard deviation (SD) varied from 0.44 (favorable) for nurse participation in hospital affairs to 0.77 (unfavorable) for nursing management. The nurse-physician relationships resulted in the lowest mean, 2.54 and the leadership/support from nurses resulted in the highest mean, 3.21. Researchers asked 100 nurses from four units to participate in their survey and 46 completed the online survey portion of the study (Eaton-Spiva et al., 2014). This particular study closely aligned with the loss of expert nephrology nurses and was used as a reference to survey participation level.

Setting

The focus setting included the chronic dialysis units located in the state of Ohio within the United States. It included chronic dialysis units operated by various sized companies and independent physician-run units. The online setting was used to contact dialysis unit administrators for email invitations to complete surveys through the nursing specialty organization. The participants of the research and surveys were reached through the nursing organization database email contact listings and not through direct contact with the researcher.
Ethical and Legal Considerations

In accordance with the University of Phoenix’s Institutional Research Board requirements, the study was given the approval number of 1000180-2 to conduct research. The nursing specialty organization’s reviewed the research study alignment prior to emailing the invitation to participate to eligible members (Appendix G). Ethical and legal considerations were addressed through the use of full disclosure statements, informed consents and transparency during the research process (Roberts, 2010). The professional code of ethics dictates no avoid harm of participants and in this nonexperimental research study, no anticipated exposure or risk was identified for survey responders (Vogt, 2007). Additionally, required courses regarding proper ethics, professional behavior, and the history of research are completed prior to approval to conduct research. Proof of Collaborative Institutional Training Initiative (CITI) participation is maintained by the University of Phoenix.

Informed consent. Participants were contacted by the nursing specialty organization’s national office through an email communication on behalf of the nursing researcher. Additional follow-up, emails, or mailing were not sent by the researcher directly to members unless it was requested by participant. Participants were supplied with the email and phone contact information regarding questions and concerns. The email contact information was only maintained on the secure computer with maintained password protection. Email communication was not printed or downloaded to any other device. Email contact information was only used for this research project and not shared with any entity or individual.
Volunteers that chose to participate in the study were provided an informed consent form to review and to attest to electronically within the Survey Monkey application. The invitation to participate letter included the purpose of the research, items to be studied, identification of researcher conducting the study, potential benefits to individual or profession, and assurance of no anticipated risk to the participant, and reassurance of confidentiality (Locke, Spirduso, & Silverman, 2014). Participants were informed of the right of withdrawal from the study, given the contact information of the researcher, and reinforcement that inclusion in the study was voluntary and not compulsory (Appendix C).

**Confidentiality.** Confidentiality was achieved through the use of a secured website, survey tools, and email (Roberts, 2010). A statement of confidentiality in the informed consent was provided with the survey to all participants. The respondents were encouraged to complete surveys in a quiet and secure environment to promote and provide privacy. Surveys were without personal identifiers. The Internet Service Provider (ISP) of the respondents was turned off in the setting of Survey Monkey to avoid identification of respondents. Questions and answers were written to avoid personal identifying information from being disclosed. The goal of collecting the information was to retain confidentiality while promoting a rich collection of data. Results of surveys were compiled and maintained on a computer with an active password lock and data backup drive during the duration of the research study. Digital files were password protected and were erased, paper documents shredded, and recordings destroyed upon completion of the dissertation study. All survey information was deleted from the computer and backup drive and information securely removed.
**Data Collection**

The first method of data collection, the Nursing Demographic Survey, was conducted after approval of the University of Phoenix Institutional Review Board. Recruitment for participants occurred via a notification email through the specialty nursing organization. The specialty nursing group maintained a list of active members, including type of employment, and job role within nephrology practice. Administrators of the Ohio chronic dialysis units were the focus audience for the survey method. Four weeks were allotted for participants to respond to the survey. Participants electronically acknowledged an informed consent within the Survey Monkey application prior to collection of any data. Survey Monkey was used to conduct the survey via electronic survey method.

Data collection began after approval of the University of Phoenix Institutional Review Board and the nursing specialty organization’s acceptance and review of alignment of research study. The survey letter contained the embedded Survey Monkey link and was emailed to administrators of Ohio dialysis units through the nephrology nursing specialty organization notification process. The planned number of surveys was 121 with the anticipated return of 20%-50%. Last date to respond to survey was four weeks after the start date of the survey. The responses were reviewed in the order they were received. ESRD Quality Incentive Program information for the month’s prior data time period was retrieved from the correlating dialysis units for data analysis of the patient quality indicators.

The second data collection process consisted of information from the Centers for Medicare and Medicaid Quality Incentive Program. The patient quality care indicators of
adequacy of dialysis (Kt/V), access type, hypercalcemia, infections, hospitalization rate, phosphorus control, and anemia management were reviewed. Data for Ohio chronic dialysis units identified in the Nursing Demographic Survey were collected in the month of June 2017. This aligns in dates for examination of nursing demographic data. July 2017 CMS data were not included due to the lag time between collection of data and reporting timeframe. Administrators of the dialysis programs have until the 10th of the following month to provide data, and with this delay, often the previous month’s data is not complete until the end of the current month.

Data were only obtained during the four week survey collection process. Data were collected and analyzed after close of survey. Records were kept on encrypted and password protected laptop. Upon completion of the research study and acceptance of completed dissertation, the collected survey responses were permanently deleted from the computer.

**Instrumentation**

Validity and reliability in quantitative research focuses on succinct measurable tools for instrumentation. The choice included surveys that gathered the needed key indicators through a series of questions. Additional metrics were gathered through already established data collection agencies providing evidence of consistent measurement of data. In this study, the Centers for Medicare and Medicaid Quality Incentive Program provided consistent measurement of patient quality indicators. Both of these were used for this quantitative cross-sectional study.

**The ESRD quality incentive program (QIP).** This program is maintained by the Centers for Medicare and Medicaid with the goal of promoting high-quality patient
care to patients afflicted with renal disease. It provides publicly reported data on unit performance and patient quality metrics established by the National Kidney Foundations Disease Outcomes Quality Initiative (NKF-KDOQI) (Centers for Medicare and Medicaid, 2015). All chronic dialysis, home dialysis, and nocturnal dialysis programs measure their patients’ outcomes based on NKF-KDOQI. Metrics for individual units, regions, divisions, and national teams are available and tracked on a weekly basis with final data published the first week of every month.

The nursing demographic survey. The survey method was the primary means of obtaining demographic information. The survey identified: (a) age, (b) years of nephrology experience, (c) nursing tenure, (d) education level, (e) certification, and (f) staffing skill mix (Appendix A). The survey was adapted from the United States Demographics survey, the Department Performance survey, and Team Performance survey templates located on Survey Monkeys website within the tools section. The survey consisted of nine items and be administered through Survey Monkey.

Internal and External Validity

The use of supported survey methods improved validity and reliability of the data collection (O'Dwyer & Bernauer, 2014). Reliability provides the ability for another researcher to reproduce this study by using same instrumentation to collect data and obtain results. Validated survey questions from the Survey Monkey website should increase reliability, reproducibility, and clarity with the participants/unit survey responses.

The Centers for Medicare and Medicaid have collected dialysis patient quality indicators and outcomes for over a decade. Currently, the ESRD Quality Incentive
Program (QIP) has been used to monitor and track patient outcomes in dialysis units throughout the United States (Centers for Medicare and Medicaid, 2015). These measurements are taken from the Kidney Dialysis Outcomes Quality Indicators (KDOQI) guidelines established by the National Kidney Foundation. Through years of work, these patient measurements were proven as a valid predictor of mortality and hospitalization of the dialysis dependent patient through review of patient data (Van Wyck, Robertson, Provenzano, McAllister, Levine, Goykhman, & Nissenson, 2009). The clinical outcomes have effectively focused on patient safety practices and standardization of dialysis services upon review of all patient data (Brady et al., 2012). It provides a consistent measure of clinical patient outcomes.

Survey responses were cross checked and verified through public websites listing chronic dialysis units. The number of staff at the unit, the number of chairs, hours, location, and date of operations are listed for consumer information. No follow up emails to administrators regarding dialysis units were done to clarify any outliers or inconsistencies in reported information.

Data Analysis

A quantitative cross-sectional study is an observational design to examine or describe events that are occurring or have occurred in the past (Fink, 2015). In this study, a simple linear regression analysis was used to predict outcomes on the consequences of the shortage of expert nephrology nurses on patient outcomes. A convenience sample was completed. The hypotheses were tested using $r$ to compute the $t$-value checking against the $t$ distribution. In this approach, null hypothesis is $r = 0$ (Gavin, 2008). The
determination of a statistically significant relationship was achieved through the use of simple linear regression.

The data collected from the Nurse Demographic Survey occurred after approval from the University of Phoenix Institutional Review Board. The nursing specialty’s organization reviewed the University’s approval and accepted the proposal. The Centers for Medicaid and Medicare Quality Incentive Program reportable data for the most current month, June 2017, was used in the comparison. The intention was to compare the experience level of the registered nurses and tenure within the chronic dialysis units and the consequences or outcomes to the reported patient quality care indicators. A comparison between different units based on the number of expert nephrology nurses present or years of experience within the unit were compared to units that lack expert nephrology nurses or tenured staff. This information was then used to compare the following variables:

1. Years of experience/tenure of registered nurses.
2. Years in nephrology nursing.
3. Level of education.
5. Patient quality care indicators listed by Centers of Medicare and Medicaid Quality Incentive Program.
   a. Vascular access type.
   b. Anemia management.
   c. Mineral bone disease.
   d. Hospital readmission rate.
e. Mortality rate.

The plan was to determine if there may or may not be consequences to patient quality care indicators or patient outcomes when there is a shortage of nephrology nursing experts in the unit. Chronic dialysis units with expert nurses performance in reported patient quality care indicators were compared to units without identified expert nurses. Percentages of tenured staff and experience were identified among the dialysis units as a comparison factor driving patient outcomes.

Statistical Package for the Social Sciences (SPSS) (2015) and Microsoft Excel was used for data synthesis. The examination of data included descriptive and inferential analysis. Coding identification specific to the survey participants/units was present with the data. This coding allowed for maintenance of confidentiality and the ability to easily view respondent data without loss of unit and administrator anonymity.

**Summary**

The purpose of Chapter three was to cover the methodology for loss of nephrology nursing experts. The Nephrology Nurse Demographic Survey and the Centers for Medicare and Medicaid Quality Incentive Program were the main sources of data. The quantitative cross-sectional study of loss of nursing experts in the nephrology specialty did provide data to identify the consequences or outcomes the expert nephrology nurses on patient quality indicators. The narrowed examination of expert nephrology nurses sought to identify specific trends in nephrology nursing experts. The goal was to obtain reliable data representing this nursing specialty and translate those identified areas to other nursing groups. Chapter four includes a presentation of the study findings and a review of the data analysis. The results may assist to understand and
interpret the connections, consequences or predict the future consequences or outcomes of the shortage of expert nephrology nurses on patient quality care indicators in the chronic dialysis unit setting.
Chapter 4

Results

This chapter presents the analysis of data, description of the sample, and the findings of the study. The quantitative cross-sectional study examined expert nephrology nurses and their consequences or outcomes on patient quality care indicators. This design used to conduct this study focusing on the chronic dialysis unit setting. The participating dialysis units in Ohio were the target population. The purpose of this quantitative cross-sectional study was to predict the consequences and relationship of the shortage of expert nephrology nurses on patient quality care indicators. Data were collected by survey of chronic dialysis unit administrators and from reported patient quality indicators. Data analysis statistically significant results supporting the need for expert nephrology nurses within the chronic dialysis units. Chapter four reviews the data collection procedure, data collection, data findings, and data analysis.

Data Collection Procedure

The use of a Nursing Demographic Survey was the first instrument used to collect data on the nurses employed within the chronic dialysis units. The experience and expertise of the nephrology nurse within the chronic dialysis units in the state of Ohio was the focus. The independent variables measured included: (a) years of nursing experience, (b) years in nephrology nursing, (c) educational level, (d) certification in nephrology nursing, and (e) age of 50 years or older.

The second instrument was the Centers for Medicare and Medicaid Quality Incentive Program used to report patient quality indicators. The dependent variables measured included areas of: (a) anemia, (b) dialysis adequacy, (c) vascular access type,
(d) calcium, (e) phosphorus, (f) mortality, and (f) hospitalization rate listed through the publicly reported data. The goal was to identify a connection between the shortage of expert nephrology nurses and potential consequences or outcomes to the patient quality care indicators. Chapter four presents the results of the data analysis and subsequent findings.

The level of nephrology nursing expertise and nursing skill mix in the dialysis units was collected through survey of the unit administrators through email notification from the nursing specialty organization. This information was then used while reviewing the dialysis unit’s data on patient quality care indicators, which are publicly reported by all dialysis units, through the Centers for Medicare and Medicaid Quality Incentive Program. The measurements focused on: (a) the anemia management, (b) albumin level, (c) dialysis adequacy, (d) access type, (e) hospitalization rate, and (f) mineral bone metabolism data (Appendix F). A comparison of units with a higher percentage of nephrology nursing experts’ verses those with a lower percentage ensued. Key survey items such as years in nursing, years in nephrology, level of education, and certification were paired with reported patient quality indicators with some interesting relationships.

Data Collection

The Nursing Demographic Survey was sent to 121 Ohio chronic unit administrators (participants) through the nursing specialty organization email distribution list. A total of 34 administrators from the chronic dialysis units completed the survey. Information regarding a total of 128 registered nurses currently working at the 34 Ohio chronic dialysis units was collected. The questions identified: (a) the number of nurses, (b) their education level, (c) experience as registered nurses, (d) experience as nephrology
nurses, (e) certification status, and (f) if the nurse was 50 years or older. The highest level of educational reported for the nurses included: (a) 73 Associate degrees, (b) 41 Bachelor degree (BSN, BA, and BS), (c) 9 diploma, and (d) 5 Master degree (MSN, MHA, MBA). The number of nurses certified in nephrology nursing was 14 (10.9%) out of the 128 identified registered nurses. This number was lower than expected based on the reported experience level within the dialysis units. The last question on the survey was to identify the administrator’s opinion on experience level within the dialysis unit.

This demographic information was grouped into two categories for the chronic dialysis units. First units with a higher level of experienced and educated nurses and second units with lower levels of experienced and educated nurses. Most of the participants identified that 2-5 registered nurses worked in the dialysis clinic and within these clinics a mix of experience levels, and educational degrees status existed.

The second source of data were obtained from the Centers for Medicare and Medicaid Quality Incentive Program. The patient quality care indicators are publicly reported each month by all chronic dialysis programs. The administrators identified the 34 chronic dialysis units they managed in the demographic survey. These 34-chronic dialysis unit’s patient quality care indicators were obtained for review.

The June 2017 data were used for the purposes of comparison. The uses of previous month’s comparison data were chosen to identify consistency and trends within the units reported patient quality care indicators. The difference in dates for examination of data was due to the lag time of the publicly reported patient quality care indicators collected by the Centers for Medicare and Medicaid. Administrators of the dialysis
programs have until the 10\textsuperscript{th} of the following month to provide data, and with this delay, often the previous month’s data is not complete until the end of the current month.

\textbf{Data Analysis}

The International Business Machines Statistical Package for the Social Sciences (SPSS) version 24 was used to analyze the collected independent and dependent variables for the research study. It was used for the basic summary of the statistics with incorporation of p-value to determine the statistical significance of the data collected. Descriptive statistics were used for the analysis. The Nursing Demographic Survey was conducted and completed in July of 2017. The information was gathered and categorized to be compared with the publicly reported data on the Centers for Medicare and Medicaid Quality Incentive Program. Comparison was made for total years of nephrology nursing experience. Units with higher levels of experience were compared with units of lower experience.

Data analysis consisted of using reported level of experience and education levels of the chronic dialysis units and subsequent key areas of Centers for Medicare and Medicaid Quality Incentive Program data. Using the quantitative cross-sectional study allowed for the examination of past events including the reported patient quality data, the reported nursing years of experience, and education level. Reliabilities were calculated using Cronbach’s Alpha resulting in a positive (or direct) reliability coefficient of .012.

A simple linear regression analysis was conducted on the patient quality indicators and was used to predict outcomes on the shortage of nursing experts on the collected convenience sample. The units were split into two categories by using the mean nephrology nursing experience of 9.968. Units with average years in nephrology
nursing less than 9.9 were compared to those with 9.9 or more. The 13-identified patient quality care indicators were run for comparison.

**Demographic data.** The Nursing Demographic survey was completed after four weeks. A total of 34 chronic dialysis administrators participated in the survey process. The number of participants solicited was 121, making the survey participant rate 29% (n=35). These administrators provided the needed information regarding the 128 registered nurses providing and managing care with the chronic dialysis unit. There were no missing data items, all entries were completed and contained information on their current registered nurse staff. There was a noted similarity of many units with the number of registered nurses staffing these units as few as two and up to seven individuals. Only two-unit administrators reported eight or more registered nurses working at the chronic dialysis units. Majority of units were part of large dialysis companies (29) with the remaining units (5) either smaller companies or physician owned/managed units. This information is readily identified when viewing the Centers for Medicare and Medicaid Quality Incentive Program data sheets.

Experience level within the dialysis units was noted to have a vast difference in years as a registered nurse (Table 1) and years in the nephrology specialty (Table 2). The years of nursing experience ranges from one year in nursing up to 43 years in nursing. The mean was 14.945 with a standard deviation (SD) of .67. The reported experience level in nephrology nursing was minimum zero with a maximum of 30. The mean was 9.968 with a standard deviation (SD) of .15.
Table 1.

*Years of Registered Nurses Experience within Participating Chronic Units*

<table>
<thead>
<tr>
<th>N</th>
<th>Mean</th>
<th>Median</th>
<th>Mode</th>
<th>SD</th>
<th>Range (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>128</td>
<td>14.94</td>
<td>13.00</td>
<td>7.0</td>
<td>.67</td>
<td>1-43</td>
</tr>
</tbody>
</table>

Table 2.

*Years of Nephrology Experience of Nurses within Participating Chronic Dialysis Units*

<table>
<thead>
<tr>
<th>N</th>
<th>Mean</th>
<th>Median</th>
<th>Mode</th>
<th>SD</th>
<th>Range (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>128</td>
<td>9.96</td>
<td>7.00</td>
<td>5.00</td>
<td>.15</td>
<td>0-30</td>
</tr>
</tbody>
</table>

Educational level within the chronic dialysis units was varied (Table 3). The registered nurses possessing an associate degree (AD) in nursing constituted the largest group at 57% or 73 nurses. Those registered nurses with a bachelor degree was 32% or 41 nurses. This grouping included Bachelor of Science, Bachelor of Science Nursing, and Bachelor of Arts identified in the Nursing Demographic Survey. Registered nurses with a diploma in nursing degree was 7% or 9 nurses. The remaining 3.9%, or a mere 5 nurses, held a master degree. These five nurses listed Masters of Nursing Science, Masters of Hospital Administration, and Masters in Business as their degree focus. The number of master degree prepared nurses, or the noted lack of master level degree within the sample units is a point of discussion in chapter five.
Table 3.

Highest Educational degree of Nurses within Participating Chronic Dialysis Units

<table>
<thead>
<tr>
<th>Educational degree</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associate</td>
<td>73</td>
<td>57</td>
</tr>
<tr>
<td>Bachelors</td>
<td>41</td>
<td>32</td>
</tr>
<tr>
<td>Masters</td>
<td>5</td>
<td>3.9</td>
</tr>
<tr>
<td>Diploma</td>
<td>9</td>
<td>7.0</td>
</tr>
</tbody>
</table>

The next question on the survey was to identify those age 50 years or older with this being based on the average age of registered nurses at 50 years or older (Rosseter, 2014). It potentially had the ability to identify units at risk (if high number of the nurses were over age 50) to experiencing a shortage of expert nephrology nurses within 10-15 years. The reported number of nurses as 50 years or older within these surveys was 36 (28.1%) which was lower than expected based on the average age of the registered nurses being 50 years or older (Table 4).

Table 4.

Nurses age groups; 50 years or older & under 50 years within Participating Chronic Dialysis Units

<table>
<thead>
<tr>
<th>Age</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 years or older</td>
<td>36</td>
<td>28.1</td>
</tr>
<tr>
<td>Under 50 years</td>
<td>92</td>
<td>71.9</td>
</tr>
</tbody>
</table>

The certification status for registered nurses within the participating chronic dialysis units was noted to be low (Table 5). Out of 128 registered nurses within the 34
chronic dialysis units, only 14 possessed certifications. This translates into 10.9% of the nurses pursued and passed the certification test. This was considered lower than expected with current standards moving toward advancing degrees, certification, and clinical ladder promotion within the nursing specialty practice. Discussion on certification importance and status is continued in chapter five.

Table 5.

Certification Status of Nurses within Participating Chronic Dialysis Units

<table>
<thead>
<tr>
<th>Certification</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certified</td>
<td>14</td>
<td>10.9</td>
</tr>
<tr>
<td>Not Certified</td>
<td>114</td>
<td>89.1</td>
</tr>
</tbody>
</table>

The last question of the Nursing Demographic Survey asked the administrator ‘Do you believe that the level of experience in registered nurses impacts patient care outcomes in the dialysis setting’. The majority, 32 out of 34 participants (94.1%), said yes, that they did believe it impacted the patient care outcomes. This may signal a belief or direct experience of seeing expert nephrology nurses making an impact on the patient quality indicators within the chronic dialysis unit setting.

Quality incentive program data. The Centers for Medicare and Medicaid Quality Incentive Program (CMS QIP) was reviewed for the 34 chronic dialysis units identified in the Nursing Demographic survey. The survey asks for the unit’s name as it is identified in the Quality Incentive Program. There was missing patient quality indicator data from some centers within the survey. This information was used for direct comparison of those units with the level of experience, education, and certification status.
of the registered nurses employed in the setting. The use of the subsequent tables better illustrate the information gathered within this study.

The Quality Incentive Program contains multiple reported metrics aligned with the National Kidney Foundations Disease Quality Initiative. The measurements were reduced to key areas pertaining to the treatment of adult hemodialysis patients (Table 6). All areas identified are measured in percentage of patients achieving the quality care indicators. The twelve areas were:

1. Anemia (patients with hemoglobin less than 10.2 g/dl).
2. Adequacy (Kt/V greater than 1.2).
3. Vascular access—percentage rate of Arteriovenous Fistulas (AVF) in use.
4. Patients with central venous catheters (CVC) longer than 90 days.
5. Hypercalcemia (calcium over 10.2 mg/dl).
6. Phosphorus less than 3.5 mg/dl.
7. Phosphorus 3.5-4.5 mg/dl.
8. Phosphorus 4.6-5.5 mg/dl.
9. Phosphorus 5.6-7.0 mg/dl.
10. Phosphorus over 7.0 mg/dl.
11. Mortality rate (facility percentage rate).
12. Readmission rate—unplanned hospital readmission (30 days or less).

These areas were chosen based on the high level of focus on each aspect and the completeness for each measurement in the Quality Incentive Program.
Table 6.

Patient Quality Care Indicators for Participating Chronic Dialysis Units

<table>
<thead>
<tr>
<th>Quality Indicator</th>
<th>N</th>
<th>Mean</th>
<th>Median</th>
<th>Mode</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hbg less than 10.2 g/dl</td>
<td>28</td>
<td>18.64</td>
<td>17.00</td>
<td>23.00</td>
<td>9.22</td>
</tr>
<tr>
<td>Kt/V greater than 1.2</td>
<td>32</td>
<td>95.50</td>
<td>96.00</td>
<td>96.00</td>
<td>2.78</td>
</tr>
<tr>
<td>AVF in use</td>
<td>32</td>
<td>67.93</td>
<td>71.50</td>
<td>45.00</td>
<td>12.32</td>
</tr>
<tr>
<td>CVC longer than 90 days</td>
<td>32</td>
<td>8.81</td>
<td>7.00</td>
<td>7.00</td>
<td>5.20</td>
</tr>
<tr>
<td>Hypercalcemia over 10.2 mg/dl</td>
<td>32</td>
<td>.75</td>
<td>1.00</td>
<td>0.0</td>
<td>.84</td>
</tr>
<tr>
<td>Phosphorus less than 3.5 mg/dl</td>
<td>32</td>
<td>7.50</td>
<td>7.50</td>
<td>5.00</td>
<td>3.03</td>
</tr>
<tr>
<td>Phosphorus 3.5-4.5 mg/dl</td>
<td>32</td>
<td>25.53</td>
<td>24.50</td>
<td>22.00</td>
<td>4.45</td>
</tr>
<tr>
<td>Phosphorus 4.6-5.5 mg/dl</td>
<td>32</td>
<td>32.75</td>
<td>30.00</td>
<td>30.00</td>
<td>5.47</td>
</tr>
<tr>
<td>Phosphorus 5.6-7.0 mg/dl</td>
<td>32</td>
<td>12.71</td>
<td>12.50</td>
<td>11.00</td>
<td>5.49</td>
</tr>
<tr>
<td>Phosphorus over 7.0 mg/dl</td>
<td>32</td>
<td>12.71</td>
<td>12.50</td>
<td>11.00</td>
<td>4.66</td>
</tr>
<tr>
<td>Mortality Rate</td>
<td>29</td>
<td>17.48</td>
<td>17.70</td>
<td>11.90</td>
<td>4.58</td>
</tr>
<tr>
<td>Readmission Rate</td>
<td>30</td>
<td>21.60</td>
<td>23.55</td>
<td>14.60</td>
<td>6.77</td>
</tr>
</tbody>
</table>

Comparison of data. The use of a linear regression analysis was used to predict the potential outcomes on the shortage of nephrology nursing experts at the chronic dialysis units. The chronic dialysis units were divided into two groups. The experienced chronic dialysis unit group contained nurses equal to or more than 14.945 years of nursing experience and equal to or more than 9.968 years of nephrology nursing experience. The inexperienced chronic dialysis units had nurses with less than 14.945 years of nursing experience and less than 9.968 years of nephrology nursing experience. Units were also divided into two groups based on educational level of the registered
nurses within the chronic dialysis units. The higher level of education chronic dialysis units contained at least one registered nurse with a bachelor or master degree. The lower level of education chronic dialysis units employed nurses with either an associate degree or diploma degree. This was based on the collected Demographic Nursing Survey data.

The dependent variables, patient quality indicators, were systematically compared with the years of nursing experience and years in nephrology nursing. These variables included: (a) hemoglobin less than 10.2 g/dl, (b) Kt/V greater than 1.2, (c) AVF in use, (d) CVC longer than 90 days, (e) hypercalcemia over 10.2 mg/dl, (f) phosphorus less than 3.5mg/dl, (g) phosphorus 3.5-4.5 mg/dl, (h) phosphorus 4.6-5.5 mg/dl, (i) phosphorus 5.6-7.0 mg/dl, (j) phosphorus over 7.0 mg/dl, (k) mortality rate, and (l) readmission rate.

The hemoglobin less than 10.2 g/dl was used as the dependent variable with nursing experience (years of nursing and years of nephrology nursing) and educational level served as the independent variables. Table 7 presents the results of this analysis. Nursing experience \( (beta=0.659; t=4.466; 95\% \ C. \ I. = -8.634 - 9.157; p=0.00) \) was significant, which means that nursing experience was associated with low percentage of patients with hemoglobin levels less than 10.2 g/dl. Education level \( (beta=0.081; t=0.416; 95\% \ C. \ I. = -0.546 - 0.862; p=0.681) \) was found not significant as an independent variable when looking at the hemoglobin 10.2 or greater in the sample group.
Table 7.

Management of Patient Quality Care Indicator Hemoglobin less than 10.2 g/dl

<table>
<thead>
<tr>
<th>Variable</th>
<th>Under standardized Coefficient S.E.</th>
<th>Std. Coefficient s Beta</th>
<th>t</th>
<th>Sig</th>
<th>95% CI Lower Bound</th>
<th>For B Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Experience</td>
<td>11.969</td>
<td>2.680</td>
<td>.659</td>
<td>4.466</td>
<td>.00</td>
<td>-8.634</td>
</tr>
<tr>
<td>Education level</td>
<td>1.508</td>
<td>3.626</td>
<td>.081</td>
<td>.416</td>
<td>.681</td>
<td>-5.946</td>
</tr>
</tbody>
</table>

The management of adequacy, Kt/V greater than 1.2 was used as the dependent variable with nursing experience (years of nursing and years of nephrology nursing) and educational level served as the independent variables. Table 8 presents the results of this analysis. Nursing experience ($beta = -.337; t = -1.960; 95\% CI. = -3.836-0.079; p = .050$) was borderline significant meaning nursing experience was mildly associated with a higher adequacy (Kt/V) for the hemodialysis treatment in the sample group. Educational level ($beta = .267; t = .258; 95\% CI. = -1.840-2.374; p = .798$) was not a predictor for a Kt/V of 1.2 or greater.
Table 8.

Management of Patient Quality Care Indicator $Kt/V$ greater than 1.2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Under standardized $B$</th>
<th>S.E.</th>
<th>Std. Coefficient $t$</th>
<th>Sig</th>
<th>95% CI Lower Bound</th>
<th>For B Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Experience</td>
<td>-1.879</td>
<td>.959</td>
<td>-0.337</td>
<td>-1.960</td>
<td>.050</td>
<td>-3.836</td>
</tr>
<tr>
<td>Education level</td>
<td>.267</td>
<td>1.032</td>
<td>0.047</td>
<td>.258</td>
<td>.798</td>
<td>-1.840</td>
</tr>
</tbody>
</table>

The percentage of arteriovenous fistulas (AVF) in use was used as a dependent variable with nursing experience (years of nursing and years of nephrology nursing) and educational level served as independent variables. Table 9 presents the results of this analysis. Nursing experience ($beta= .263; t=1.494; 95% C. I. = -2.384- 15.388; p=.146$) was not a predictor for the percentage of arteriovenous fistulas (AVF) in use.

Educational level ($beta= -.286; t= -1.635; 95% C.I. = -16.120- 1.787; p=.113$) was also not found to be a predictor in percentage of arteriovenous fistulas in use.
Table 9.

**Management of Patient Quality Care Indicator AVF in use**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Under standardized B</th>
<th>Coefficient S.E.</th>
<th>Std. Coefficient Beta</th>
<th>t</th>
<th>Sig</th>
<th>95% CI Lower Bound</th>
<th>For B Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Experience</td>
<td>6.502</td>
<td>4.351</td>
<td>.263</td>
<td>1.494</td>
<td>.146</td>
<td>-2.384</td>
<td>15.388</td>
</tr>
<tr>
<td>Education level</td>
<td>-7.167</td>
<td>4.384</td>
<td>-.286</td>
<td>-1.635</td>
<td>.113</td>
<td>-16.120</td>
<td>1.787</td>
</tr>
</tbody>
</table>

The percentage of central venous catheters (CVC) in use longer than 90 days was used as a dependent variable with nursing experience (years of nursing and years of nephrology nursing) and educational level served as independent variables. Table 10 presents the results of this analysis. Nursing experience ($\beta = .193; t = 1.078; 95\% C.I. = -1.802-5.835; p = .289$) and education level ($\beta = .236; t = 1.331; C.I. = -1.336-6.336; p = .193$) with neither statistically significant on the percentage of central venous catheters still in use after 90 days.
Table 10.

Management of Patient Quality Care Indicator CVC longer than 90 days

<table>
<thead>
<tr>
<th>Variable</th>
<th>Under standardized</th>
<th>Coefficient S.E.</th>
<th>Std. Coefficient S.E Beta</th>
<th>t</th>
<th>Sig</th>
<th>95% CI Lower Bound</th>
<th>95% CI Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nursing Experience</td>
<td>2.016</td>
<td>1.87</td>
<td>.193</td>
<td>1.078</td>
<td>.289</td>
<td>-1.802</td>
<td>5.835</td>
</tr>
<tr>
<td>Education level</td>
<td>2.500</td>
<td>1.879</td>
<td>.236</td>
<td>1.331</td>
<td>.193</td>
<td>-1.336</td>
<td>6.336</td>
</tr>
</tbody>
</table>

The lab value of hypercalcemia over 10.2 mg/dl was used as a dependent variable with nursing experience (years of nursing and years of nephrology nursing) and educational level served as independent variables. Table 11 presents the results of this analysis. Nursing experience ($beta = -.249; t = -1.411; 95\% C.I. = -1.031-.189; p = .169$) and education level ($beta = -.133; t = -.428; C.I. = -.770-.503; p = .672$) with neither statistically significant on the percentage of hypercalcemia over 10.2 mg/dl.

Table 11.

Management of Patient Quality Care Indicator Hypercalcemia over 10.2 mg/dl

<table>
<thead>
<tr>
<th>Variable</th>
<th>Under standardized</th>
<th>Coefficient S.E.</th>
<th>Std. Coefficient S.E Beta</th>
<th>t</th>
<th>Sig</th>
<th>95% CI Lower Bound</th>
<th>95% CI Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nursing Experience</td>
<td>-.421</td>
<td>.298</td>
<td>-.249</td>
<td>-1.411</td>
<td>.169</td>
<td>-1.031</td>
<td>.189</td>
</tr>
<tr>
<td>Education level</td>
<td>-.133</td>
<td>.312</td>
<td>-.078</td>
<td>-.428</td>
<td>.672</td>
<td>-.770</td>
<td>.503</td>
</tr>
</tbody>
</table>
The lab value of phosphorus less than 3.5 mg/dl was used as a dependent variable with nursing experience (years of nursing and years of nephrology nursing) and educational level served as independent variables. Table 12 presents the results of this analysis. Nursing experience \((beta= -.011; t= -.058; 95\% \text{ C.I.} = -2.334- 2.205; p= .954)\) and education level \((beta= -.133; t= 1.127; C.I. = -2.435- 2.169; p= .907)\) with neither statistically significant on the percentage of patients with a phosphorus level under 3.5 mg/dl.

Table 12.

*Management of Patient Quality Care Indicator Phosphorus less than 3.5mg/dl*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Under standardized B</th>
<th>Coefficient s</th>
<th>Std. Coefficient s Beta</th>
<th>t</th>
<th>Sig</th>
<th>95% CI Lower Bound</th>
<th>95% CI Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Experience</td>
<td>-.065</td>
<td>1.111</td>
<td>-.011</td>
<td>-058</td>
<td>.954</td>
<td>-2.334</td>
<td>2.205</td>
</tr>
<tr>
<td>Education level</td>
<td>-.133</td>
<td>1.127</td>
<td>-.022</td>
<td>-118</td>
<td>.907</td>
<td>-2.435</td>
<td>2.169</td>
</tr>
</tbody>
</table>

The lab value of phosphorus 3.5- 4.5 mg/dl was used as a dependent variable with nursing experience (years of nursing and years of nephrology nursing) and educational level served as independent variables. Table 13 presents the results of this analysis. Nursing experience \((beta= .659; t= .403; 95\% \text{ C.I.} = -2.683- 4.001; p= .690)\) and education level \((beta= -1.428; t= -.861; C.I. = -4.818- 1.963; p= .396)\) with neither statistically significant on the percentage of patients with a phosphorus level 3.5- 4.5 mg/dl.
The lab value of phosphorus 4.6-5.5 mg/dl was used as a dependent variable with nursing experience (years of nursing and years of nephrology nursing) and educational level served as independent variables. Table 14 presents the results of this analysis.

Nursing experience \((\text{beta} = -.170; t = -.933; 95\% \text{ C.I.} = -5.949 - 2.221; p = .358)\) and education level \((\text{beta} = .099; t = .542; \text{C.I.} = -3.046 - 5.242; p = .592\) with neither statistically significant on the percentage of patients with a phosphorus level 4.6-5.5 mg/dl.
Table 14.

**Management of Patient Quality Care Indicator Phosphorus 4.6-5.5 mg/dl**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Under standardized B</th>
<th>S.E.</th>
<th>Std. Coefficient s Beta</th>
<th>t</th>
<th>Sig</th>
<th>95% CI Lower Bound</th>
<th>For B Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Experience</td>
<td>-1.864</td>
<td>1.997</td>
<td>-.170</td>
<td>-.933</td>
<td>.358</td>
<td>-5.949</td>
<td>2.221</td>
</tr>
<tr>
<td>Education level</td>
<td>1.098</td>
<td>2.026</td>
<td>.099</td>
<td>.542</td>
<td>.592</td>
<td>-3.046</td>
<td>5.242</td>
</tr>
</tbody>
</table>

The lab value of phosphorus 5.6- 7.0 mg/dl was used as a dependent variable with nursing experience (years of nursing and years of nephrology nursing) and educational level served as independent variables. Table 15 presents the results of this analysis. Nursing experience \((\beta = -.185; t = -1.031; 95\% \ C.I. = -6.078- 2.004; p = .311)\) and education level \((\beta = .181; t = 1.006; C.I. = -2.082- 6.117; p = .323)\) with neither statistically significant on the percentage of patients with a phosphorus level 5.6- 7.00 mg/dl.
Table 15.

Management of Patient Quality Care Indicator Phosphorus 5.6-7.0 mg/dl

<table>
<thead>
<tr>
<th>Variable</th>
<th>Under standardized B</th>
<th>S.E.</th>
<th>Coefficient S</th>
<th>Std. Coefficient Beta S</th>
<th>t</th>
<th>Sig</th>
<th>95% CI Lower Bound</th>
<th>95% CI Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Experience</td>
<td>-2.037</td>
<td>1.976</td>
<td>-.185</td>
<td>-1.031</td>
<td>.311</td>
<td>-6.078</td>
<td>2.004</td>
<td></td>
</tr>
<tr>
<td>Education level</td>
<td>2.017</td>
<td>2.005</td>
<td>.181</td>
<td>1.006</td>
<td>.323</td>
<td>-2.082</td>
<td>6.117</td>
<td></td>
</tr>
</tbody>
</table>

The lab value of phosphorus over 7.0 mg/dl was used as a dependent variable with nursing experience (years of nursing and years of nephrology nursing) and educational level served as independent variables. Table 16 presents the results of this analysis. Nursing experience ($beta = .326; t = 1.879; 95\% CI = -.269-6.364; p = .070$) and education level ($beta = -1.234; t = -.872; CI = -4.799-1.930; p = .390$) with neither statistically significant on the percentage of patients with a phosphorus level over 7.00 mg/dl.
Table 16.

Management of Patient Quality Care Indicator Phosphorus over 7.0 mg/dl

<table>
<thead>
<tr>
<th>Variable</th>
<th>Under standardized B</th>
<th>Standardized S.E.</th>
<th>Std. Coefficient s Beta</th>
<th>t</th>
<th>Sig</th>
<th>95% CI Lower Bound</th>
<th>95% CI Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Experience</td>
<td>3.048</td>
<td>1.622</td>
<td>.326</td>
<td>1.879</td>
<td>.070</td>
<td>-.269</td>
<td>6.364</td>
</tr>
<tr>
<td>Education level</td>
<td>-1.434</td>
<td>1.645</td>
<td>-.151</td>
<td>-.872</td>
<td>.390</td>
<td>-4.799</td>
<td>1.930</td>
</tr>
</tbody>
</table>

The mortality rate indicator was used as a dependent variable with nursing experience (years of nursing and years of nephrology nursing) and educational level served as independent variables. Table 17 presents the results of this analysis. Nursing experience (beta = -249; t = -1.451; 95% C.I. = -5.464-.942; p = .159) statistically no significance between experience level of the nursing staff and the mortality rate within the chronic dialysis unit. The education level (beta = -.410; t = -2.384; C.I. = -7.090-.525; p = .025) was found to be a significance predictor of mortality rate within the sample population.
Table 17.

Management of Patient Quality Care Indicator Mortality Rate

<table>
<thead>
<tr>
<th>Variable</th>
<th>Under standardized $B$</th>
<th>S.E.</th>
<th>Std. Coefficient $\beta$</th>
<th>$t$</th>
<th>Sig</th>
<th>95% CI Lower Bound</th>
<th>95% CI Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Experience</td>
<td>-2.261</td>
<td>1.558</td>
<td>-.249</td>
<td>-1.451</td>
<td>.159</td>
<td>-5.464</td>
<td>.942</td>
</tr>
<tr>
<td>Education level</td>
<td>-3.807</td>
<td>1.597</td>
<td>-.410</td>
<td>-2.384</td>
<td>.025</td>
<td>-7.090</td>
<td>-.525</td>
</tr>
</tbody>
</table>

The readmission rate indicator was used as a dependent variable with nursing experience (years of nursing and years of nephrology nursing) and educational level served as independent variables. Table 18 presents the results of this analysis. Nursing experience ($beta=.076; t=.400; 95\% C. I.=-4.203-6.240; p=.692$) no statistical significance between experience level of the nursing staff and the readmission rate within the chronic dialysis unit. The education level ($beta=-.169; t=893; C.I.= -2.984-7.579; p=.380$) was not a significance predictor of readmission rate within the sample population.
Table 18.

Management of Patient Quality Care Indicator Readmission Rate

<table>
<thead>
<tr>
<th>Variable</th>
<th>Under standardized Coefficient s</th>
<th>Std. Coefficient s Beta</th>
<th>t</th>
<th>Sig</th>
<th>95% CI Lower Bound</th>
<th>For B Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Experience</td>
<td>1.018</td>
<td>2.545</td>
<td>.076</td>
<td>.400</td>
<td>-4.203</td>
<td>6.240</td>
</tr>
<tr>
<td>Education level</td>
<td>2.298</td>
<td>2.574</td>
<td>.169</td>
<td>.893</td>
<td>-2.984</td>
<td>7.579</td>
</tr>
</tbody>
</table>

Research Questions and Hypotheses Testing

This quantitative cross-sectional research study was driven by two research questions focused on the shortage of expert nephrology nurses and patient quality care indicator relationship. The following hypotheses were tested by identifying by calculating the descriptive statistics and finding its probability ($p$ value). Based on the $p$ value the null ($H_0$) hypothesis was either accepted or rejected.

Research question 1 (RQ1): What is the relationship between the shortage of expert nephrology nurses and patient quality care indicators?

$H_{01}$- There is no statistically significant relationship between the shortage of expert nurses in nephrology and the effect on patient quality care indicators.

$H_{A1}$- There is a statistically significant relationship between the shortage of expert nurses in nephrology and the effect on patient quality care indicators.

Research question 2 (RQ2): What is the relationship between the skill mix in the dialysis unit (lack or percentage of expert nephrology nurses) and the effect on patient quality care indicators?
There is no statistically significant relationship between the skill mix in the dialysis unit (lack or percentage of expert nephrology nurses) and the effect on patient quality care indicators.

$H_02$: There is a statistically significant relationship between the skill mix in the dialysis unit (lack or percentage of expert nephrology nurses) and the effect on patient quality care indicators.

There were three areas of patient quality indicators that were affected by relationship between the experience level or skill mix within the chronic dialysis units. The first was the Hemoglobin level of 10.2 or less with a $p$ value of .00 for the experience level of the nurses. The second was the adequacy, Kt/V of 1.2 or greater, with a $p$ value of .05 for the experience level of the nurses. The third area was morality rate for the facility with a $p$ value of .025 for the education level of the nurses. The null hypothesis was rejected based on this information. The level of experience and skill mix did have a statistically significant relationship for these three measurements.

**Summary**

Chapter four reviewed the data collection procedure, data collection of the demographic information and patient quality indicators. The analysis of the data, including hypothesis testing identified areas of relationship between the shortages of nephrology nursing expertise in the chronic dialysis unit setting. Some collected data did not have statistically significance which identifies the need to reexamine what is being measured in the nephrology setting and how best to capture those data points. Chapter five further discusses the need to look further into the phenomena of nursing expertise,
education, certification, and how it relates to the present and future of the nephrology nursing specialty.
Chapter 5

Conclusion and Recommendations

The purpose of this quantitative cross-sectional study was to identify a relationship between the shortage of expert nephrology nurses in the chronic dialysis unit setting. The study intended to identify consequences or outcomes on the patient quality indicators publicly reported to the Centers for Medicare and Medicaid Quality Incentive Program. The shortage of expert nephrology nurses is a concern for the nephrology specialty. The need to have experts in place at all units promotes the transference of skills and knowledge to the inexperienced nurses. The ability to identify expert nephrology nurses within dialysis units and recognize their potential influence on patient quality indicators is needed for consistent quality care.

The research study was one step toward a better understanding of this relationship. The findings are a start to comprehending on how the shortage of expert nephrology nurses may have consequences or affect outcomes on the current and future patient quality indicators. There are multiple ways to measure quality care for patients and the choice to use the Centers for Medicare and Medicaid Quality Incentive Program was based on access to information. However, this may not be the best choice or measurement for the need to have expert nephrology nurses in the chronic dialysis unit. Discussion points looked at the advantages and limitations of the findings within this study.

Implications of Findings

The Nursing Demographic Survey results offered some interesting information from the Ohio chronic dialysis units that participated in the data collection. The survey
questions provided the: (a) years of nursing experience, (b) years of nephrology nursing experience, (c) level of education, (d) certification status, and (e) 50 years of age or older vs. younger than 50 years of age. The final question on the survey asked the chronic unit administrators if they believed the level of experience in registered nurses impacts patient care outcomes in the dialysis setting patient quality indicators. The results to the last question was 32 out of 34 (94.1%) respondents believed it was related. This supported the initial thoughts surrounding the need to understand the shortage of expert nephrology nurses and the potential impact on patients. Specifically showing evidence, the experience level of these expert nurses played any role in improving outcomes for patients in the chronic dialysis setting. And if there were improvements from the presence (or reduced outcomes from the shortage) being able to identify which patient areas were most at risk from lack of nursing expertise.

**Implication for nephrology nursing practice.** The study found three areas where the experience or education level of the registered nurse related to the improved patient outcomes in the Ohio chronic dialysis unit setting. The hemoglobin of 10.2 g/dl or less was the first patient quality indicator with statistical relevance. This is an important aspect for any patient but more so for the end stage renal disease patient. Kidney disease interferes with the patient’s ability to produce red blood cells due to the lack of erythropoietin made by the damaged kidney. The renal patient is often in a state of anemia and this must be managed through the physician’s orders and protocols completed by the registered nursing team. There is a strong need to manage care to keep patient’s anemia levels above 10.2 g/dl thus maintaining a low percentage of chronic unit dialysis patients with low hemoglobin levels. The advantage to having adequate
hemoglobin is improvement in patients’ ability to carry out activities of daily living and potential improved quality of life. The surveillance and monitoring of the patients trending anemia level does require education, training, and understanding of the complexities of the chronic renal disease patient.

The second patient quality indicator with noted statistical relevance was for adequacy (Kt/V of 1.2 or greater). Adequacy level signifies the ability to remove toxins from the dialysis patient’s blood while on treatment. It is determined by the laboratory values drawn while at the chronic dialysis center and used to guide the type and length of treatment each patient needs to maintain homeostasis. The nursing team needs to provide prescribed treatments, draw blood work at the correct times following precise procedures, and ensure appropriate follow up for patients lacking a Kt/V of at least 1.2 or greater. The skilled nursing team works patients to enable meeting this essential patient quality indicator. A dialysis treatment only replaces up to 15% of a healthy kidney’s function. The adequacy measurement is an objective way to ensure the dialysis treatment is removing enough of the toxins within the patient’s blood. The patient’s dialysis needs can change through time, requiring vigilance for lab values, patient condition, and patient assessment. Experience aids the registered nurse to identify trends and conditions sooner thus reducing the risk to the patient of poor adequacy lab results. An effective treatment translates into improved quality of life for the dialysis patient.

The level of experience within the chronic dialysis unit should be looked at on a local level, regional level, and statewide level. The ability to balance the need to bring in new nurses, educate them, and train them in nephrology care alongside expert nephrology nurses could prove beneficial. Organizing effective training programs for new
nephrology nurses with support from skilled preceptors and mentors is needed. This may prove difficult, as when data were collected some units were noted to have three-five registered nurses, and many had units with only two registered nurses identified. Chronic dialysis units may look to create centralized training locations with experienced nurses to work with the newer nurses to fill essential skill acquisition.

**Implication for nursing education.** The third patient quality indicator with statistical significance was the mortality rate in the chronic dialysis unit. An increased level of education among the registered nurses was associated with a lower rate of mortality in the unit. This could be due to the increased level of understanding regarding patient conditions, disease process, or improved ability to manage the multiple aspects of complex patient care. Those people choosing to start dialysis do want to extend their lives and nephrology professionals work toward not just extension of life, but look to have quality (Bonner, 2006). Education may be the essential element.

The promotion and encouragement of advanced education needs understanding and focus. Many entry level registered nurses graduate from associate degree programs. An associate degree in nursing or diploma registered nursing degree are efficient and timely ways to obtain a registered nursing license. However, they are considered more technical in nature than the bachelor prepared registered nurses. These entry level degrees are to be viewed as the beginning of a nursing career, not the ending, with the campaign to move nurses to the next level of education.

The additional education obtained through bachelor degree program focus on nursing theory, improved pathophysiology, and complex disease management. The bachelor prepared nurse learns how to practice leadership skills and learns the essential
components to begin research based practice and promotion. All essential to function and thrive in today’s fast paced healthcare system. Registered nurses require support to move toward higher degree levels and the bachelor degree is one step on the journey. Once the nurse achieves that level serious consideration should be given to advancing towards the master or doctoral degree.

The advanced practice nurse requires a master or doctoral level degree. In this research study only five nurses held a master level degree. This was only 3.9% of the nurses caring for patients in the 34 Ohio chronic dialysis units. This is an alarmingly low percentage of registered nurses within the nephrology nursing specialty. The complexities of renal failure, the management of multiple comorbidities, and advanced understanding of care and management requires advanced education and skills. An investigation into the reasons why these chronic dialysis units had such a low number of master prepared nurses could provide insight into the problem. Perhaps it is not promoted, encouraged, reimbursed, or considered valuable for these particular nurses or in the nephrology specialty in general.

Nephrology nursing certification is another aspect of promotion and support for advancing practice within specialty nursing. The registered nurses working within the surveyed units reported 10.9% or a mere 14 individuals certified in the nephrology specialty. Certification is an outward sign of the level of knowledge acquired by the nephrology nurse. Obtaining initial certification requires the registered nurse meets established educational level, minimum number of hours (varies from 2,000-3,000), and continuing education credits. There are two accreditation bodies, within the United States of America, that provide certification. The first, Nephrology Nursing Certification
Commission (NNCC), provides three levels of certification for the registered nurse based on education and experience level. The second, Board of Nephrology Examiners Nursing and Technology, provides two certifications based on area of nephrology nursing specialty practice. Understanding what moves a nurse to pursue certification, knowing the barriers, and promotion of certification by employers may improve the percentage of certified nephrology nurses.

Nursing education should be viewed as an ever-moving target and pursuit of knowledge a life-long process. While forced advanced education would not be feasible, the promotion and support for nurses that want advanced education must be central to the solution. Education is contagious, for when one nurse returns to advancing education and learning the sharing of new processes and information is inevitable. Those that are successful in pursuing and obtaining additional degrees become the driving force in process and system changes occurring within the healthcare communities. They encourage others to better themselves, seek out best practices, and push for improved patient care and conditions.

**Implication for nursing research.** There was a total of 12 patient quality indicators reviewed for this project. The lack of statistically significant findings for nine of those indicators is also a significant finding. The study has three patient quality care indicators with statistical significant data evidence that the null (0) hypothesis is rejected. However better support would have been identified if more quality care indicators had statistical significance.

Additional research focusing in on all aspects of the independent variables of the expert nephrology nurse is vital. Knowing the years of nursing experience and years of
nephrology nursing experience are just two variables for identification of expert status. The types of work environments: level of care, patient acuity, staffing dynamics, and location influence the type of experience gained within the healthcare system. Educational level can also be varied for the bachelor degree or master degree may not be specific to nursing. Knowing when, how, and type of institution the registered nurse obtained will also contribute factors not measured within this study. Certification was identified but was not specific into level or type of nephrology certification. Again, this can vary with nurses obtaining certification at different stages of their careers.

Nursing researchers could explore all these various areas within the nephrology nursing expert. The researcher may narrow down how the shortage of the expert nurse directly affects not only patient care but also the specialty practice and future nursing career choices. The researcher may also uncover how to provide better support and training for nurses to obtain expert status while maintaining an extended nursing career.

**Implication for nursing policy.** The Centers for Medicare and Medicaid (CMS) have established the ‘Conditions for Coverage for End-Stage Renal Disease Facilities’ with the last major update occurring in 2008. This publication provides the guidance for minimum standards for patient care including the expectations for education, training, and staff requirements. Employers are driven to make hiring and staffing decisions based on this direction provided by the government agency. The established minimum standards state registered nurses must have a minimum of one year of nursing experience and three months of dialysis experience prior to working independently in the chronic dialysis unit (Centers for Medicare and Medicaid, 2015). Independently is defined as the only licensed nurse in the unit while patients are on the unit’s premises. Dialysis
providers must also establish a comprehensive program to onboard and train the new nurses and show proof of competency (Centers for Medicare and Medicaid, 2015). However there is minimal direction on what competency entails or how to measure the nurse’s ability level to function in the chronic dialysis unit. This causes a wide variation in training methods, amount of education for nephrology care or dialysis theory, and competency level within the chronic dialysis unit setting.

Healthcare and nursing should look at the current policy and practice for the chronic dialysis unit setting. Defining a required number of hours of training versus, a broad statement of three months of training (for a new nurse) or experience is a practical policy change. The rational is because 90 days of training at 24 hours a week (288 hours total) verses 40 hours a week (480 hours total) is a very different amount of education and training. Additional thoughts look to the age of the current Centers for Medicare and Medicaid document guiding nephrology practice is dated back to 2008. Healthcare is ever changing and specialty practices also maintain a quick change in needs and demands. A renewed process, based in evidenced based practice and best demonstrated practice, needs to spur government agencies to revisit initial recommendations for current practice.

**Scope**

The scope of this research study was intended to identify the shortage of the expert nephrology nurse effects on patient quality care indicators. The limits of findings focus on the use of Ohio chronic dialysis units, the response rate of 34 chronic dialysis unit administrators, and the concern over what measurements would have relevance in
the research study. This reduces the overall applicability and scope to all chronic dialysis units.

The use of a convenience sample of 34 dialysis units limits the statistical analysis to be generalized to all chronic dialysis units. The use of only Ohio chronic dialysis unit’s limits applicability of findings to other states. This limits transferability to all chronic dialysis units because of the limited number of units participating in the research study. It may also lack application to very large Ohio based chronic unit’s due to the high number of units listing two through seven registered nurses. Additional studies using chronic dialysis units across the United States may provide additional insights on the position of the expert nephrology nurse within the nephrology specialty practice.

Home dialysis (peritoneal and home hemodialysis) and acute (in-hospital) dialysis settings are not the same as chronic unit dialysis. Thus, the statistical significance does not apply to these two types of dialysis settings. The use of the expert nurse may be of increased need in these areas due to the nature of the work. Registered nurses frequently work autonomously in the home and acute dialysis setting. Home nurses take on the role of teacher in addition to the nurse role when training and educating patients. Acute nurses work with the highest acuity and medically unstable renal patients. Experienced acute dialysis nurses spend years working in conjunction with critical care nurses and physicians. Both settings involve a different pace and skill set for successful patient care.

**Strength**

The strength of the quantitative cross-sectional study is noted in the ability to manage and analyze multiple data points. The independent variables and dependent
variables were readily entered into the Statistical Package for the Social Sciences (SPSS) software. Additional strengths within this study was the adequate number of participants (34) completing the entire Nursing Demographic Survey. Access to publically reported patient quality indicators for all participants. The study did identify a statistically significant relationship between the expert nephrology nurse and patient quality indicators in three key areas. This provided support for concern regarding units without expert nephrology nurses present in the chronic dialysis unit setting.

**Transferability to other settings.** This study focused on the Ohio chronic dialysis unit setting. Despite this unique type of nursing environment the research study and results have transferrable potential in other settings. The chronic dialysis units outside of Ohio measure and display patient quality care indicators on the Centers for Medicare and Medicaid website. This would allow further studies of nephrology nurses education, experience, and certification in conjunction with the units’ patient quality care indicators. Acute or hospital based units have different metrics to monitor quality care within the setting. However these measurements could be approached in the same manner, by reviewing the patient metrics and collecting data regarding the nursing staff providing the care. The multiple practice areas within nephrology nursing could reveal where expertise is most needed whether in the chronic unit, acute unit, home program, pediatrics, or transplant areas.

This research study has additional transferability for other specialty practice areas within nursing. Institutions collect and maintain patient care metrics in nearly every setting. The potential to take this information and compare it to the current staff model within each unit could identify proper mix of exert nurses for optimum patient outcomes.
It may also identify the relevance or support for current hiring practices, level of education or experience preferred, or promotion of certification level within the units. The opportunity to understand how current practices relate between expert nurses and patient quality care indicators may improve preparation for future healthcare needs.

Limitations of Findings

The research study findings are limited based on the number of participating units (34), location of the units (Ohio) and focus on only chronic dialysis units. The Nursing Demographic Survey questions was limited to nine demographic based questions and the use of Centers for Medicare and Medicaid Quality Incentive Program data were based on one month. Each variable contributed differently to the overall research study and subsequent analysis.

Limits of patient quality data. The Centers for Medicare and Medicaid Quality Incentive Program patient quality data were limited in measurement for all aspects of patient care. The metrics focus on lab results provided through the chronic dialysis centers. The 34 participating chronic dialysis units were currently reporting the required metrics however there were areas within the data missing for some units. The overall missing data occurred in only two units, yet this did limit knowing exactly the consequences or outcomes for those two specific units on every aspect of patient quality care indicators. The use of one months reported data limited any potential for chronic dialysis unit trending. Additionally, one metric used in the Centers for Medicare and Medicaid Quality Incentive Program had to be omitted, Hospitalization rate, due to metrics measured based on the number of patient days (average census x expected rate of hospital admissions) verses a percentage rate. This additional metric of hospitalization
rate may have added to the support of expert nephrology nurses or refuted any consequence or outcome on patient care.

The use of an additional patient center survey for dialysis care may have provided other insights. In-Center Hemodialysis Consumer Assessment of Healthcare Providers and Systems Survey (ICH CAHPS) is another measurement to monitor quality care not used in this research study. This survey asks participants their perceptions on dialysis care and health quality. It focuses on patient’s view of communication with nephrologists, staff, knowledge of treatment options, how problems are handled, and satisfaction with the care. It captures items not easily assessed by the laboratory results. The identification on how patients feel toward their caregivers may show differences based on experience and education of the registered nurses in the chronic dialysis unit.

Another consideration for data, the Five Star rating program through the Centers for Medicare and Medicaid, were not included in this research study. This program uses the reported lab results provided through the Centers of Medicare and Medicaid Quality Improvement Initiative, National Healthcare Safety Network (NHSN), and In-Center Hemodialysis Consumer Assessment of Healthcare Providers and Systems Survey. These are combined to provide an overall star rating for each dialysis facility. The ratings range from one to five, with five being the best possible rating. Units are encouraged to reach this level and maintain as a sign of optimum performance. This rating is also to be displayed in the dialysis unit and is readily available online for the public to compare dialysis units.

**Limitation on participation.** The chronic dialysis unit administrators were notified via email through a nursing specialty organization. This excluded chronic
dialysis administrators that were not members of the nursing specialty organization. This created a potential to miss specific types of dialysis units, non-intentional exclusion, and potential misses of key information from these non-participating units. Improvement in participant recruitment and variety of clinic settings may have been achieved through direct email contact with dialysis companies or dialysis facilities.

Limitation on survey. The research study only identified if age 50 years or older and under age 50 years old. The data collection may have improved if the exact age of the registered nurse was known. This may have identified those nurses close to age 50, or may also have identified how many nurses were in their 40’s. It is noted during the review of literature, nurses in their 40’s tend to change work environments. They look outside of hospital based nursing and the chronic dialysis unit may be a potential draw for that age group. This ability to attract nurses with 20 plus years of experience into the dialysis setting may lend to unit stability.

The dialysis unit was not asked for information regarding retention, turnover, or years of employment at the chronic dialysis unit. Units with higher retention would potentially be viewed as more stable and provide improved consistency in patient care (Carmel & Baker-McClearn, 2011). Keeping nurses in place, maintaining a stable work environment, and improving satisfaction may be associated with leadership style, physician interaction, and team dynamics. The unit that is stable may influence patients that view the chronic unit staff as an extension of their lives. For better or worse the staff sees patients more often the patients’ families and often build a lasting connection.

The overview of the interdisciplinary team for the chronic dialysis units was also not provided. The chronic dialysis unit has multiple disciplines working to provide
optimum care to the renal patient. The social worker provides support and direction to the team and patient through counseling and resources. Patients may initially not be able to afford food, medications, or care. Guidance is needed for patient, family, and staff to manage the transitional time for this dialysis patient. The dietician provided guidance and essential information on the renal diet needs for each patient. Dietitians collaborate with the patient, family, and staff to improve lab results. The nephrologists and nurse practitioners responsible to provide orders and direct medical care must be active participants in the renal care team. Their presence, support, and temperament drives the best practices and essential care of the medically complex individual. Together an effective team manages patient care. The ineffective team struggles to complete the simplest of tasks.

**Limitation of comparison.** The chronic dialysis units were divided into two groups for comparison. One group consisting of higher level of experience and the other group with a lower level of experience. If the units were divided up into multiple levels for units based on years of experience a different statistical analysis may have occurred. Again this would need additional participants, increased numbers from the 34, for improved accuracy and reduced error in the statistical significance.

Dividing units by educational level for diploma, associate degree, bachelor degree, and master degree level nurses may have yielded altered statistical information. While this particular sample was small, there was a noted high percentage of associate degree and bachelor degree registered nurses. There is a noted difference between a two-year degree and a four-year degree that may contribute to overall ease and efficiency
with care for the renal patients. Further investigation may have noted the reason behind the rate of associate degree and bachelor degree level registered nurses.

The alarmingly low number of masters prepared nurses, only five (3.9%), was a noted area of concern for the nephrology nursing specialty practice. Additional concern was the number of certified nephrology nurses was only 14 or 10.9%. Data were not collected on the reason for a specified level of education or the choice to pursue certification. At a time when Magnet status and promotion of clinical ladders prevails these two factors are a surprising data of practicing nephrology nursing. Understanding this low percentage could be investigated in future research.

**Recommendations for Future Research**

Improved relevance to the study could be accomplished through increased participants across the United States. Additional information on not just years of nursing experience and years of nephrology experience, but also inclusion on the number of hours worked by each nurse. Identification of the chronic dialysis unit’s size, location (rural, suburban, urban) and patient census would add needed factors. Information about acuity level for patients at the unit would also benefit overall understanding of patient population needs within the locations.

Team mix, including number of dialysis technicians, the ratio of nurses and technicians related to patient census. The number of chairs, number of shifts, and overall unit hours of operation provide greater information on the demand on nursing teams. Large units appear to work more like factories than clinics. The unit may see disconnect between patients and staff. Nurses may have less time to complete assessments, provide medications, and carry out learning opportunities. Smaller units may struggle to keep
staff, manage needed time off, or be able to accommodate specific patient treatment needs. All aspects could negatively influence reported patient quality care indicators and quality of life for the renal patient. Just one expert nurse may make the difference in all these unit types.

Patient demographic information would add data regarding patient stability, support, and financial resources. The inclusion of indigent population, immigrants (including undocumented), and underserved areas could provide insight into units performing well verses poor performers. This would be regardless of nursing staff presence or skill among the staff. Basic needs of housing, food, and safety must be met for these noted high risk populations before dialysis care can be effectively managed.

Further study is warranted to comprehend the overall need for expert nephrology nurses in all aspects of care for the renal patient. Time, effort, knowledge acquisition, and skill mastery occur at different speeds for nurses. The ability to define the expert status, move more nurses toward that level, and in turn improve patient care is paramount to all healthcare settings. Additional studies should focus on expert nurses, defining what quality care involves, understanding how to retain experienced nurses, and promotion of cooperation within disciplines. The use of quantitative and qualitative means would continue to add to the overall understanding of Benner’s Novice to Expert and Watson’s Caring theories as it applies to the expert nephrology nurses.

**Recommendations for Nephrology Nurses**

The nephrology nursing specialty practice needs to look to promotion of further education and certification among its nursing population. The development and adoption of a clinical ladder within the nephrology nursing would be a valuable step toward
uniformity within the specialty. Identification of established pathways based on the nurses current educational level, years of nursing experience, and overall career goals could be beneficial. Ideas may intertwine the nurse’s individual aspirations with the specialty’s need to advance skill and understanding of the complexities of renal patient care. This objective will require extensive collaboration across nephrology nursing, employers, and the healthcare community.

Recruitment of new nurses into the nephrology nursing specialty needs to be a priority. Engaging in current school of nursing activities, training, and clinical experiences should be looked to as opportunities to interact with student nurses. It is an area of nursing that receives little attention within the formal classroom setting and many do not understand how the dialysis treatment works on the patient. Other individuals may have heard negative stories surrounding renal disease, dialysis care, or complaints about the working environment. Taking time to speak with fellow nurses, family, and friends and dispelling any myths is important. Explaining the role of a nephrology nurse and the value of their role is essential to maintain the specialty.

**Recommendations for Dialysis Unit and Leadership**

Nurses are a valuable and limited resource. The nursing shortage has been identified and is not disputed. Nephrology nursing specialty is time intensive, requires months of additional training, and involves multiple demands placed on the registered nurses. A deep dive into each unit’s current training, education, and retention of nephrology nurses must be completed. Identification of chronic dialysis units struggling to meet patient quality indicator metrics verses those that are successful needs to be viewed from all aspects. The current team skill mix, the level of education, certification
status, age (those planning for retirement) and anticipating future demand play a part of the units’ viability.

Leadership will also need to assess for competitiveness to recruit the new nurses, experienced nurses, and advanced degree holders into the nephrology nursing specialty. Salary, wage, and compensation packages need to attract these nurses. Employers also need to know how to keep current nephrology nurses in the specialty by offering flexibility in scheduling (where needed), options for cross training, and for promotion. Opportunity for advancing education, ability to conduct research, and working on special projects may be additional ways to attract and keep nephrology nurses within the specialty practice (Bonner, 2007).

**Summary**

Chapter five identified this research study is only the beginning of understanding the relationship between the expert nephrology nurse and patient quality indicators. Additional research is needed to provide understanding on the intricacies of the nephrology nursing specialty. It is a specialty that requires commitment, perseverance, and patience. There is a need for a high level of skill, to work as a team, to communicate to all people, and remember the patient has a life beyond the dialysis chair. The treatment provides life to many individuals throughout the world and creates the ability to continue with enjoyed activities with family and friends. Those within nephrology realize and embrace their role as caregiver, friend, and professional for these complex medical patients. Understanding the expert nephrology nurse’s reach will only improve the experience for all patients.
Conclusion

This quantitative cross-sectional research study is one look at the shortage of expert nephrology nurse’s relationship to patient quality care indicators. The goal was to find a relationship between the expert nephrology nurse and the patient quality care indicators. There was a noted relationship on three patient quality care indicators of anemia (hemoglobin less than 10.2 g/dl), adequacy (Kt/V 1.2 or greater) and facility mortality rate. In each of these metrics units with more experienced registered nurses, anemia and adequacy, or higher level of education, mortality rate, was statistically significant.

Additional discussed recommendations for research, practice, and policy revolve around the need for greater understanding of the expert nephrology nurses. Identification on initial recruitment, retention of current nurses, and promotion of this specialty nursing practice all require further investigation. Continued analysis of patient quality care metrics, satisfaction surveys, and facility ratings could all help align the relationship to expert nephrology nurses within the chronic dialysis units.
References


Staggs, V. S., & Dunton, N. (2012). Hospital and unit characteristics associated with nursing turnover include skill mix but not staffing level: An observational cross-
sectional study. *International Journal of Nursing Studies, 49*(9), 1138-1145. doi:10.1016/j.ijnurstu.2012.03.009


Appendix A

Demographic Survey for Registered Nurse Experience and Skill Mix in Chronic Dialysis Unit Questions for Survey

1. Is your chronic (in-center) dialysis unit in the state of Ohio?
2. Please provide the name of your center.
3. How many registered nurses do you employ at this unit? Please include yourself if you are a registered nurse.
4. Please list the nurses- without personal identification- with his or her number of years as a registered nurse.
   Example: Nurse A- 14 years as registered nurse
   Nurse B- 5 years as registered nurse
5. Please list the nurses- without personal identification- with his or her number of years as a nephrology nurse.
   Example: Nurse A- 5 years as nephrology nurse
   Nurse B- 2 years as nephrology nurse
6. Please list the nurses- without personal identification- with his or her educational degree level.
   Example: Nurse A- Associates Degree (AD)
   Nurse B- Bachelor’s Degree (BSN)
7. Please list which nurses are age 50 years or older- without personal identification.
   Example: Nurse A
8. Please list which nurses- without personal identification- are certified in nephrology nursing.
   Example: Nurse B
9. Do you believe that the level of experience in registered nurses impacts patient care outcomes in the dialysis setting?
Appendix B

Study Protocol Shortage of Expert Nephrology Nurses

1. Shortage of expert nurses in the nephrology nursing is a potential patient safety and quality of life concern for renal patients. There is a need to relate nurse expertise status to patient quality care indicators.

2. Key stakeholders for this study include nephrology nurses, dialysis companies, clinics, hospitals, nephrology nursing specialty organizations, renal care groups, physicians, and renal patients.

3. The list for the survey will be obtained through the specialty organization.

4. Survey participants will be provided consent form and confidentiality statement.

5. Survey participants have the opportunity to elect or decline participation in the study.

6. Potential risks and management of those risks will be provided to all participants.

7. Participants choosing to take the survey will be asked to complete the questionnaire in the designated time frame.

8. Survey will be nine questions and provided through Survey Monkey.

9. Survey questions will be adapted from previous survey templates will be piloted.
10. Surveys will be compiled and compared to publically reported Centers for Medicaid and Medicare Quality Incentive Program (CMS QIP) patient quality care indicators.

11. In-center (chronic) dialysis units with reported expert nephrology nurses (percentage) will be compared to those without reported expert nephrology nurses.

12. Statistical analysis using the SPSS software will be used to analyze the data.

13. The results of the study will be shared with the participants upon request.

14. The results will be shared through a written report to stakeholders.

15. All data will be de-identified and shared online in aggregate form in any future publications or presentations.

16. All data related to this study will be maintained by the investigator for a period of seven (7) years in a password protected device. After seven (7) years all electron
Appendix C

Informed Consent for Participation in Nephrology Nurse Demographic Survey

Welcome to the Nephrology Nurse Demographic Survey

Informed Consent:

Thank you for your participation in this survey. Your feedback is important.

Please answer the following questions as honestly as possible. These questions concern the level of expertise and experience of the registered nurses at your chronic dialysis unit.

The purpose of this survey is to help the researcher measure the impact of the shortage of nephrology nursing experts on the patient quality care indicators. I do not anticipate that taking this survey will contain any risk or inconvenience to you. Furthermore your participation is strictly voluntary and you may withdraw your participation at any time without penalty.

All information collected will be used only for my research and will be kept confidential. There will be no connection to you specifically in the results or in future publication of the results. Once the study is completed, I would be happy to share the results with you if you desire. In the meantime, if you have any questions please ask or contact:

Karen Gaietto

Additionally, if you have any concerns about your treatment as a participant in this study, please call or write:

Chair, Institutional Review Board for Protection of Human Participants
University of Phoenix

150
1625 W. Fountainhead Pkwy

Tempe, AZ 85282-2371

Although the chairperson may ask your name, all complaints are kept in confidence.

By clicking START SURVEY you are verifying that you have read the explanation of the study, and that you agree to participate. You also understand that your participation is strictly voluntary.
Appendix D

Invitation Letter to Participate in Study

Expert Nephrology Nurse Study

Be part of an important research study of expert nephrology nurses.

- Are you an administrator at a chronic (in-center) dialysis unit?
- Are you in the state of Ohio?

If you answered yes to these questions you may be eligible to participate in the expert nephrology nurse study.

The purpose of this study is to investigate the relationship between expert (highly experienced and skilled) nephrology nurse and patient outcomes in the chronic dialysis setting. Participation will take form of a short survey administered through an email link provided through Survey Monkey. Survey information will be collected for four weeks.

This study is being conducted by:

Karen Gaietto RN, MSN, CNN

Doctoral Student

University of Phoenix

Please email with any questions or concerns.
Appendix E

Nephrology Nurse Demographics Survey Instruction Guide and Questions for Participants

Thank you for participating in the survey process. This survey is nine questions long. Anticipated time to complete survey is 15-20 minutes. Below are the list of questions you will be asked during the survey. Please complete the survey as accurately as possible.

1. Is your chronic (in-center) dialysis unit in the state of Ohio? (yes/no)
2. Please provide the name of your center. (this is to verify location within state of Ohio)
   a. Please include the complete name of the center as identified for Centers for Medicare and Medicaid Quality Incentive Program (CMS QIP)
3. How many registered nurses do you employ at this unit? Please include yourself if you are a registered nurse.
   Only include registered nurses- not licensed or vocational nurses
4. Please list the nurses- without personal identification- with his or her number of years as a registered nurse.
   Example: Nurse A- 14 years as registered nurse
   Nurse B- 5 years as registered nurse
5. Please list the nurses- without personal identification- with his or her number of years as a nephrology nurse.
   Example: Nurse A- 5 years as nephrology nurse
   Nurse B- 2 years as nephrology nurse
6. Please list the nurses- without personal identification- with his or her educational degree level. **Please include nursing and non-nursing degrees in this section.**

   Example: Nurse A- Associates Degree (AD)
   Nurse B- Bachelor’s Degree (BSN)

7. Please list which nurses are age 50 years or older- without personal identification.

   **Only list those 50 years or older.**

   Example: Nurse A

8. Please list which nurses- without personal identification- are certified in nephrology nursing.

   Example: Nurse B

9. Do you believe that the level of experience in registered nurses impacts patient care outcomes in the dialysis setting? **Yes or No**

Upon completion of the survey you will see a thank you for participation with the Survey Monkey Icon.
Appendix F

ESRD QIP Summary: Payment Year 2016 (Centers for Medicare and Medicaid, 2016)

The following clinical measurements from Quality Incentive Program (QIP) are focused on in this research dissertation.

1. Hemoglobin >12g/dl
   a. Lower percentage desired

2. Vascular Access Type (VAT) Measure Topic (fistula/catheter)
   a. Higher rate of fistulas desired
   b. Catheter use greater than 90 days

3. Kt/V Dialysis Adequacy Measure Topic (hemodialysis, peritoneal dialysis)
   a. Percentage of patients with 1.2 equal to/or greater Kt/V on hemodialysis
   b. Percentage of patients with 1.7 equal to/or greater Kt/V on peritoneal dialysis

4. NHSN Bloodstream Infection in Hemodialysis Outpatients
   a. Lower rate desired
   b. Number of new positive blood culture events based on blood cultures drawn as outpatient or within 1 calendar day after hospital admission

5. Hypercalcemia
   a. Uncorrected serum calcium of 10.2 or greater

6. Mineral Metabolism
   a. Phosphorus levels

7. Anemia Management
a. ESA dosage appropriate for hemoglobin level

8. Standardized Readmission Ratio (SRR)
   a. Lower rate desired
   b. Ratio of the number of unplanned 30-day hospital readmissions to the number of expected unplanned 30-day hospital readmissions

The Centers for Medicare & Medicaid Services (CMS) administers the End-Stage Renal Disease (ESRD) Quality Incentive Program (QIP) to promote high-quality care by outpatient dialysis facilities treating patients with ESRD. The first of its kind in Medicare, this program changes the way CMS pays for the treatment of ESRD patients by linking a portion of payment directly to facilities’ performance on quality care measures. The ESRD QIP will reduce payments to ESRD facilities that do not meet or exceed certain performance standards.
Appendix G

Letter of Cooperation from Nursing Specialty Organization

June 29, 2017

VIA Email –

Karen Gaietto, RN, MSN, CNN
Clinical Content Developer
Clinical Education & Training

Dear Karen,

This letter will confirm that your request to purchase the American Nephrology Nurses Association membership list for the state of Ohio, for a one-time Eblast, has been approved per the following:

Project Title:
The Shortage of Expert Nephrology Nurses and Patient Quality Care Indicators

Per parameters contained in your submitted documentation (list below; documents attached):
- Proposal (Updated June 2017)
- IRB Net Document - Approval for Study
- Citi Completion Report 4396948
- Data Access and Use Permissions Template
- Appendix B - Study Protocol
- Appendix C - Survey Consent
- Appendix D - Invitation to Participate
- Appendix E - Survey

Please let us know if you have any additional questions.

Sincerely

Enclosures
Author Biography

Karen Gaietto is a nurse educator and clinical content developer for DaVita HealthCare Partners, Incorporated. She obtained her masters of nursing education and doctorate of nursing philosophy through the University of Phoenix and is certified in nephrology nursing care. Her work focuses on the nephrology nursing specialty practice, development of skill acquisition, and encouragement of continued educational at all levels of nursing. She believes in the promotion of evidenced based practice and enhancement of patient safety and quality care initiatives to improve the renal patient’s life. When not working or writing she enjoys spending time outdoors and with her husband, children, and grandchildren.