

**BUILDING BRIDGES TO EFFECTIVE CHRONIC KIDNEY DISEASE
MANAGEMENT: A MIXED-METHODS NEEDS ASSESSMENT
OF PRIMARY CARE PHYSICIANS AND MINORITY NEPHROLOGY
PATIENTS IN EASTERN NORTH CAROLINA**

by
Sally Pirate
May 2009

APPROVED BY:

PRIMARY PROFESSOR:

Joe Pirate, PhD

Date

PROFESSIONAL PAPER CONTENT ADVISOR:

Jane Pirate, MD

Date

CHAIR, DEPARTMENT OF PUBLIC HEALTH:

PeeDee Pirate, MD

Date

**Building Bridges to Effective Chronic Kidney Disease Management:
A Mixed-Methods Needs Assessment of Primary Care Physicians and Minority Nephrology
Patients in Eastern North Carolina**

Sally Pirate, MPH Candidate
East Carolina University
Brody School of Medicine, Department of Public Health
Hardy Building, 1709 W. Sixth Street
Greenville, NC 27834

MPH 6992-Professional Paper II

Primary Professor:

Joe Pirate, PhD
Brody School of Medicine
Department of Public Health

Primary Content Advisor:

Jane Pirate, MD
Brody School of Medicine
Department of Nephrology and Hypertension

Spring 2009

Building Bridges to Effective Chronic Kidney Disease Management: A Mixed Methods Needs Assessment of Primary Care Physicians and Minority Nephrology Patients in Eastern North Carolina

Sally Pirate, MPH¹, Joe Pirate, PhD¹, Jane Pirate, MD²

¹ Department of Public Health, Brody School of Medicine, East Carolina University, Greenville, NC 27834

² Department of Nephrology and Hypertension, Brody School of Medicine, East Carolina University, Greenville, NC 27834

Corresponding Author:

Sally Pirate, MPH, Department of Public Health, Brody School of Medicine, East Carolina University, Greenville, NC 27834

Telephone: 252-555-1234

Fax: 252-744-4008

Email: pirates252@ecu.edu

Running Head: Building Bridges to Effective Chronic Kidney Disease (CKD) Management

Word Count: 4,099

Key Words: Disease Management, Kidney Diseases, Needs Assessment, Nephrology, North Carolina, Primary Health Care

Abstract Word Count: 268

Figures: 0

Tables: 3

ABSTRACT

Objectives

This study aimed to assess and identify chronic kidney disease (CKD) management-related needs among primary care physicians (PCPs) and minority nephrology patients in Eastern North Carolina (ENC). The objectives were to: 1) identify gaps in CKD management; and 2) identify barriers to accessing health services among CKD patients

Methods

A mixed-methods needs assessment was conducted among two target populations in ENC: PCPs and minority nephrology patients. A random sample of 200 PCPs practicing in ENC was invited to complete a mailed, semi-structured questionnaire assessing demographics, knowledge of CKD management variables and physician-identified needs for improvement. Minority nephrology patients were recruited to participate in a one-time, qualitative interview assessing demographics and barriers to care.

Results

The response rate for the PCP questionnaire was 16.5% (n=33). The mean PCP participant age was 49.7 years. The majority of PCP respondents (45.5%) answered exactly 3 out of 5 questions correctly. Qualitative analysis of physician-identified needs for improving CKD management resulted in the following themes: desire for increased CKD knowledge and understanding, request for CKD management quick reference tools, need for local nephrology health services, need for better patient compliance, need for aggressive treatment of CKD co-morbidities, and need for affordable medications. Predominant barriers to care among patients were: (1) inability to afford and obtain necessary medications; (2) gaps in Medicaid and Medicare coverage; and (3) inconsistency in providers seen at primary care practices.

Conclusions

Our study highlighted some very important needs among PCPs and nephrology patients in ENC.

Additional research, to directly assess gaps in CKD management among various geographic areas, specialties, and provider types in North Carolina, is strongly recommended.

INTRODUCTION

The burden of chronic kidney disease (CKD) in the United States and North Carolina is approaching epidemic proportions. Approximately 26.3 million Americans are affected by earlier stages of CKD (stages 1-4).¹ It is estimated that in North Carolina alone, nearly 1 million people have CKD, not including those with renal failure.² Without proper treatment and management, CKD rapidly progresses to End-Stage-Renal Disease (ESRD), requiring dialysis or renal replacement therapy (stage 5). According to the United States Renal Data System, more than 387,000 people in the United States and 11,000 people in North Carolina suffer from ESRD, with racial and ethnic minorities disproportionately represented.³ While CKD has a significant impact on morbidity and mortality within the nation and the state, it often receives much less attention than other serious chronic illnesses such as diabetes or heart disease. The steadily increasing rates of CKD indicate that there are underlying issues that remain uncovered. Although CKD is not completely preventable, it can be effectively managed to dramatically improve the quality and length of life in renal disease patients.

Results from a study using the U.S. Renal Data System population, in which a mathematical model was developed to assess the economic impact of decreasing the progression of CKD, showed that if the rate of decline in glomerular filtration rate (GFR) decreased by 10%, 20%, and 30% after December 31, 1999, in all patients with a glomerular filtration rate (GFR) of 60 mL/min or less (diminished kidney function), cumulative direct healthcare savings through 2010 would equal approximately \$19, \$39, and \$61 billion dollars, respectively.⁴ The study also showed that for a 10%, 20%, and 30% decrease in the rate of decline in GFR in all patients with a GFR of 30 mL/min or less (approaching ESRD), estimated cumulative savings through 2010 would be \$9, \$20, and \$33 billion dollars, respectively.⁴ The study provides strong evidence for

supporting increased CKD management and avoiding the economic burden of ESRD, particularly dialysis treatment and renal transplantation.

CKD management is vital to improving health among renal disease patients in Eastern North Carolina (ENC), particularly high-risk minority populations. Unfortunately, there are numerous barriers to effectively managing this disease. In North Carolina, there are approximately 3.4 nephrologists per 10,000 people with CKD stages 2-5.³ This low ratio makes it difficult for nephrologists to properly address the needs of the exorbitant number of CKD patients within the state. Recently, the North Carolina Institute of Medicine's Task Force on CKD acknowledged this issue and suggested that nephrologists pursue collaborative relationships with primary care practitioners to improve CKD management practices and allow nephrologists to focus on caring for patients with advanced renal disease.³

The objectives of this mixed-methods needs assessment were to: 1) identify gaps in CKD management among primary care physicians (PCPs) through a mailed, semi-structured, 12-item questionnaire to a random sample of 200 PCPs practicing in the 41-county region of ENC; and 2) identify concerns related to accessing primary and specialty health care through open-ended interviews with 12 dialysis and 12 pre-dialysis patients seen at the Nephrology and Hypertension Center in Greenville, NC.

METHODS

A mixed-methods needs assessment was conducted among two target populations in ENC: PCPs and minority nephrology patients. Researchers obtained approval from the East Carolina University, Brody School of Medicine, University Medical Center Institutional Review Board (UMCIRB) prior to the initiation of this project. All subjects' rights were protected.

Needs Assessment of PCPs

A current CD roster of all practitioners in North Carolina was obtained via a \$25 request from the North Carolina Medical Board. The roster was stratified by state, license type, primary specialty and then by the 41 ENC counties to include only those physicians practicing in ENC and exclusively in the specialties of general internal medicine and family practice. A random sample of 200 eligible PCPs was contacted to participate via mailed questionnaires.

The 12-item questionnaire contained six questions assessing demographic characteristics including age, sex, race, ethnicity, highest medical degree obtained, and year highest medical degree received. Five additional fixed questions assessed the following CKD management variables: proper diagnosis and treatment of CKD, hypertension awareness/management, proteinuria relevance/management, diabetes awareness/management, anemia management, National Kidney Foundation Kidney Disease Outcomes Quality Initiative awareness (K/DOQI), and proper and timely referral to a nephrologist. Questions 1-3 were patient scenarios obtained from the 2007 American College of Physicians' Medical Knowledge Self-Assessment Program (MKSAP) version 14. Questions 4 and 5 were exam-style questions obtained from the National Kidney Foundation. All questions were accessed via the East Carolina Center for the Study and Treatment of Kidney Disease (ECCKD). All answers were validated by the American College of Physicians' internal board and the National Kidney Foundation's review panel, as well as Brody School of Medicine Nephrology faculty prior to use. Additionally, levels of difficulty were assigned to questions 1-5 by ECCKD nephrologists; easy, medium, difficult, medium, easy, respectively. The 5 fixed questions were assessed using validated answers from the MKSAP 14 and National Kidney Foundation. Questions with multiple responses were deemed incorrect. The total number of questions correct was recorded based on the following 6 categories: None, 1, 2,

3, 4, All. One open-ended question assessed self-identified areas of need and recommendations for improving CKD management by PCPs; “In your opinion, what would help you better manage CKD in your patients?”

This study consisted of three mailings. At the initial mailing, PCPs were asked to return the questionnaires in provided self-addressed stamped envelopes. Follow-up reminder post cards were mailed to all non-respondents three weeks after the initial mailing. All physicians who had not responded by March 15, 2009 were considered “refusals”. Each participating physician was mailed an incentive packet containing an answer key, guidelines for managing CKD, and a thank you card.

Needs Assessment of Minority Nephrology Patients

Twelve dialysis and twelve pre-dialysis minority patients were recruited to participate in a one-time qualitative interview. Eligible patients were African-American or Native American adults between the ages of 18 and 70 years and who were diagnosed with chronic kidney disease in the pre-dialysis stage or end-stage renal disease and receiving dialysis. Only patients seen at the Nephrology & Hypertension Center located in Greenville, NC were eligible to participate in the study.

Purposive criterion sampling was employed to recruit patients for this study. Nephrologists at the Nephrology & Hypertension Center informed eligible patients about the study, its purpose and referred all interested patients to project staff. Project staff then informed the patients about the interview process and obtained informed consent prior to the initiation of the interview. All interviews occurred in a private setting within the clinic. Dialysis patients were interviewed prior to the initiation of their dialysis treatment. Pre-dialysis patients were interviewed following their nephrology clinic visit. Project staff recorded responses by hand and

using a tape recorder. Tape recorded interviews were transcribed after the interviews and matched with supplemental hand-recorded notes.

Once informed consent was obtained, demographic information was requested from each participant. The seven demographic variables assessed were: age, sex, race, ethnicity, highest level of education, insurance status and annual household income. Ten open-ended questions were posed to each patient to assess the barriers to accessing primary and specialty health services and patient-identified issues or concerns regarding their health and health care.

Data Analysis

Descriptive statistics were presented as numeric values for continuous data and percents for categorical data. Independent samples t-tests were used to compare the continuous provider demographic variables *age* and *years practicing* between two knowledge-level groups (Group 1: ≤ 3 correct; Group 2: 4 or 5 correct). Due to the small sample size, the Fisher's exact test was used to compare the categorical provider demographic variables *sex*, *race*, and *license type* between the same two knowledge-level groups (Group 1: ≤ 3 correct; Group 2: 4 or 5 correct). All quantitative analyses were conducted using SPSS 17.0.⁵

Qualitative data gathered from the semi-structured physician questionnaires and patient interviews were managed using QSR NVivo 8.0 qualitative data management software.⁶ Independent coders assessed the physician responses and data-rich patient interview transcripts, developing codes both inductively and deductively. A collaborative codebook was developed, identified in the data and translated into categorical themes. Themes and patterns were reviewed and generalizations were found in the data.

RESULTS

Needs Assessment of PCPs

Of the 200 physicians contacted to participate in the study, 33 (16.5%) returned a completed questionnaire. The majority of participating physicians, 87.9%, were licensed MDs. The mean age was 49.7 years. The majority of respondents were male, non-Hispanic or Latino, White/Caucasian, physicians who have practiced medicine over 20 years (Table 1).

Resulting percentages for the total number of questions answered correctly based on the 6 categories (None, 1, 2, 3, 4, All) were 0.0%, 0.0%, 6.1%, 45.5%, 30.3% and 18.2%, respectively. The percent responding correctly for the 5 fixed questions ranged from 48.5% to 100.0%.

When we examined the bivariate association between knowledge of CKD treatment categorized into two groups (Group 1: ≤ 3 correct; Group 2: 4 or 5 correct) and the continuous demographic variables *age* and *years practicing*, we found no statistically significant differences between the two groups (Table 2). We also examined the bivariate association between knowledge of CKD treatment as defined by two groups and the categorical demographic variables *sex*, *race*, and *license type* and found no statistically significant differences between the two groups (Table 2).

Forty-nine percent of respondents completed the single open-ended question that asked, “In your opinion, what would help you better manage CKD in your patients?” Qualitative analysis of this question revealed the following predominant themes: (1) desire for increased CKD knowledge and understanding, (2) request for quick reference tools for CKD management, (3) need for local nephrology health services, (4) need for better patient compliance, (5) need for aggressive treatment of CKD co-morbidities, and (6) need for affordable medications.

Needs Assessment of Minority Nephrology Patients

The twelve dialysis patients interviewed had a mean age of 54.1 years. Interviewees were all African-American and predominantly female, with half having achieved a high school diploma or higher. Medicare was the only source of insurance coverage for the majority of these patients and most indicated a total annual household income of less than \$15,000 (Table 3).

The twelve pre-dialysis patients interviewed had a mean age of 55.6 years. Interviewees were all African-American and predominantly female. The majority of these patients indicated an education level of less than high school (or equivalent). In contrast to the dialysis patients, Medicaid was the predominant source of insurance coverage, with most pre-dialysis patients indicating a total annual household income between \$15,000 and \$34,999 (Table 3).

Most dialysis and pre-dialysis patients interviewed identified rising medical costs as barriers to receiving health services, with the majority reporting the cost of medications as their primary barrier to care. The inability to afford necessary medications resulted in many of these patients not taking them or using alternative remedies. One patient said, "...and I ain't taking my medicine like I supposed to", while another stated, "...and I got a couple prescriptions from January that I haven't filled yet...I can't fill." When describing high blood pressure, one patient stated, "You know, I used to use vinegar. I would take a sip of vinegar...anything to get this pressure down." The high cost of medications was even the basis for one dialysis patient's decision not to pursue renal transplantation. According to this patient, "...And you talking about one of these prescriptions is \$2,500 and \$800. Now, that's an issue. So, I'm thinking, is it worth it? Is it worth me going through this? And then get to the point where I cannot take that medicine or afford that medicine at this particular month and then all of a sudden, I'm right back here...Because I can't afford to take that medicine...So, I just said uh uh. I'm not gonna do that.

Unless God change my mind. I'm just gonna stay like I am." One patient reported seeking medication assistance at the local federally-qualified health center, the Bernstein Center. This patient stated, "...Because at one time, some of the medicines they were putting me on, I couldn't afford them...I couldn't afford them so, when I moved to the Bernstein Center, I get them for \$5. That's a lot better."

Gaps in Medicaid and Medicare coverage were also common barriers for these patients. One patient stated, "Well, when I reach my gap payment, I have to pay full price...Because, when the gap is reached, they go back and charge me the full price for medicines that I need and stuff until the next year come in." Most patients expressed not only frustration with gaps in coverage for services, but confusion as well. One patient stated, "...Once you sign up, like your Medicaid and your Medicare thing doesn't kick in no more, the insurance some kind of way kicks in." According to another, "You know, I really have to have it, but sometimes, it gets where...I guess, you call it a spend down. Where they get cheaper, but then after that, it'll go back up. I got one prescription, was costing me like \$300 and I need it. So what I would do, I would just try to get a few at a time."

Another key barrier identified by these patients was an inconsistency in providers seen at primary care practices. Among others, some direct statements regarding this were, "You know, every time I go, I usually have them, but they always changing the doctor at family practice. Every time you go, you got a different doctor"; "...when they don't switch up on me"; and "...ever since I was big enough to go to the doctor on my own. But they just change so much, you can't keep up with the name."

Most patients reported having no difficulties attending scheduled doctor or dialysis appointments. Transportation problems or interference from work posed difficulties for some

patients. The majority of patients also reported currently having a primary care doctor. Most interviewees felt that they adequately followed the doctor's instructions. Those that did not follow instructions were unable to do so because they could not obtain their medications, did not feel like taking them or could not lose weight as advised. The majority of patients felt that nothing could be done to help their kidney doctor better treat them for kidney disease, as they felt that current efforts by their kidney doctor were sufficient. However, some patients suggested that better communication (if doctor listens to them), honesty, keeping scheduled appointments and more "one-on-one hands-on time" would help their kidney doctor better treat them for kidney disease.

While most patients felt that neither they nor their kidney doctor could have done anything differently to prevent them from progressing to dialysis, others identified specific areas that could have been improved. Those patients specified the following: (1) their doctor could have let them know sooner; (2) regret drinking alcohol as much; (3) a better diet; and (4) if their primary care doctor had listened to their complaints. One patient stated, "...before I was seeing the doctors over there in...and I kept telling them, I kept telling them something is not right with my back. My back keeps hurting, my back keeps hurting...but, they give you Motrin and send you home...never took a chance to check my kidneys."

Nearly all patients were satisfied with the care being received from their nephrologist. When one unsatisfied patient was asked to identify a specific area in which their care could be improved, the patient stated, "...the listening part." Most patients indicated that they had a late diagnosis of CKD. Most reported that their kidneys had failed when they found out they had kidney complications and very few reported receiving proper warning from a physician that their

kidneys were deteriorating. Their main advice for other patients was to take their medicines and do what the doctor says.

Diabetes and hypertension were mentioned more frequently among pre-dialysis patients. Many pre-dialysis patients also expressed uncertainty regarding their current condition. Direct statements regarding uncertainty were, “I’m not really educated as to, you know, what it is that can be done. You know, I basically go on what they tell me as far as the options that I have as far as dialysis”; “...I’m not exactly sure on the level of my kidney function right now”; and when asked what they were specifically unsure of, “Exactly how much time do I have before I definitely need to go on dialysis. Basically, how much time I have left.”

DISCUSSION

Our needs assessment of PCPs revealed several important findings. The majority of PCPs responding to the survey answered 3 out of 5 questions correctly. Respondents performed the poorest on the MKSAP 14 questions, of which there were 3. These questions assessed proper diagnosis and treatment of CKD, hypertension awareness/management, proteinuria relevance/management and diabetes awareness/management. Qualitative analysis of physician-identified needs for improving CKD management resulted in the following themes: (1) desire for increased CKD knowledge and understanding, (2) request for quick reference tools for CKD management, (3) need for local nephrology health services, (4) need for better patient compliance, (5) need for aggressive treatment of CKD co-morbidities, and (6) need for affordable medications.

A literature search revealed no studies that directly quantitatively or qualitatively assessed the needs of PCPs practicing in North Carolina with regard to current knowledge and

practices of standard nephrology guidelines. However, a recent study was conducted at Duke University in which a commercial database was analyzed to assess practice patterns and conformance to clinical practice guidelines among nephrologists and non-nephrologists who care for patients with advanced CKD (estimated GFR [eGFR] ≤ 30 ml/min per 1.73 m^2).⁷ While this study was not restricted to include North Carolina practitioners only, the study found that nephrologist conformance to guidelines was systematically better than that of non-nephrologists.⁷ It also found that a large number of patients with advanced CKD were being treated solely by non-nephrologists.⁷

Comparable to our study, a qualitative study of 10 PCPs conducted in an upstate New York practice-based research network in 2006 directly assessed the needs of PCPs in managing CKD. It resulted in five general themes similar to the current study: (1) lack of awareness of K/DOQI guidelines; (2) desire for more CKD practice guidance; (3) persistence of traditional, less accurate, diagnostic procedure; (4) variability in the treatment of complications; and (5) uncertainty of timing for referral to a nephrologist.⁸ Respondents in our study not only demonstrated weaknesses in their knowledge of standard nephrology practice guidelines by their performance on the assessment, but they also self-identified the need for greater knowledge and understanding of CKD treatment and management practices, as well as quick reference tools for reinforcement. By directly involving primary care physicians in the identification of specific opportunities for improving management of CKD by non-nephrologists, our study adds valuable information to the current literature pool.

Additionally, our needs assessment of minority nephrology patients revealed several key findings. Predominant barriers to care identified among the patients interviewed were: (1)

inability to afford and obtain necessary medications; (2) gaps in Medicaid and Medicare coverage; and (3) inconsistency in providers seen at primary care practices.

Perhaps the most important aspect of effectively managing CKD and slowing the progression to ESRD is the ability of patients to adequately and consistently receive the care that will facilitate such outcomes. While the literature has identified barriers to accessing health care such as issues with transportation and unaffordable health services, there have been no studies specifically examining barriers within the CKD patient population, minority or otherwise.⁹ A literature search also revealed no studies conducted within the United States that qualitatively assessed the needs of minority nephrology patients with earlier stages of CKD. The qualitative studies conducted in the United States that currently exist within the literature targeted ESRD patients already on dialysis or transplanted and focused on other issues such as quality of life, adherence to medication regimens, and donor attitudes.¹⁰⁻¹² Based on these findings, the existing literature fails to identify barriers associated with access to care among nephrology patients with earlier stages of kidney disease.

Strengths and Limitations

This project reflects PCPs' knowledge and practices in ENC regarding CKD management, as well as detailed themes highlighting specific areas of need among providers and patients. A primary strength of this project is that it provides much needed information in a research area that has received little attention. Exploratory and descriptive in nature, this project uncovered issues among nephrology patients that had yet to be identified, particularly among low-income, rural minority patients. It also provided insight into CKD management practices by PCPs in North Carolina; an area that had not previously been examined.

However, our mixed-methods needs assessment had several limitations. First, the response rate for the PCP questionnaire was 16.5%. A meta-analysis of citations for articles published from 1985-1995 found an average response rate for physician mailed questionnaires of 61%.¹³ While the response rate for this study was undoubtedly poor and significantly lower than the average response rate found in the previously mentioned meta-analysis, lower response rates are not uncommon for mailed physician questionnaires, one of the more frequently used methods of surveying physicians in health services research. A quantitative study employing mailed questionnaires to primary care physicians assessing knowledge, attitude and practices related to newborn hearing screening produced a response rate of 16.1%.¹⁴ Comparable to our study, questionnaires were mailed to a random sample of physicians and reminder post cards were mailed a couple weeks following the initial correspondence.¹⁴ That study resulted in a low response rate given an original sample size of 12, 211.¹⁴ A systematic review of 66 published reports published in 2007 explored methodologies for improving response rates in surveys of physicians.¹⁵ This review found postal and telephone strategies including small monetary incentives to be more successful than fax or web-based approaches.¹⁵ It also found questionnaires that were brief, personalized and endorsed by legitimizing professional associations to be more effective.¹⁵ While this study's physician questionnaire was fairly brief, personalized and endorsed by the ECCKD, the low response rate suggests that inclusion of a more substantial incentive may have improved participation.

Other primary limitations of this needs assessment are the small sample sizes for both target populations and the narrow geographic area. The small sample size contributed to the inability to find statistically significant differences between the two physician groups based on knowledge of CKD treatment and limits generalizability of the quantitative results. Convenience

sampling of minority nephrology patients for this study also greatly limits generalizability of the qualitative interview findings. Mailing of the questionnaires to the practitioners could have compromised the integrity of the research if participants opted to use additional resources to respond to the questions. Some physicians also chose multiple responses for fixed questions. While the wording of the questions implied selection of only one answer, this should have been explicitly stated in the instructions.

Conclusions

Our needs assessment provides real-time information regarding individual, interpersonal and community barriers to effective CKD management at the PCP and patient levels. This information is currently missing from the literature and will undoubtedly serve as a benchmark for those striving to effect change in our systems. In order to optimize CKD care, PCPs must be better integrated into the existing care model. This will involve identifying and acknowledging the needs of PCPs regarding CKD diagnosis and treatment, as well as accurately responding to those needs. While no statistically significant differences were found between groups based on performance on the assessment and demographic variables, only 18.2% of participants answered all 5 questions correctly. This provides a strong basis for further inquiry. Furthermore, our study emphasizes the importance of open communication among providers and patients. Renal disease patients should have a working understanding of their disease and be empowered to actively participate in treatment and management decision making. Established partnerships between providers and patients provide continuity and are highly encouraged.

Though small, our study highlighted some very important needs among PCPs and nephrology patients in ENC. Additional research, on a much larger scale, to assess gaps in CKD management among various geographic areas, specialties, and provider types, is strongly

recommended. While additional research is invaluable to thwarting the growing problem of CKD incidence and prevalence within NC, translation of such research into real practice solutions is of paramount importance. Currently, the ECCKD is actively pursuing educational and training opportunities to improve CKD management by primary care physicians in ENC. We encourage the ECCKD, as well as our colleagues throughout the state, to maintain a focus on translating this and other research into sustainable and effective best-practice solutions. Building bridges to effective CKD management is essential for improving health and health care among renal disease patients in ENC and beyond.

REFERENCES

1. Coresh J, Selvin E, Stevens LA, et al. Prevalence of chronic kidney disease in the United States. *JAMA*. 2007;298(17):2038-2047.
2. Vupputuri S, Jennette CE. *The Burden of Kidney Disease in North Carolina, 2007*. University of North Carolina Kidney Center, Chapel Hill, July 2007.
3. Alexander-Bratcher K, Plesia M, Skipper L, Silberman P, Holmes M. Chronic Kidney Disease in North Carolina. *N C Med J*. May/June 2008;69(3):197-204
4. Trivedi HS, Pang MM, Campbell A, Saab P. Slowing the progression of chronic renal failure: economic benefits and patients' perspectives. *Am J Kidney Dis*. 2002;39(4):721-729.
5. SPSS for Windows, Rel. 17.0.0. 2008. Chicago: SPSS Inc.
6. QSR NVivo Version 8.0. 148.0 Patent Pending. Copyright © QSR International Pty. Ltd. 1999-2008. All rights reserved.
7. Patwardhan M, Samsa G, Matchar D, Haley W. Advanced Chronic Kidney Disease Practice Patterns among Nephrologists and Non-Nephrologists: A Database Analysis. *Clin J Am Soc Nephrol* 2007; 2: 277-283
8. Fox C, Brooks A, Zayas L, McClellan W, Murray B. Primary Care Physicians' Knowledge and Practice Patterns in the Treatment of Chronic Kidney Disease: An Upstate New York Practice-based Research Network (UNYNET) Study. *JABFM*. January-February 2006; 19(1):54-61
9. Devoe J, Baez A, Angier H, et al. Insurance+Access≠Health Care: Typology of Barriers to Health Care Access for Low-Income Families. *Ann Fam Med*. 2007;5(6):511-518.
10. Al-Arabi S. Quality of Life: Subjective Descriptions of Challenges to Patients with End Stage Renal Disease. *Nephrology Nursing Journal*. May-June 2006. 33(3):285-292.
11. Zelikovsky N, Schast AP, Palmer JA, Meyers KEC. Perceived Barriers to Adherence among Adolescent Renal Transplant Candidates. *PediatrTransplantation*; 2008;12:300–308.
12. Pradel F, Mullins D, Bartlett S. Exploring donors' and recipients' attitudes about living donor kidney transplantation. *Progress in Transplantation*; Sep 2003; 13 (3):203-210.
13. Moeller M, White K, Shisler L. Primary Care Physicians' Knowledge, Attitudes, and Practices Related to Newborn Hearing Screening. *Pediatrics*. October 2006; 118(4):1357-1370.

14. Cummings S, Savitz L, Konrad T. Reported Response Rates to Mailed Physician Questionnaires. *HSR: Health Services Research*. February 2001; 35(6):1347-1355.
15. VanGeest J, Johnson T, Welch V. Methodologies for Improving Response Rates in Surveys of Physicians: A Systematic Review. *Eval Health Prof*. 2007; 30:303-321

TABLES

Table 1. Demographic Characteristics of PCP Survey Respondents (N=33)

Characteristic	% (n)
Age (years)	
25-49	42.4 (14)
50-64	30.3 (10)
≥ 65	6.1 (2)
Missing	21.2 (7)
Mean ; years (s.d.)	49.7 (11.5)
Sex	
Male	75.8 (25)
Female	24.2 (8)
Ethnicity	
Hispanic or Latino	9.1 (3)
Not Hispanic or Latino	81.8 (27)
Missing	9.1 (3)
Race	
White/Caucasian	81.8 (27)
Black/African-American	6.1 (2)
Asian	6.1 (2)
Other	3.0 (1)
Missing	3.0 (1)
License Type	
MD	87.9 (29)
DO	12.1 (4)
# Years Practicing	
≤10	21.2 (7)
11-20	24.2 (8)
>20	54.5 (18)

Table 2. Demographic Characteristics by Knowledge-Level Group

Characteristic	Group 1: ≤ 3 correct (n=17)	Group 2: 4 or 5 correct (n=16)	<i>p</i>
Age [*] ; mean (n)	48.5 (12)	50.6 (14)	0.645
Years practicing [*] ; mean (n)	20.9 (17)	23.4 (16)	0.538
Male ^{**} ; % (n)	70.6 (12)	81.3 (13)	0.688
White/Caucasian ^{**} ; % (n)	70.6 (12)	93.8 (15)	0.175
MD ^{**} ; % (n)	82.4 (14)	93.8 (15)	0.601

* Group means were compared using the independent samples t-test; Equal variances assumed; 2-sided

** Group proportions were compared using Fisher's exact test; 2-sided

Table 3. Demographic Characteristics of Minority Nephrology Patients Interviewed

Characteristic	Dialysis (n=12) % (n)	Pre-dialysis (n=12) % (n)
Age (years)		
18-49	16.7 (2)	25.0 (3)
50-64	75.0 (9)	58.3 (7)
≥ 65	8.3 (1)	16.7 (2)
Mean (s.d.)	54.1 (9.4)	55.6 (9.0)
Sex		
Male	41.7 (5)	25.0 (3)
Female	58.3 (7)	75.0 (9)
Ethnicity		
Not Hispanic or Latino	58.3 (7)	50.0 (6)
Missing	41.7 (5)	50.0 (6)
Race		
Black/African-American	100.0 (12)	100.0 (12)
Highest level of education		
Less than high school (or equivalent)	50.0 (6)	66.7 (8)
High school graduate (includes equivalency i.e. GED)	16.7 (2)	25.0 (3)
Some college, no degree	16.7 (2)	8.3 (1)
Bachelor's degree	16.7 (2)	0.0 (0)
Insurance Status		
Private only	0.0 (0)	25.0 (3)
Medicare only	66.7 (8)	0.0 (0)
Medicaid only	8.3 (1)	33.3 (4)
Combined coverage	25.0 (3)*	16.7 (2)**
Uninsured	0.0 (0)	8.3 (1)
Uncertain/no answer	0.0 (0)	16.7 (2)
Annual Household Income		
Less than \$14,999	33.3 (4)	25.0 (3)
\$15,000-\$34,999	25.0 (3)	33.3 (4)
\$35,000-\$49,999	8.3 (1)	8.3 (1)
\$50,000-\$74,999	8.3 (1)	8.3 (1)
\$75,000-\$99,999	8.3 (1)	0.0 (0)
Do not know	16.7 (2)	8.3 (1)
Prefer not to say	0.0 (0)	16.7 (2)

* Three dialysis patients with combined coverage indicated the following: (1) private insurance and Medicare; (2) private insurance, Medicare and Medicaid; and (3) Medicare and Medicaid.

** Two pre-dialysis patients with combined coverage both indicated private insurance and Medicare.