Chapter Five

Conclusions

Chronic kidney disease (CKD) is a major public health problem facing the state. There are a little less than a million people in North Carolina with different stages of chronic kidney disease. Many people do not realize they have CKD, especially in the early stages. Kidney disease is the 10th leading cause of death in our state, but the impact of this disease is actually far greater. A person's kidneys filter out toxins and other waste from their body. Improperly functioning kidneys can lead to damage in other body organs. Thus, people with kidney disease die more often of cardiovascular diseases than through complete kidney failure.

Like many other diseases, chronic kidney disease is largely preventable. Public health campaigns that help reduce the incidence of diabetes and hypertension will lead to reductions in the number of people with CKD. In addition, with early intervention and treatment people with CKD can learn to manage their chronic health problems. The treatment of kidney disease is often the same or complimentary to the treatment prescribed for high blood pressure or diabetes. Therefore, helping people with CKD manage their health problems will also lead to improvements in other comorbid conditions.

The North Carolina General Assembly has recognized the growing prevalence of kidney disease and identified it as a health challenge facing the state. In 2006 the General Assembly directed the North Carolina Institute of Medicine to study this problem and develop recommendations to implement a cost effective plan for prevention, early screening, diagnosis, and treatment of chronic kidney disease and its complications.

The Task Force organized its recommendations around a comprehensive system of care for people at various stages of kidney disease. These recommendations also address the legislative charge to the Task Force:

(1) Reduce the occurrence of chronic kidney disease by controlling the most common risk factors, diabetes and hypertension, through preventive efforts at the community level and disease management efforts in the primary care setting.

The Task Force identified a number of public and private initiatives that are aimed at controlling some of the common risk factors that contribute to CKD (including diabetes and hypertension). However, these programs are not available statewide. In Recommendations 4.1-4.3 the Task Force recommended continuation of these programs and further expansion of educational efforts. The Task Force specifically recommended increasing appropriations to the Division of Public Health by $500,000 annually to expand diabetes prevention and control with these funds targeted to community-based programs that educate at-risk populations about CKD and the importance of early screening.

(2) **Educate the public and health care professionals about the advantages and methods of early screening, diagnosis, and treatment of chronic kidney disease and its complications based on Kidney Disease Outcomes Quality Initiative (KDOQI) Clinical Practice Guidelines for chronic kidney disease or other medically recognized clinical practice guidelines.**

The Task Force recognized that more work is needed to educate the public and primary care providers about the importance of early screening. Recommendations 4.3 and 4.4 are targeted at educating the public about CKD and early intervention while Recommendation 4.6 targets health care professionals.

As noted previously, the Task Force recommended that the General Assembly appropriate $500,000 to implement community-based diabetes prevention and control programs that target at-risk populations for CKD (Rec. 4.3). Part of these funds would be used to educate at-risk populations about chronic kidney disease and the importance of early screening. Similarly, Recommendation 4.4 asks public and private payers to examine their claims data to identify people who may be at-risk of or diagnosed with CKD in order to send targeted patient education materials to educate their enrollees about this condition.

The Task Force identified the need to provide more targeted education to primary care providers about the importance of early screening, the use of the eGFR to “stage” people with chronic kidney disease, and the application of evidence-based treatment guidelines for people with CKD. Strategies to provide more intensive education were identified in Recommendation 4.6.

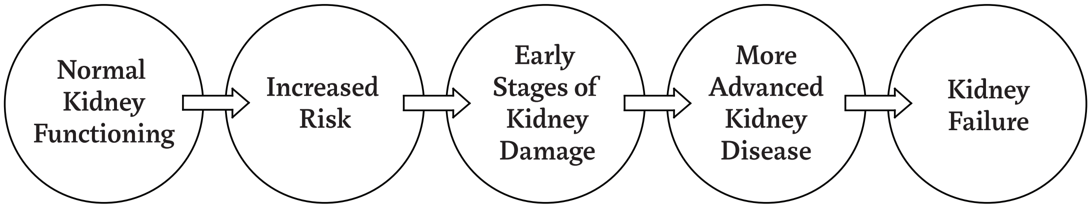
(3) **Educate health care professionals about early renal replacement therapy education for patients (including in center dialysis, home hemodialysis, peritoneal dialysis as well as vascular access options and transplantation) prior to the onset of end-stage kidney disease when kidney function is declining.**

The Task Force spent a great deal of time examining ways to prevent kidney disease or delay the progression of the disease through better disease management. Inevitably, there will be some individuals with CKD who progress to kidney failure. These patients need better education about all their choices of kidney therapy—including transplantation, home dialysis, in-center dialysis, and supportive therapy only—as well as education about the importance of protecting their veins prior to the need for dialysis. In addition, the Task Force recognized the importance of providing patients with early vascular access to support dialysis (if that is the option chosen by the patient) in order to reduce the need for more expensive emergency placement of vascular access. These issues are addressed in Recommendation 4.15.

(4) **Make recommendations on the implementation of a cost-effective plan for prevention, early screening, diagnosis, and treatment of chronic kidney disease and its complications for the State's population.**

The Task Force considered ways to implement a cost-effective plan for the prevention, early screening, diagnosis, and treatment of chronic kidney disease. The goal was to either prevent CKD from occurring or to identify patients early in the disease so as to provide appropriate treatment to manage their health problems. The higher costs of dialysis and treatment of complications from comorbid conditions could be reduced by funding efforts to lower the prevalence of diseases and conditions that can lead to CKD, that accelerate progression in the GFR decline, and/or that lead to complications in CKD. Thus, the Task Force recommended a system of care encompassing prevention, early identification, and treatment to prevent or delay the progression of kidney disease to kidney failure. The first three elements of the coordinated system of care focus on people with normal kidney functioning, increased risk, or early stages of kidney damage. The goal is to prevent more advanced kidney disease or kidney failure.

Chart 4.1.
Coordinated System of Care for Patients as They Progress with Kidney Disease



Normal Kidney Functioning	Increased Risk	Early Stages of Kidney Damage	More Advanced Kidney Disease	Kidney Failure
◆ Primary prevention to reduce risk factors ◆ Outreach and education *(Recs. 4.1-4.4, 4.6)*	◆ Screen for CKD *(Recs. 4.5, 4.7-4.9)*	◆ Primary care provider diagnoses and develops treatment action plan ◆ Primary care providers work in collaboration with patient educators and specialists to manage patient's care ◆ Patient education and disease management ◆ Treatment of comorbid conditions *(Recs. 4.5-4.14)*	◆ Nephrologist assumes care of kidney disease ◆ Treat for complications, comanagement with primary care provider and other specialists (as needed) ◆ Disease and case management ◆ Patient education about kidney replacement options ◆ Preparation for replacement, if the patient chooses kidney replacement *(Recs. 4.15)*	◆ Replacement by dialysis or transplant *(Recs. 4.15)*

Adapted from National Kidney Foundation. KDOQI clinical practice guidelines for chronic kidney disease: evaluation, classification, and stratification. *Am J Kidney Dis*. 2002;39(suppl. 1):S1-S266.p.6 Figure 1.

The Task Force focused on identifying people who are at high-risk for developing kidney disease and screening them (Rec. 4.5) by obtaining a spot urine albumin to creatinine ratio and a serum creatinine to obtain the estimated GFR (Recs. 4.7 and 4.8). Patients who have been identified as having CKD should have their disease "staged" using the National Kidney Foundation's five stages of disease categories (Rec. 4.7). Providers should follow the KDOQI or other evidence-based guidelines to manage or slow the progression of the disease and should refer the patients to nephrologists in the early stages for consults or in the later stages for more active management of kidney disease (Rec. 4.7). In addition, public and private payers and insurers should develop disease management systems and quality improvement initiatives to ensure that patients receive evidence-based standards of care and that they are educated appropriately to manage their health problems (Recs. 4.10, 4.11, 4.12, 4.13, 4.14).

(5) Identify current barriers to adoption of best practices and potential policy options to address these barriers.

Primary care providers are currently faced with enormous challenges providing the most up-to-date evidence-based care to all of their patients. The Task Force recognized that the time and resource constraints facing most primary care providers were one of the greatest barriers which prevented patients with CKD from receiving evidence-based care. Thus, the Task Force recommended system supports to facilitate primary care practitioners in the adoption of best practices. First, the Task Force recommended that all laboratories in the state report the eGFR anytime a practitioner requests a serum creatinine measurement (Rec. 4.8). Second, the Task Force recommended that all businesses that develop electronic health records include clinical decision supports to help identify patients at risk for developing CKD and to help manage patients with the condition (Rec. 4.9).

The second barrier that the Task Force identified was the lack of insurance coverage. The Task Force recognized that some of the at-risk populations identified with CKD will be uninsured. These uninsured patients will need access to ongoing primary care, medications, and nephrology consults (when necessary) in order to manage their chronic health problem. The Task Force recommended that the General Assembly appropriate additional funds to expand the health care safety net and pay for nephrology consults for the uninsured who have been identified with CKD (Rec. 4.5).

In total, the Task Force made 15 recommendations, 6 of which were considered high priority. These recommendations, if implemented, will lead to reductions in the incidence of chronic kidney disease in the future. Equally important, ensuring that people with chronic kidney disease are identified early and provided appropriate education, support and treatment to manage their health problems should lead to improved health status, increased productivity, and the reduced disability that results if their conditions progress to kidney failure.

	General Assembly	DHHS	Primary Care Providers	Nephrologists	Insurers and Payers	Other
Rec. 4.1 The Task Force supports ongoing efforts by the North Carolina Division of Public Health, the North Carolina Department of Public Instruction, and other state and local organizations to enhance community education about and reduce the risk factors for chronic kidney disease.		✓				
Rec. 4.2 The North Carolina General Assembly should increase funding to the Division of Public Health to build statewide capacity for chronic disease prevention programs that reduce the risk factors that may lead to chronic kidney disease by funding implementation of the Eat Smart, Move More NC objectives and by increasing funding to local communities through the Statewide Health Promotion, Healthy Carolinians, and Health Disparities programs.	✓	✓				
Rec. 4.3 (PRIORITY) (a) The NC General Assembly should appropriate $500,000 in recurring funding to the Division of Public Health and the Office of Minority Health and Health Disparities to expand diabetes prevention and control funding. Funding should be limited to programs that are built on evidence-based or promising practices that educate at-risk populations about CKD and the importance of early screening. Funding priority should be given to programs that: (1) Increase outreach in existing counties and to expand to counties that are not being adequately served by existing programs. (2) Include a plan for ongoing evaluation of effectiveness.	✓ $500K	✓				✓ (Community-based program)

	General Assembly	DHHS	Primary Care Providers	Nephrologists	Insurers and Payers	Other
(3) Target populations at increased risk for developing CKD, and incorporate local partners such as faith-based health ministries, beauty salons/barber shops, civic and senior citizen groups, public health departments, and primary care practitioners. (b) Programs must be evaluated in a timely fashion to demonstrate effectiveness in order to receive continued funding. (c) In order to ensure that the most effective elements of programs are emulated appropriately, the Division of Public Health and Office of Minority Health and Health Disparities should work with existing grantees and others to foster inter-program collaboration. Collaborative activities should include, but not be limited to, sharing of appropriately privacy-protected evaluative data to allow improvement in a program's current (or potential) design.						
Rec. 4.4 Public and private insurers should examine patient-level eligibility and claims data to identify people who are at risk of or diagnosed with CKD. Insurers should explore mechanisms to increase awareness of CKD among consumers at risk, such as targeted messaging that encourage consumers to be screened for kidney function.					✓	
Rec. 4.5 (PRIORITY) (a) The North Carolina General Assembly should provide $550,000 in recurring funding to the Division of Public Health to help pay for the screenings of uninsured patients who are at high-risk for developing kidney disease,	✓ $22.9 M	✓				

	General Assembly	DHHS	Primary Care Providers	Nephrologists	Insurers and Payers	Other
including people with diabetes, hypertension, cardiovascular disease, family history of CKD, or other evidence-based risk factors which have been demonstrated to contribute to the development of CKD.[a] (b) The North Carolina General Assembly should appropriate an additional $2,400,000 to the Community Health Center grants program to expand care to uninsured individuals with CKD.[b] Priorities should be given to: (1) Areas of the state that do not have sufficient safety net capacity. (2) Programs that provide primary care, disease management, and care management to patients with CKD.						

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[a] This cost estimate assumes that the Division of Public Health will screen 5% of the uninsured population with hypertension. The Division of Public Health estimated that there are approximately 328,000 uninsured adults with hypertension. The current combined cost for a urine microalbumin and serum creatinine laboratory report is approximately $38. Multiplying these figures indicates a total cost of close to $11.5 million. The Division estimates that they may be able to screen approximately 5% of these individuals for a cost of $550,000.

[b] Combining information from a variety of data sources including the Behavioral Risk Factor Surveillance Survey (BRFSS) and the National Health and Nutrition Examination Survey (NHANES), the NC IOM estimates that approximately 40,000 North Carolinians uninsured with stage 3 or higher CKD.

Furthermore, the same analysis estimates that approximately 16,000 of these uninsured with CKD indicate they have no usual source of care; they would need to be linked with a primary care medical home. The Bureau of Primary Health Care suggests that community health centers use a standard budget of approximately $150 per year per patient to provide primary care services to the uninsured (New Access Points (NAP) Grant Competition Announcement Number HRSA08-077. Health Resources and Services Administration. US Department of Health and Human Services. http://www.hrsa.gov/grants/. Accessed November 1, 2007.) Using $150 as a per-person estimate, primary care services for these 16,000 uninsured are estimated at $2,400,000. This cost estimate is very conservative since providing services to people with chronic illnesses will be more expensive than providing services to uninsured without chronic illness. Further, this only includes the estimated cost of providing primary care services to people with CKD and does not include other uninsured individuals with diabetes, hypertension, cardiovascular disease, or other chronic illnesses who do not also have CKD. Providing a primary care home to other people with chronic illnesses would require additional funds. For more details on estimation see Appendix 2.

	General Assembly	DHHS	Primary Care Providers	Nephrologists	Insurers and Payers	Other
(3) Organizations that provide comprehensive services, including pharmaceuticals, to the uninsured with incomes <200% FPG. (c) The North Carolina General Assembly should appropriate an additional $15 million to the Community Health Center grants program to expand care to the uninsured with other chronic illnesses that can lead to CKD.[c] Priorities should be given to: (1) Areas of the state that do not have sufficient safety net capacity. (2) Programs that provide primary care, disease management, and care management to patients with high-cost chronic illnesses, including but not limited to: diabetes, hypertension, cardiovascular disease, and other evidence-based risk factors which have been demonstrated to contribute to the development of CKD (3) Organizations that provide comprehensive services, including pharmaceuticals, to the uninsured with incomes <200% FPG. (d) The North Carolina General Assembly should provide $5 million to the NC Division of Public						

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[c] BRFSS data suggest there are approximately 250,000 uninsured North Carolinians with diabetes, hypertension, or cardiovascular disease who do not have CKD; 100,000 of this number have no usual source of care. The Bureau of Primary Health Care estimates that community health centers should budget approximately $150 per year per patient to provide primary care services to the uninsured (New Access Points (NAP) Grant Competition Announcement Number HRSA08-077. Health Resources and Services Administration. US Department of Health and Human Services. http://www.hrsa.gov/grants/. Accessed November 1, 2007.). Using $150 as a per person estimate, primary care services for these 100,000 uninsured are estimated at $15,000,000. This cost estimate is conservative since providing services to the uninsured with chronic illnesses will be more expensive than providing services to the uninsured without chronic illnesses.

	General Assembly	DHHS	Primary Care Providers	Nephrologists	Insurers and Payers	Other
Health Purchase of Medical Care (POMC) program to help pay for nephrologist consults for uninsured patients with incomes <200% FPG.[d] Funding should be used to: (1) Pay for nephrology consultations that follow the Renal Physicians' Association consultation standards for patients with chronic kidney disease with <30 eGFR, or other patients with higher eGFR if a clinical action plan cannot be prepared or the appropriate evaluation performed. (2) Support a coordinated system of care between the primary care provider and nephrologist.						
Rec. 4.6 The NC Area Health Education Centers program, the National Kidney Foundation (NC Chapter), the UNC Kidney Center, NC Renal Care, the NC Medical Society, the NC Academy of Family Physicians, the NC Chapter of the American College of Physicians, the Old North State Medical Society, the NC Academy of Physician Assistants, the NC Nurses Association Council of Nurse Practitioners, the NC Association of Pharmacists, and Community Care of NC should collaborate to provide targeted CKD educational programs for primary care providers. The education should include information about the importance						✓ **(AHEC, NKF, other academic health programs, provider associations)**

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[d] The NC IOM estimates there are approximately 40,000 uninsured individuals with CKD who are in stages 3-5 and who are not receiving dialysis. For purposes of this estimate, we assumed that all of the uninsured would need access to a nephrology consult once a year even if they otherwise had access to primary care providers for the ongoing management of their health problem. Medicaid pays between $49.50-$202.50 to nephrologists for consultations, depending on the CPT code. For purposes of this estimate, we assumed that each patient would receive one consult/year with an average cost of $125.

	General Assembly	DHHS	Primary Care Providers	Nephrologists	Insurers and Payers	Other
of early screening for at-risk populations, the use of the eGFR to identify people with CKD, stages of the disease, diagnosing the etiology of the disease, and evidence-based treatment guidelines of people with the disease. Education should be provided in a variety of settings including, but not limited to, health professional training schools, residency programs, continuing medical or nursing education, practice consultants, and quality improvement initiatives.						
Rec. 4.7 (PRIORITY) (a) Primary care providers should routinely screen their patients who are at high risk for chronic kidney disease including patients with diabetes mellitus, hypertension, cardiovascular disease, family history of CKD, or other evidence-based risk factors which have been demonstrated to contribute to the development of the disease. Screening should include albumin measurement from a spot urine sample[e] and serum creatinine to obtain the estimated GFR. (b) Patients who have been identified with CKD should be staged using the NKF 5 stages of disease categories. (c) Health care providers who have patients who have been diagnosed with CKD should follow the KDOQI or other evidence-based guidelines to manage and slow the progression of CKD. These guidelines include, but are not limited to:			✓	✓		✓ **(Nutritionist)**

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[e] The KDOQI guidelines state that albumin should be measured in a spot urine sample using either albumin-specific dipstick or albumin-to-creatinine ratio.

	General Assembly	DHHS	Primary Care Providers	Nephrologists	Insurers and Payers	Other
(1) Treating patients to achieve a target blood pressure of <130/80.						
(2) Prescribing an ACE inhibitor or ARB as specific therapy to slow the progression of kidney disease as well as control blood pressure.						
(3) Using combination hypertensive therapy, which should include a diuretic.						
(4) Evaluating patients with eGFR<60 mL/min/1.73m^2 for anemia.						
(5) Treating to ensure strict glucose control in diabetes.						
(6) Detecting and managing other cardiovascular risk factors, particularly cholesterol and tobacco use.						
(7) Monitoring the rate of eGFR decline in patients with CKD at least yearly and more often for patients with rapid decline or specific risk factors.						
(8) Referring patients to registered dietitians for nutrition therapy when appropriate.						
(d) Primary care providers should refer patients with eGFR <30 to nephrologists for ongoing care. Other patients, with higher eGFR, should also be referred to a nephrologist for consultation or comanagement if a clinical action plan cannot be prepared or the appropriate evaluation performed, or if a patient is experiencing rapid decline in kidney function. There should be sustained coordination between the primary care provider, disease management or care management staff, nephrologists and other specialists.						

	General Assembly	DHHS	Primary Care Providers	Nephrologists	Insurers and Payers	Other
Rec. 4.8 (PRIORITY) The estimated GFR values should be computed and reported on all creatinine determinations by clinical laboratories in North Carolina. (a) Hospital and commercial clinical laboratories should incorporate a calculated eGFR on all patient laboratory data that includes measurement of the serum creatinine. Carolina Renal Care, the College of American Pathologists, and the National Kidney Foundation NC Chapter should work collaboratively to educate clinical laboratories of the importance of reporting the eGFR when a provider orders a serum creatinine or when the creatinine is part of a metabolic panel. (b) Payers and insurers should require that all serum creatinine determinations for their members and dependents automatically include the eGFR. (c) The NC Division of Public Health along with Carolina Renal Care should monitor the clinical laboratories to determine if reporting of eGFR has become standard practice throughout the state when a serum creatinine is ordered. If the preceding recommendations are insufficient to make eGFR reporting standard practice throughout the state within 1 year for all laboratories, the General Assembly should amend the General Statutes to require all creatinine laboratory reports to include eGFR values.	✓	✓	✓	✓	✓	✓ (Lab)
Rec. 4.9 Businesses and organizations that develop electronic health records should provide the capacity for						✓ (Electronic Health Records)

	General Assembly	DHHS	Primary Care Providers	Nephrologists	Insurers and Payers	Other
chronic disease registries and clinical decision support prompts that incorporate CKD screening and treatment measures for at-risk groups.						
Rec. 4.10 (a) Public and private insurers, payers, and other organizations that offer disease management or quality improvement initiatives targeted at people with diabetes, hypertension, or cardiovascular disease should give greater emphasis to CKD prevention, screening and management. (1) Payers, insurers, and other organizations should remind patients and providers to obtain regular screenings for CKD including urine microalbumin and estimated GFR from serum creatinine. (2) Payers, insurers, and other organizations should adopt evidence-based clinical practice recommendations for screening and management of CKD (including those referenced in Recommendation 4.7), and should develop and include performance measures relevant to CKD detection and treatment in quality improvement and quality assurance programs. (b) Public and private payers and insurers should provide targeted disease management or case management services and medical nutrition therapy to all patients with CKD once they have progressed to Stage 4. Patients should be provided information about different types of renal replacement therapy.					✓	

	General Assembly	DHHS	Primary Care Providers	Nephrologists	Insurers and Payers	Other
Rec. 4.11 The National Kidney Foundation, the American Society of Nephrology, the American Society of Pediatric Nephrology, and the American Dietetics Association should work with national quality and standard setting organizations to devise quality performance measures that assess the degree to which practitioners screen and manage patients with or at risk of developing CKD in accordance with nationally recognized guidelines.				✓		✓ (NKF, Other organizations)
Rec. 4.12 Community Care of North Carolina (CCNC) should create a CKD disease management initiative as part of its §646 Medicare waiver, if approved, which will focus on older adults age 65 or older or people with disabilities who are also receiving Medicare. CCNC should incorporate evidence-based treatment of people with CKD into the initiative, and identify clinical performance measures to assess the quality of care provided to patients with the disease.					✓ CCNC	
Rec. 4.13 (a) North Carolina foundations and/or national foundations should provide funding to the University of North Carolina at Chapel Hill to pilot test and evaluate the effectiveness of the Kidney Care Prevention Program (KCPP), a chronic kidney disease certification program being developed in conjunction with the NC Community College System. People who are trained for disease management of CKD should also be cross trained for diabetes, hypertension, and cardiovascular disease. (b) Public and private payers and insurers should provide funding for CKD trained educators if						✓ (Foundations, UNC-CH)

	General Assembly	DHHS	Primary Care Providers	Nephrologists	Insurers and Payers	Other
determined to be effective and cost efficient[f] in slowing the progression of the disease or improving health.						
Rec. 4.14 (PRIORITY) (a) Disease managers or case managers who manage patients with diabetes, hypertension, or cardiovascular disease should be cross-trained in the management of people with chronic kidney disease. (b) Existing programs that provide disease management education and/or certification for diabetes, hypertension, or cardiovascular disease management should ensure that the curriculum includes information about prevention, screening, treatment and self-management skills for people with chronic kidney disease. (c) The North Carolina General Assembly should provide funding to the Department of Health and Human Services to support the infrastructure needed to expand the DPH Diabetes Education Recognition Program with a special focus on CKD screening and management. The General Assembly should appropriate $150,000 in FY 2008-2009, $300 000 in FY 2009-2010, and $450,000 in FY 2010-2011 and thereafter to support this program.	✓ $150K - $450K	✓				✓ (Disease and case managers)

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[f] The term cost efficient here means "leads to a generally accepted reasonable cost per unit of improvement in health." This is a lower standard of effectiveness than cost-saving (meaning the program leads to overall cost decreases). For more discussion see Chapter 3.

	General Assembly	DHHS	Primary Care Providers	Nephrologists	Insurers and Payers	Other
Rec. 4.15 (PRIORITY) (a) Nephrologists should actively build collaborative relationships with primary care providers in their referral base and provide consultations when requested to help in developing care management plans. Nephrologists should also help educate primary care providers and other health care professionals on current recommendations regarding detection and management of people with chronic kidney disease and the accompanying vascular complications including cardiovascular disease. (b) Academic health centers, AHEC, and Carolina Renal Care should widely disseminate the Renal Physicians Association toolkit to all nephrologists across the state to better understanding of chronic disease management and to incorporate this knowledge into management of patients with CKD. Specifically, nephrologists should be referred to the model consultation template and other tools for communicating effectively with primary care providers. (c) The American Society of Nephrology should provide educational programs to nephrologists pertaining to CKD management, the need for early collaborative relations with primary care providers, and information that should be included in any nephrology consultation letter for a primary care provider. (d) Nephrologists and/or primary care providers who are managing the care of patients with later stages of CKD should refer patients for medical nutritional therapy, when appropriate.			✓	✓		

	General Assembly	DHHS	Primary Care Providers	Nephrologists	Insurers and Payers	Other
(e) Nephrologists, in conjunction with disease management or patient educators, primary care providers, and private dialysis centers should provide patients with early education prior to the onset of kidney failure including: (1) All options of kidney therapy including transplantation, home dialysis (including hemodialysis and peritoneal dialysis), in-center hemodialysis and supportive therapy only. (2) The need to protect veins prior to the need for dialysis. (f) Nephrologists should work with patients in stage 4 to ensure that they are offered transplantation or timely placement of peritoneal or vascular access to prevent possible medical complications from emergency treatment for kidney failure and to reduce the utilization of temporary catheters for access to circulation for renal replacement unless there is no other option.						