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The Case for Disease Management in Chronic Kidney Disease

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ABSTRACT

Chronic kidney disease (CKD) is a growing epidemic in the United States and worldwide, with nearly two thirds of CKD patients also having diabetes, hypertension, or both. Morbidity and mortality among patients with CKD are high, as are the costs associated with care, which is highly fragmented. Disease management (DM) programs are designed to coordinate the delivery of care to patients, improve clinical outcomes, and reduce costs along the continuum of care. The goals of DM programs in CKD patients are to fill the gaps in current care by focusing on four key areas: (1) slowing the progression of CKD, (2) identifying and managing the complications of CKD, (3) identifying and managing associated comorbid conditions, and (4) smoothing the transition to renal replacement therapy (RRT). To be successful, this approach requires multidisciplinary collaboration among physicians (eg, primary care physicians, endocrinologists, cardiologists, nephrologists, surgeons) and participating caregivers including nurses, dieticians, social workers, and pharmacists. Patient identification, limited reimbursement, late patient referral, and lack of primary care physician and nephrologist knowledge about the importance and details of CKD management are all barriers that must be overcome for such programs to be successfully implemented. Considering the magnitude of the opportunity, DM applied to CKD is a promising approach to the care of this vulnerable population. (Disease Management 2006;9:86–92)

INTRODUCTION

Chronic kidney disease (CKD) is a growing public health problem in the United States. Although there is an abundance of data regarding the epidemiology of end-stage renal disease (ESRD) from the US Renal Data System (USRDS) and Centers for Medicare and Medicaid Services (CMS), much less data are available regarding the incidence and prevalence of CKD. The best estimates of the number of patients with CKD come from the Third National Health and Nutrition Examination Survey (NHANES III).[1] An estimated 19 million people in the United States have CKD of stages 1–4. This far outweighs the number of patients with CKD of stage 5 (Table 1).[2]

CKD can be defined as an impairment of kidney function as evidenced by decreased glomerular filtration rate (GFR) or abnormal

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Table 1. NKF-K/DOQI Classification System for CKD

Stage	*Description*	*GFR (mL/min/1.73 m²)*	*Opportunities for interventions—start and continue*	*Prevalence (%)*
1	Kidney damage with normal or ↑ GFR	>90	Screening and identification; treatment of comorbid disease	3.3
2	Mild ↓ GFR	89–60	Treatment of comorbid disease (eg, aggressive BP control)	3.0
3	Moderate ↓ GFR	59–30	Testing and treating for common complications of CKD (ie, anemia, hyperparathyroidism)	4.3
4	Severe ↓ GFR	19–15	Planning for renal dialysis and transplantation	0.2
5 or ESRD	Kidney failure	<15 or dialysis	Permanent vascular access and initiation of RRT	0.1

NKF-K/DOQI, National Kidney Foundation, Kidney Disease Outcome Quality Initiative; CKD, chronic kidney disease; GFR, glomerular filtration rate; BP, blood pressure; ESRD, end-stage renal disease; RRT, renal replacement therapy.

findings on renal imaging or renal biopsy, or urinary findings indicating damage to the nephron in the form of proteinuria or hematuria. Formulas such as the Modification of Diet in Renal Disease (MDRD) GFR equation are currently the most widely used estimators of GFR.[3] A diminished GFR indicates that there is impairment of the primary filtering function of the kidney.

The cost of caring for patients with kidney disease is high. For ESRD alone, the cost was $25 billion in 2004, with over $17 billion from Medicare, the latter representing over 6.7% of the overall Medicare budget.[4] Similarly, the costs of care for CKD patients are considerable. The majority of the costs associated with caring for patients with CKD come from hospitalizations and these are most frequent and costly in the six months prior to initiating dialysis.[5] The cost during the month of initiation of dialysis is estimated to be $25,000–$35,000 per member per month (PMPM) with 70% of that cost coming from hospitalization.[4] According to CMS data, estimated annual healthcare cost per patient for CKD is $28,000, and for ESRD patients it is $65,000–$85,000 (CMS estimates, personal communication). In comparison, annual cost for patients with diabetes is $10,000 per patient and $5000 per patient for congestive heart failure (Southwest Securities estimates, the American Diabetes Association, Disease Management 2000 Directory and various industry sources, personal communication). The burden on Medicare and private insurers for patients with kidney disease is disproportionately high.

In order to improve clinical outcomes and control costs, the care of CKD patients needs to focus on four domains: (1) slowing the progression of CKD, (2) identifying and managing the complications of CKD, (3) identifying and managing associated comorbid conditions, and (4) smoothing the transition to renal replacement therapy (RRT). Despite the availability of clinical practice guidelines from the National Kidney Foundation and the Renal Physicians Association that address these areas of care, there remain significant gaps in how these guidelines are implemented.[3,6,11]

THE OPPORTUNITY

There has been documented impact of disease management (DM) in the treatment of patients with ESRD,[12,13] and similar results would be anticipated by applying DM to patients with CKD not yet on dialysis.[14]

Trivedi et al[15] used a mathematical model to predict the economic impact that reducing the rate of decline in GFR might have. In patients with a GFR of 60 mL/min/1.73 m² or less (National Kidney Foundation Kidney Disease Outcomes Quality Initiative [NKF-K/DOQI] stage 3), if the rate of decline of GFR decreased by 10%, 20%, or 30%, the cumulative healthcare

savings through 2010 would be approximately $18.56, $39.02, or $60.61 billion dollars, respectively. In patients with more advanced CKD, with GFR's of 30 mL/min/1.73 m^2 or less (NKF-K/DOQI Stage 4), a 10%, 20%, or 30% reduction in rate of decline of GFR might amount to a cumulative savings through 2010 of $9.06, $19.98 or $33.37 billion dollars, respectively. Additional studies by Remuzzi et al[16] analyzed data from the RENAAL trial, a study of the effects of losartan in patients with type 2 diabetes and CKD. Losartan decreased the risk of ESRD by 25%–35%, depending on baseline level of renal function. For every 100 patients with a serum creatinine of >2.0, 1.6–2.0, or <1.6 mg/dL, four years of losartan therapy was estimated to save US $1,503,000, $1,022,000, and $528,591, respectively, by delaying the progression of disease to ESRD.

Once patients have reached stage 3 CKD (GFR < 60 mL/min), in addition to initiating therapies to slow the progression of CKD, coordinating the management of complications of CKD (eg, anemia, bone disease) and comorbid conditions (eg, diabetes, cardiovascular disease) becomes increasingly important. For example, proactive management of anemia and hypertension in this population has been shown to improve and even regress left ventricular hypertrophy, improve congestive heart failure (CHF), and decrease hospitalization rates.[17]

Finally, as ESRD is approached, over 50% of patients present with the need for hospitalization and emergency dialysis, with associated significant clinical morbidity and costs.[5] Early referral of CKD patients to nephrologists, one of the key focuses of the CKD DM program, is associated with a substantial reduction in inpatient days and increase in the proportion of patients with arteriovenous fistulas (the preferred access of choice for hemodialysis).[18–20] In addition, the large numbers of patients who present for emergency initiation of dialysis is unacceptably high, but can be reduced when earlier referral and timely vascular access placement occurs.[21–23] Patients with advanced CKD who present with the need for emergency dialysis might be considered to "crash" into dialysis. They may present to the emergency room or their physician with the need to initiate dialysis immediately. This occurrence is not uncommon among patients with CKD, yet there are opportunities to prevent this.[22,23] RMS Disease Management (RMS) analyzed data from 2000–2004 from 10 payers (RMS Disease Management, Inc., personal communication) and found that, of the 2,244 patients studied, 1,279 patients or 57% crashed into dialysis. The cost of the month of care when the crash occurred averaged more than $19,000. This is consistent with a retrospective cohort study examining CMS data from 1995–1998, which found that 69% of patients required hospitalization to initiate dialysis.[5] Crash dialysis can be avoided if appropriate planning for anticipated dialysis is carried out, a major role of the CKD DM program.

BARRIERS TO SUCCESSFUL CKD DM

The DM model has been shown to improve clinical outcomes in several disease states; however, patients with CKD have complex medical issues and an array of other comorbid diseases. Most DM programs have been aimed at managing disease states such as diabetes, CHF, asthma and chronic obstructive pulmonary disease (COPD). Patients with CKD usually have multiple medical comorbidities that require management in addition to the CKD per se, increasing the complexity of the challenge.

The ability to identify patients with CKD is a significant barrier to the success of DM in this population.[24] CKD is a rather insidious condition, with the majority of patients relatively asymptomatic in the early stages of the disease. Identification of patients is generally carried out utilizing laboratory and/or claims data. For example, much of the data available to determine whether a patient has CKD comes from CPT codes assigned by providers. This coding may be based on an elevated serum creatinine, although some physicians may not assign this diagnostic code for billing purposes. Even if laboratory data is available, some patients may not be identified as having kidney disease because the serum creatinine is only mildly elevated, even though their GFR may be significantly reduced. Recently, initiatives have been

introduced to have the estimated GFR reported by laboratories whenever a serum creatinine is obtained.[25] Unfortunately, however, laboratory measurements of serum creatinine may not be available for many patients. Recently, CMS has proposed a series of ICD-9 codes that would be unique for each stage of CKD. Despite these limitations, high positive predictive values indicate that Medicare claims data can be used to accurately identify patients with CKD as noted in a study of 1852 elderly Medicare beneficiaries hospitalized for myocardial infarction.[26] This may permit better patient identification in the future using claims data, particularly when laboratory data is not available.

Even if patients are identified, a substantial barrier to successful application of DM in CKD patients is the magnitude of the problem. The number of patients estimated to have CKD is very high and it is unlikely that all patients with CKD will be able to be seen by nephrologists, especially in light of the current and projected shortage of nephrologists. It may only be feasible to have patients with more advanced CKD (stages 3 and higher) seen by a nephrologist. Therefore, it becomes important for primary care practitioners (PCPs) to take primary responsibility for managing patients in the early stages of CKD.

Cardiology practices are another source of CKD patients. A significant number of patients with CHF and coronary artery disease also have stage 3 or higher CKD. For the DM model to be successful in CKD the care coordinators will have to ensure a collaborative effort among disparate physicians and support staff, and target the relevant comorbid conditions (Table 2).

Another barrier to the more widespread application of CKD DM relates to the lack of recognition by health plans and CMS of the importance of focusing on this small but high-cost population. Most large health plans are still coping with the five major chronic conditions (ie, diabetes, coronary artery disease, CHF, asthma, COPD) and only in recent years have started viewing ESRD as an equally important condition for DM intervention. The link between starting the DM during the earlier stages of CKD and improved outcomes for ESRD patients is just beginning to be understood and appreciated.[27–29]

Table 2. Target Comorbid Conditions and Complications Associated with Chronic Kidney Disease

Preventative healthcare
Hypertension
Hyperglycemia and insulin resistance
Vaccinations and infections
Smoking cessation
Obesity
Cardiovascular
Anemia
Atherosclerosis
Congestive heart failure
Dyslipidemia
Glycemia control
Hypertension
Metabolic disorders
Hyperparathyroidism and metabolic bone disease
Metabolic acidosis
Malnutrition
Hyperkalemia
Proteinuria

In addition, it is critical to the success of DM in CKD for nephrologists and other physicians to be enthusiastic participants in the program. Physicians in a fee-for-service environment are accustomed, for the most part, to practicing medicine in an episodic manner and addressing problems as they arise rather than along the continuum of care.[30] As the delivery of health care changes and preventative measures come to the forefront of medicine, physicians are beginning to realize the need for a different approach in patient management. Certainly, the long-term outcomes and eventual cost savings from intervening before costly problems arise has prompted physicians to rethink the care plans for their patients. There may, however, be some difficulty in adopting new strategies for patient care given that many physicians have practiced within this environment for a long time. In addition, physician income is often significantly dependent on in-hospital care, which decreases dramatically with successful DM. Engaging physicians in optimizing care while maintaining their financial position is a difficult but not insurmountable issue, with recent creative approaches to sharing risk and pay-for-performance showing some promise.

Finally, the cost of applying DM to CKD may also be a barrier to its success. The cost of hir-

ing a nurse care manager, social worker, dietician, and pharmacist may be prohibitively expensive for a clinical nephrology practice. For a health plan outsourcing a CKD DM program to a disease management organization (DMO), the return on investment must be sufficient to justify this approach, generally a PMPM DM fee with part or all of the fee at risk. In addition, the DMO must be confident that a sufficient improvement in care and lowering of costs is possible within the budget provided by the health plan. Currently care is unmanaged and costly; the introduction of DM is anticipated to achieve substantial cost savings, but this remains to be proven.[31]

DEVELOPMENT AND IMPLEMENTATION OF DM IN CKD

DM for CKD patients can be provided by DMOs, or internally within a health plan or clinical practice. Because of the resource investment and content expertise needed, however, most health plans prefer a "buy" rather than "build" approach. RMS has a structured program which administers and oversees such a program in CKD. Patients with CKD are identified and staged according to the NKF-K/DOQI classification, and patient eligibility for the program is coordinated through the health plan. A claims analyst identifies patients using paid claims data, CPT codes, or laboratory data and verifies enrollee eligibility, demographic data, and data on providers involved in care. A nurse care manager ("Health Service Coordinator") coordinates care and communication among providers and support staff. The medical records of these patients are reviewed and the DM nurse care manager develops and discusses a care plan with the primary care provider based on current practice guidelines. If a patient has more advanced kidney disease (CKD stages 3–5), is in need of further diagnostic evaluation, or requires expert nephrology consultation for management recommendations, the patient is then be referred to a nephrologist for further evaluation and treatment. A comprehensive care plan is developed and patients are seen by the skilled support staff for evaluation, management assistance, and education.

A regional medical director oversees the medical operations of the program including clinical, quality, and utilization outcomes, an account manager is responsible for the business and financial aspects of the DMO program, and information technology specialists are responsible for maintaining databases including financial and clinical information. The clinical data is utilized in a structured continuous quality improvement (CQI) process to ensure the best outcomes, and to permit medical management changes where needed.

SUCCESS METRICS

The success of a CKD DM program can be measured with clinical, utilization, and financial metrics. Clinically, slowing the rate of progression of CKD over time is quantifiable and an important goal of DM. In addition, control of hypertension, level of hemoglobin, level of albumin, and control of calcium and phosphorus can be measured and tracked, and outcomes compared with nationally recognized benchmarks. Utilization metrics include the use of emergency rooms, days spent in rehabilitation or skilled-nursing facilities, and hospitalizations. While benchmark data are available for ESRD patients, there is no benchmark data for CKD patients, and other approaches to demonstrating the success of the program (such as the use of control populations for comparison) must be considered. Finally, the important financial metric depends on the perspective. For the DMO this includes the cost of delivering the DM services as well as the degree to which fees are placed at risk, or in the capitated environment, larger sums are at risk. For the health plan, the return on investment is essential to understand; the need for rapid returns, which are difficult to achieve in chronically ill individuals, makes this more challenging. Such calculations are essential, however, in the buy or build decision, but may be difficult to quantify.

CONCLUSION

The number of patients with CKD continues to grow as do the opportunities to intervene in

disease progression and improve patient outcomes. CKD is a costly condition, and poor CKD care contributes to the poor outcomes and high costs of ESRD. By focusing on four key areas (ie, slowing the progression of CKD, identifying and treating the complications of CKD, identifying and treating complications of comorbid conditions, smoothing the transition to RRT), CKD DM can lead to substantial improvement in clinical outcomes and lower costs of care. The barriers to successfully implementing DM in CKD are formidable. However, CMS has recently recognized the potential value of DM in CKD, and has awarded RMS a CKD DM project as part of its High Cost Beneficiary Demonstration. This project will permit testing of medical management and care coordination approaches and help to determine if the promise of DM for CKD patients can be realized.

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