Applying Disease Management Strategies to Medicare

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PEOPLE WITH CHRONIC ILLNESSES GENERALLY ENROLL in the Medicare program after completing their employment years. Many require treatment for illnesses that have developed—and have often been neglected—over years, or even decades. Because it acts as a social safety net, the Medicare program frequently has to pay for the latest and costliest phase of the disease, an outcome that might have been averted through earlier intervention. Thus, the extent to which chronic illnesses are avoided or managed in the general population is relevant to the goals and eventual cost of the Medicare program. A corresponding long-term viewpoint is often lacking in health care for the general population because of factors like enrollee turnover, short-term budget concerns in health plans, lack of insurance, and insufficient continuity of care.

Policy makers are looking for ways to lower future Medicare costs. Some private-sector initiatives and proposals for Medicare reforms would control costs by restricting eligibility, reducing covered benefits, or cutting payments to providers. However, in many cases it is possible to alter

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the natural history of a disease by intervening systematically at earlier stages in order to lessen morbidity, improve quality, and avoid unnecessary utilization (Institute of Medicine 1991; Lafayette 1995; Steinman 1996; Mackenzie and Brenner 1998).

Accordingly, in this article we suggest that the Medicare program adopt an expanded, population-based perspective. This approach would emphasize prevention of chronic illnesses, early identification, and aggressive monitoring of cost and quality of care (Rowe 1999). We base our discussion on the example of chronic renal disease and the related entitlement to Medicare for patients with end-stage renal disease (ESRD), a condition that requires renal replacement therapy for survival. The general principles also apply to many conditions affecting the aged and disabled populations covered by Medicare.

The ESRD Component of Medicare

Special statutory entitlement for ESRD began in 1973, when Medicare became the primary insurer after kidney transplantation or onset of dialysis. There is a waiting period for individuals with employer-sponsored group health insurance (recently expanded from 18 to 30 months), during which time Medicare is the secondary payer. ESRD beneficiaries are eligible for all Medicare-covered services. Medicare paid ESRD claims totaling approximately \$9.6 billion in 1996, up from \$6.3 billion in 1992 and \$8.9 billion in 1995. Nationwide, total direct monetary costs for ESRD (including all sources of public and private payments) were estimated at \$13.1 billion in 1995 and \$14.6 billion in 1996. From 1992 to 1996 the overall average cost per ESRD patient was approximately \$41,000 per year at risk (National Institutes of Health 1993; U.S. Renal Data System 1998).

There were approximately 284,000 Medicare ESRD patients as of December 31, 1996 (U.S. Renal Data System 1998). The number of patients has been growing at rates ranging from 7 to 12 percent per year over the past decade. Costs per patient are likely to accelerate over the next decade as the mix of ESRD patients shifts toward the elderly and the diabetic. Modest changes in patient composition, which have led to the inclusion of more high-cost subgroups over the past few years, are reflected in the prevalence figures. For example, the percentage of ESRD patients with diabetes as the primary cause of ESRD rose from 25 percent in 1990 to 32 percent in 1996.

Reflecting general trends in the Medicare program, rising costs, questions about quality of care, and concerns about inappropriate incentives have spawned debates about the ESRD entitlement program. Friedman (1996) argues in defense of the program, fearing that policy makers might not fully appreciate its successes. Notably, Medicare covers about 93 percent of all ESRD patients. Rettig (1996) believes the current system may warrant closer scrutiny and possibly some major reforms, and Altman (1997) questions whether the ESRD entitlement to Medicare should continue at all. In any case, more than a third of ESRD patients are over 65, and many also have insurance coverage under Medicaid. Therefore, the government will continue to incur health care costs for many people with ESRD. Moreover, other expensive health conditions have relatively high prevalence rates in the publicly funded populations: cardiovascular and respiratory disease, behavioral health conditions, and diabetes, to name some examples (Stuart and Weinrich 1998).

Raising the Safety Net by Anticipating Future Needs

The Medicare program was introduced over thirty years ago, when the prevailing form of health care insurance was almost exclusively concerned with reimbursing providers for diagnosing or treating illnesses. Nowadays, the emphasis has shifted to lowering costs through prevention, screening, and earlier interventions. In this context, Medicare is not well positioned:

- Health insurers for the employed populations can be less concerned about the future health status and costs of their covered populations because most people eventually become the responsibility of Medicare.
- The Medicare program has done little to adopt or promote population-based or disease management approaches, which could promote better health at an affordable cost.
- The government does not translate its long-term interests or regulatory authority into actions that could make program goals more attainable.

Repositioning the Medicare program along these lines is equivalent to raising the safety net in order to shorten individuals' periods of

intensifying needs, worsening prognoses, and accumulating costs, all of which can result from inadequate attention to their chronic illness(es).

Extending the Medicare secondary-payer period from 18 to 30 months for ESRD patients has sparked a recent flurry of interest among private-sector groups in chronic renal disease management programs (Day and Sparrow 1997). This illustrates, for better or worse, how the government can stimulate actions to improve care for, in this case, future Medicare beneficiaries. However, the short time horizon often needed to ensure positive financial returns from disease management programs in the private sector (often one to three years) means that private efforts will likely continue to focus on ESRD, rather than on earlier stages.

In the remainder of this article, we will discuss the opportunities that lie in those earlier stages and detail the sorts of actions that could improve the results for the patient and the program. By anticipating the current and future needs of people at risk for chronic diseases, the Medicare program could position itself to improve costs and health outcomes. It could begin with the following set of anticipatory clinical and managerial interventions:

- modeling the natural history of the disease
- screening and segmenting patient populations
- targeting clinical and psychosocial interventions
- implementing administrative supports
- reinforcing optimal systems with appropriate public policies

These interventions, which we will discuss in the next sections, are illustrated with examples from chronic renal disease. In order to carry out these activities, clinical practitioners and researchers will need to dedicate their time and resources to formulating the most cost-effective interventions. In order to devise and carry them out, it is essential to have an adequate administrative infrastructure, government backing, and regulatory support of the outcomes.

Modeling the Natural History of the Disease

Many chronic diseases begin years before individuals transfer to coverage under Medicare. The needed changes must begin with a blueprint for when and how to intervene in the progression of a disease. The goal of disease modeling is to identify controllable factors that can affect

disease progression, quality of care, health status, outcomes, and costs. This clarifies interactions between cost, quality, and clinical and psychosocial interventions across the different stages of the natural history of the disease.

Disease modeling can begin with a flow chart of the chronology of events, highlighting important decision-making points, such as clinical tests and interventions. This process often entails interdisciplinary consensus-building in order to specify the opportunities for improving cost and quality outcomes (Harvey and DePue 1997a,b). Modeling can also involve analysis of longitudinal data on test results and patient encounters across a continuum of care. For chronic renal patients, one major benefit of disease modeling will be an emphasis on care prior to the onset of ESRD.

The natural history of a disease typically encompasses stages through which a person moves sequentially; each stage offers opportunities for preventing or hindering further progression or complications. Prior to pathogenesis, the individual is at risk for the disease but is not yet affected by it. For example, precursor diseases like diabetes and hypertension place individuals at substantially higher risk for chronic renal disease. In the early stages of pathology, there can be significant loss of renal functioning, although it can go undetected for a long period. In chronic renal disease, the beginning of significant nephropathy is often called pre-ESRD, and it continues through a period, sometimes called *predialysis*, when the patient approaches the need for dialysis or a transplant in order to stay alive.

Early detection in this pre-ESRD stage is possible through laboratory tests, like those for elevated levels of serum creatinine (National Institutes of Health 1993). By reflecting the inability of the kidney to excrete creatinine, this test assesses the glomerular filtration rate. Typically there are related concerns: poor dietary intake, contraindicated medications, related biochemical imbalances, inadequate patient compliance and self-management, and emergence or worsening of comorbidities, such as cardiovascular disease. The duration of pre-ESRD ranges from months to decades.

In the advanced stages of pathology, chronic renal disease reaches its full development, and the kidneys no longer function adequately. The worsening of comorbidities, particularly when they are cardiovascular diseases, can cause death during pre-ESRD. If not, eventually the patient arrives at end-stage renal disease. Typically, there are complications and

comorbidities associated with ESRD that require treatment. During predialysis and ESRD, patients' social functioning is likely to deteriorate, and they often lose the ability or desire to work.

Screening and Segmenting Patient Populations

For many chronic diseases, dramatic increases in cost, morbidity, and mortality occur with each successive stage of illness. By screening and segmenting populations, it is possible to tailor interventions to the risks and needs of individuals. It can be advantageous to identify individuals early, preferably without waiting either for patients to present for medical care or for primary care physicians (PCPs) to refer patients to nephrologists or other specialists. The goal is to apply interventions early enough to produce net cost or quality benefits; the interventions usually take the form of an emphasis on preventive care, patient and family education, and self-management. Generally, important distinctions can be made based on clinical data, claims or encounter data, demographics, and/or psychosocial evaluations.

Table 1 summarizes disease management for the stages of chronic renal disease. The first entry, *clinical threshold*, demarcates the pre-ESRD and ESRD stages of pathology. Serum creatinine levels of at least 1.5 mg/dl for females and 2.0 mg/dl for males can effectively identify individuals in the pre-ESRD stage. For patients with creatinine values near the lower bound, it may be necessary to verify chronic kidney dysfunction—pre-ESRD—through repeated elevated values over time, perhaps a period of six months or more. Higher levels of 4.0 mg/dl and above identify individuals who have advanced toward ESRD and who could benefit from interventions that prepare them for appropriate renal replacement therapies.

The inability of the kidneys to sustain life marks the beginning of ESRD. The prevalence rate of ESRD in the general population is very low, on the order of 1 case per 1,000 people. The prevalence rate for pre-ESRD is likely to be four to seven times higher, according to internal estimates at Kaiser Permanente. Aside from the precursor diseases, risk factors that have been identified for developing ESRD include black race, other nonwhite race, low income, Medicaid status, and limited access to health care (Perneger, Whelton, and Klag 1995). A more comprehensive, population-based disease management program could screen and segment patients in order to select high-risk groups and direct them into appropriate clinical management.

Given the low prevalence rates, it is fortunate that effective screening can be achieved through ordinary laboratory test results that are often part of routine physical examinations.

Targeting Clinical and Psychosocial Interventions

The second entry in table 1 lists the *chief clinical goals* of chronic renal disease management during each stage. The goal in prepathogenesis is primary prevention of renal disease, which offers a wide range of potential benefits. For example, control of hypertension can also delay or improve heart disease. Once pathology in the kidney has been detected and a diagnosis of pre-ESRD is made, secondary prevention may be initiated to impede progression of the disease.

Proper management should stress early detection at this stage, so that interventions can begin quickly. There is growing support in the literature for aggressive detection and management of patients with chronic renal failure before they need renal replacement (McCarthy 1999). Several interventions are indicated for secondary prevention, with the goals of delaying progression to ESRD, controlling complications and comorbidities, and preparing for onset of dialysis. Beginning in the predialysis stage, patients frequently require interventions from mental health professionals and aggressive support from all members of the clinical team and their own families in order to maintain functioning, including employment, if at all possible. For ESRD patients, clinical goals include ensuring proper treatment, extending the patient's life span, limiting morbidity, and maximizing remaining functional capacity.

The third entry highlights *critical clinical interventions* for each stage. In the prepathogenesis stage, patients are classified according to group or individual risk factors. Normal precautions for these patients include adopting a healthy lifestyle and undergoing routine physicals and diagnostic screening. Pre-ESRD patients require several additional and important interventions. Because diabetes is the most common cause of chronic renal failure, controlling the disease is paramount for diabetics. Similarly, control of hypertension and management of lipids could slow the progression toward renal failure and limit the damage caused by cardiovascular diseases. It is also essential during this stage to ensure that the patient eats a proper diet and avoids nephrotoxic drugs, which can inflict further damage. Erythropoietin (EPO) to control anemia is likely to bolster good health during this time. Patient education

TABLE 1
Features of Disease Management for Stages of Chronic Renal Disease

Feature of disease management	Stage of the disease		
	Prepathogenesis	Pre-ESRD ^a	ESRD
1. Clinical threshold	Serum creatinine (mg/dl): <1.5 (females) <2.0 (males)	Serum creatinine (mg/dl): ≥1.5 (females) ≥2.0 (males) ≥4.0 (<i>predialysis</i>)	Renal failure Transplant or onset of dialysis
2. Chief clinical goals	Primary prevention Manage precursor conditions and comorbidities, if present (e.g., diabetes, lipids, glucose)	Secondary prevention Retard progression Improve nutrition Maintain functioning <i>Prepare for dialysis or transplant</i>	Tertiary prevention Avoid complications
3. Critical interventions	Proper diet Exercise Routine physician examinations, including serum creatinine levels	Control precursor conditions Avoid nephrotoxic substances Patient education <i>Erythropoietin (EPO)</i> <i>Patient education—renal replacement modalities</i> <i>Prepare vascular access</i>	Transplantation Hemodialysis Peritoneal dialysis

4. Coordinating physician	Primary care physician	Nephrologist Other PCP (optional)	Nephrologist
5. Other caregivers	(As needed, based on risk status and existing conditions)	Multidisciplinary team: Pharmacist Dietitian Vocational counselor Mental health provider Social worker <i>Case manager</i> <i>Vascular surgeon</i> <i>Transplant team</i>	Multidisciplinary team Dialysis providers

^aItalicized entries reflect latter pre-ESRD, also known as predialysis.

and compliance are pivotal in the success of these interventions. Later, during the predialysis stage, choosing a renal replacement therapy, like kidney transplantation, hemodialysis, or peritoneal dialysis, and preparing for vascular access (if hemodialysis is indicated) are important for the smooth transition to the required ESRD treatments. Decisions must also be made about treatment setting (e.g., home versus dialysis center).

The fourth entry of table 1 depicts the *coordinating function* of the primary physician. Generally, individuals in each of the stages (with adequate access to care) have routine prevention and primary care needs. In the prepathogenesis stage, a primary care physician usually performs or supervises midlevel providers in these activities. A primary care physician can stay involved in later stages for similar functions, although the nephrologist may replace the PCP in addition to supervising renal care and coordinating input from other specialists. The nephrologist's role can be important for chronic diseases because specialists are usually more familiar with the range of available interventions and common complications. It has been estimated that only about 20 to 25 percent of chronic renal disease patients are referred to a nephrologist prior to initiation of dialysis (Ellrodt, Cook, Lee, et al. 1997).

Other caregivers illustrates the importance of a multidisciplinary team for pre-ESRD and ESRD patients. Nonphysician providers, like nurses, dietitians, social workers, and other specialists in the target disease, are often used in disease management. They can add to the scope of expertise available for complex chronic diseases and help to coordinate care across sites. Staff education programs may be used to promote team building.

The respective secondary and tertiary prevention efforts in pre-ESRD and ESRD require diverse expertise in order to handle a number of issues. A dietitian can address nutritional needs (e.g., limiting sodium and potassium). Also, because patients nearing ESRD often feel too sick to eat properly balanced meals, their diets may require adjustments. Vocational counseling can help ESRD patients to avoid loss of employment, a common occurrence among this group. It is important to maintain employment, even if retraining is necessary, because restoring vocational functioning is especially difficult once a patient stops working. Mental health counseling can help patients to deal with the pain of adjustment and loss and can enhance compliance and self-management. A social worker often must be called in to handle the many issues related to insurance status, disability, and the family (including informal supports and caregiving). A vascular surgeon evaluates appropriate access points for the patient who is considering hemodialysis. The transplant team

includes a surgeon, a coordinator (usually a nurse), and a nephrologist, who orchestrates the assessments, surgery, and necessary immunosuppressants.

Psychosocial issues related to patient compliance and self-management constitute a major challenge for the multidisciplinary team, reflecting the fact that care-seeking behavior can be influenced by the patient's psychosocial needs (Lafayette 1995). It is important to enlist the patient and the family as members of the care management team, educating and encouraging them to make decisions. Demand management techniques, such as "telephone nurse triage," whereby a nurse determines the appropriate response to a patient's needs on the telephone, may be used to reinforce these objectives.

In the case of chronic renal disease, and probably many other diseases as well, the effectiveness of various interventions could depend on the extent to which the full arsenal is consistently applied. For example, a patient whose hypertension is under control, but who is still regularly exposed to poor diet and nephrotoxic drugs, may not benefit from the new regimen without a multidisciplinary team to supervise and bolster his or her compliance.

Implementing Administrative Supports

Population-based medicine and disease management programs can be expensive and time consuming for both clinical and managerial leaders. The efforts of many players must be coordinated and supported by the administration. Table 2 shows several management approaches that are pertinent to disease management and applies them to chronic renal disease.

The first entry displays the application of *clinical guidelines* to the stages of illness. Clinical guidelines define standard treatment for each patient segment and then reduce practice variation by applying that standard. Most clinical guidelines currently used for various diseases are part of a first generation; they were developed through consensus and implemented with little patient risk segmentation and limited information systems support. Protocols based on evidence represent a long-range goal (Lafayette 1995). At present, wide variations in practice patterns can be observed in ESRD treatment—for example, among dialysis centers (McClellan, Flanders, and Gutman 1992). Up to now, clinical guidelines have been only sporadically applied to ESRD care, and hardly at all to pre-ESRD care. The most established guidelines are the standards

TABLE 2
Administrative Supports for Chronic Renal Disease Management

Administrative support	Stage of the disease		
	Prepathogenesis	Pre-ESRD	ESRD
1. Clinical guidelines and pathways	Screening tools Management of precursor conditions	Define roles for multidisciplinary team Fully staff multidisciplinary team Support needed benefits (e.g., EPO)	Criteria for hospital admission Advance directives
2. Integrated delivery system	Referrals as necessary	Assigned patient teams Quarterly team meetings	Weekly team meetings Interfaces among institutional providers: hospital, dialysis center, transplant center, hospice
3. Change behavior	Patient education: Healthy lifestyle Wellness Manage precursor conditions Provider education: Follow guidelines Recognize risk factors	Patient education: Compliance Manage comorbidities Promote arteriovenous (AV) stula	Avoid unnecessary hospital admissions Discharge planning
4. Information technology	Automated encounters (with diagnosis) Automated lab results	Deploy pharmacists to: Review creatinine levels and medications Monitor referrals and follow-up Decision support	Monitor admissions, days of care Quality indicators

for the dose of dialysis set by the Renal Physicians Association (1996) and the National Institutes of Health.

The National Kidney Foundation (NKF) recently completed a detailed set of 114 guidelines for ESRD patients covering four areas: hemodialysis, peritoneal dialysis, anemia, and vascular access (National Kidney Foundation 1997). The NKF guidelines, which took two years to prepare, have greatly expanded the potential for clinical applications, but it is still too early to assess their impact. Furthermore, owing to the relatively high mortality rates associated with this disease, it is prudent to address death and dying through vehicles like advanced directives. About 23 percent of dialysis patients die each year, and only 29 percent of dialysis patients can expect to survive for five years (U.S. Renal Data System 1998).

The second entry of table 2 highlights the importance of the delivery system for meeting patients' needs. *Integrated delivery systems*—which can link providers by common ownership or by contracts—coordinate care across sites and providers (Harris 1996; Whitelaw and Warden 1999). Integration allows patients to navigate the delivery system more easily and yields the most cost-effective care. An example of integration would be the creation of a common medical record, either paper-based or electronic, that can be accessed by all providers.

As the severity of illness increases, patients require more frequent and complex encounters with providers. ESRD patients have a particularly intense need for institutional providers: dialysis (or transplant) centers, hospitals, and not uncommonly, hospice care. The relatively high cost of institutional services indicates the importance of efficiently managing acute episodes of care, especially avoiding and shortening hospital admissions.

One path to efficient management is displayed in the third entry, administrative support for *changing behaviors*. Physicians and patients must change their behavior if disease management is to succeed. Physicians need to team up with nonphysicians, appreciate the value of clinical guidelines, and accept ongoing critical evaluation of their practice patterns through data analysis. Patients need motivation to attend education programs, comply with prescribed regimens, and embrace the importance of self-management of their disease. Active intervention to encourage behavioral change will usually be necessary to counter physicians' and patients' frequent resistance to changing roles. It is important for nephrologists to build teams, which they often lack the skills to do

because traditionally they work independently in their own practices. It is important for management to apply financial incentives appropriately in order to avoid rewarding inefficiency and to encourage compliance with clinically optimal guidelines.

To obtain the best value from *information technology* during each stage of illness, managers need to generate, analyze, and disseminate information about handling the disease. Sizable investments are needed to develop integrated data systems throughout the continuum of care and to capture information on the range of outcomes and clinical processes. The inability to do so has been a major hurdle for disease management programs to date (Steinman 1996). Many health plans and providers have not yet availed themselves of the full range of existing information technology applications.

However, this is an especially promising area (Lafayette 1995). New applications, like electronic patient medical records and on-line educational services for patients and families, are being developed. Specialized software for clinical management of renal disease patients is now available. It is anticipated that this software will evolve into integrated disease management systems. Vendors providing disease management program software for other chronic diseases are likely to develop renal disease applications as well.

Reinforcing Optimal Systems with Appropriate Public Policies

Table 3 summarizes several policy options available to Medicare that could promote population-based management of chronic renal disease. Prevention must be emphasized at each stage in order to lessen future severity of the disease and avoid complications as it progresses. The critical early screening and referral of pre-ESRD patients would require a commitment to develop and disseminate pre-ESRD clinical guidelines, reimburse providers to promote use of the guidelines, educate patients about the need for screening, and help them to respond constructively when the results are positive. The policy would articulate the complete scope and quality of suitable clinical and nonclinical interventions at each stage of the disease. ESRD screening and preventive care programs should be implemented for patients who are already enrolled as Medicare or Medicaid beneficiaries. Medicare managed care beneficiaries can be included by requiring managed care organizations (MCOs) to

TABLE 3
Medicare Policy Options to Promote Chronic Renal Disease Management

Policy options	Stage of the disease		
	Prepathogenesis	Pre-ESRD	ESRD
1. Prevention	Disseminate guidelines Reimburse providers for screening Patient awareness education	Reimburse for secondary prevention services: EPO, ACE inhibitors, dietary counseling, patient education	Reimburse for nutritional supplements
2. Efficient service delivery		Encourage AV stulas over synthetic grafts (e.g., change relative payment rates)	Develop utilization profiles for nephrologists, including avoidable admissions Reimburse for routine travel to dialysis
3. Quality monitoring	Screening tests for renal dysfunction	Nutritional status Compliance with secondary prevention Timely referral for assessment: AV stula, graft, and/or transplant	Hospitalization rates Urea reduction ratio (URR) Complication rates Transplant rates Survival rates

implement these services and to report on pre-ESRD care as part of their reporting requirement for quality outcomes. Medicare fee-for-service (FFS) beneficiaries can be included by expanding reimbursement and developing new billing codes for pre-ESRD care. Medicaid policy should be revised to require pre-ESRD screening and preventive services. Many of these interventions are linked to the management of comorbidities and thus can be woven into broader disease management programs, such as hypertension and diabetes clinics and drug utilization review.

Adding preventive services to the Medicare and Medicaid programs could be controversial but money-saving in the long run. Unless prevention is incorporated, Medicare will continue to bear the high costs of treating greater numbers of ill-prepared ESRD patients with multiple complications and comorbidities. Some estimates suggest that 30 to 40 percent of ESRD patients enter treatment only after an emergency-room visit triggered by undiagnosed renal failure (Lunbeck, Laudan, and Lee 1996). Mortality rates in this crisis situation can be as high as 25 percent.

The second policy option, improving the *efficiency of service delivery*, is designed for beneficiaries in the FFS reimbursement system, which often encourages overuse of some services. For example, pre-ESRD and ESRD patients often undergo surgery for synthetic grafts instead of for arteriovenous (AV) fistulas, thereby incurring preventable hospitalizations. Inpatient claims represented 38 percent of total ESRD claims paid by Medicare in 1996 (U.S. Renal Data System 1998). Spending on vascular access procedures per hemodialysis patient-year at risk has been estimated at up to \$7,871, or 17 percent of total spending per hemodialysis patient (National Institutes of Health 1993). Fistulas require more time and skill and result in fewer complications (which lead to more surgery), although reimbursement incentives to vascular surgeons favor synthetic grafts. Fistulas also require fewer replacements, and thus less surgery. A recent study identified a trend away from the use of fistulas for vascular access and cited lack of appropriate pre-ESRD care as the most likely cause (Chertow 1996; Hirth et al. 1996). The Medicare fee schedule could be adjusted to reflect the greater time and skill required for AV fistulas, as well as their long-term cost-effectiveness.

Reimbursement for nephrologists' services is currently bifurcated into routine ambulatory services related to dialysis and other consultations (including all inpatient services). The former are bundled in the monthly capitation payment (MCP). Nephrologists are currently paid significantly more when treating patients in the hospital. Although MCP

payments are reduced when patients are hospitalized, the net result is significantly higher income for the nephrologist. Nephrologists should be given new incentives to help reduce unnecessary hospital admissions, perhaps allowing them to share in savings generated through overall efficiency (Tompkins, Wallack, Bhalotra, et al. 1996). The availability of complete Medicare data would permit profiling of provider performance and would help to lower costs and improve quality. Furthermore, lack of access to routine transportation can result in missed dialysis sessions, or even in abuse of ambulance benefits. Reimbursing for routine transportation, even on a periodic basis, may help to alleviate these problems.

The third entry of table 3 shows options for *monitoring and improving quality* at each stage of illness. The main indicator in the general population is the periodic screening for signs of chronic renal disease. The pre-ESRD population needs closer, more sophisticated monitoring of nutritional status, compliance with secondary prevention services (e.g., EPO), and timely referrals for assessing mode of renal replacement therapy. In the ESRD stage, the number of patients is relatively small, and the services are intensive. Complications (mostly vascular access) and comorbidities (mostly cardiovascular) account for much of the resource consumption and threats to quality. The urea reduction ratio (URR) and Kt/V (whereby K = clearance, t = time on dialysis, and V = patient volume, or body mass) currently represent the standard benchmarks for dialysis dosage, and transplantation is the highest-quality mode of treatment for all viable candidates.

The Institute of Medicine and the Prospective Payment Assessment Commission have recommended the development of widely accepted process and outcome measures for quality assurance in conjunction with systems for monitoring and feedback (Institute of Medicine 1991; Prospective Payment Assessment Commission 1996). Measures of quality outcomes, as well as monitoring mechanisms and regulations, should be established for pre-ESRD care of patients covered by Medicare, Medicaid, MCOs, and insurance companies. Reporting on these measures could be linked to MCOs' eligibility to participate in the Medicare managed care program.

Long-term outcome objectives should be constructed, based on existing clinical quality indicators like those already developed by HCFA and the NKF (Health Care Financing Administration 1997). These guidelines should be expanded, however, to include pre-ESRD patients, nonclinical indicators (such as measures of daily functioning and self-care), and cost objectives. These quality measures could be analyzed in

conjunction with case mix and utilization information to create profiles of providers serving Medicare ESRD patients. This may produce useful information about the nephrologist's role, which may in turn stimulate nephrologists to participate more actively in plans for the care of pre-ESRD patients.

Applying Disease Management Principles to Other Diseases

Table 4 illustrates the application of many of these concepts to other health care conditions. Current best practices in geriatric health care are premised on a growing body of knowledge about health promotion and disease prevention as aging occurs.

Health care interventions designed to maintain or restore wellness can begin in the *prepathogenesis stage*. Long-run prevention can take the form of modifying dietary intake to prevent colon cancer or osteoporosis, and short-term prevention could be realized through measures like immunization against pneumonia or influenza. A healthy lifestyle can help to prevent many types of health conditions, slow the progression of disease, and lessen acuity. Furthermore, early pathology can signal a need for lifestyle modification in order to retard the progress of some diseases, or even to reverse the disease process.

TABLE 4
Examples of Interventions Aimed at Significant Health Care Conditions

Stage of the disease	Types of interventions and illustrative health conditions
1. Prepathogenesis	<i>Immunization</i> against pneumococcal pneumonia or influenza <i>Appropriate diet</i> , such as fiber to prevent colon cancer <i>Nutritional supplements</i> , such as calcium to prevent osteoporosis
2. Early pathology	<i>Lifestyle modification</i> to retard or reverse diabetes, hypertension, hyperlipidemia, or arthritis <i>Screening</i> for breast cancer, colon cancer, or cervical cancer
3. Advanced pathology	<i>Provision of prescription drugs</i> , such as antidepressants, or chemotherapeutic agents <i>Geriatric case management</i> to avoid hospital admissions for congestive heart failure

The Lifestyle Heart Trial (Ornish, Scherwitz, Billings, et al. 1998) showed that ambulatory patients could be motivated to make and sustain comprehensive lifestyle changes that would stop, and even reverse, the progress of coronary atherosclerosis. The prescription followed by these patients was a vegetarian diet with 10 percent fat intake, moderate aerobic exercise, stress management training, smoking cessation, and group psychosocial support. This group of patients utilized significantly fewer resources; for example, they were far less likely to undergo percutaneous transluminal coronary angioplasty and cardiac hospitalizations.

Early detection and intervention can be pivotal for improving the management of many diseases. Screening individuals at risk for certain conditions, like breast or colon cancer, can give them a much greater chance of survival and recovery. Medicare has already approved payment for colon cancer screening, recognizing that early detection through fecal occult blood screening reduces mortality and morbidity. Colon cancer epidemiology links dietary constituents—like fat, fiber, red meat—and lifestyle factors—like activity level and alcohol use—to its incidence (Bertagnoli, McDougall, and Newmark 1997), suggesting further opportunities for Medicare to intervene in another disease at an earlier stage.

In recognition of its changing role from third-party insurer to responsible buyer, Medicare has been moving forcefully to promote preventive care and ensure quality. Currently, Medicare has added some vaccinations and a few early detection/screening services to its coverage. However, the rate of use of preventive services paid for by Medicare, such as mammograms, eye exams for diabetics, and immunization for pneumococcal pneumonia, tends to be "extremely erratic" (Wennberg 1999) and does not begin to approach either the ultimate goal of 100 percent or the Kaiser Permanente benchmarks used in this study. (For example, Kaiser's 82 percent mammography rate was double that of the top-performing geographic region.)

Medicare may be expanded to include coverage for prescription drugs, which could greatly improve treatment for diseases in early and advanced stages of pathology. Medicare beneficiaries have a high rate of prescription drug use. Soumerai and Ross-Degnan (1999) have described the adverse clinical consequences of noncoverage of drugs. They suggest that total costs may actually be higher because of unintended hospital and nursing-home use, and they propose a national pharmacy assistance program. In many cases, as in the treatment of depression or certain cancers, compliance with medications is required for long periods.

Finally, some diseases are sufficiently chronic and/or expensive to warrant special attention by geriatric or other case managers, often in conjunction with multidisciplinary teams. Congestive heart failure, for example, can require studious attention to nutritional guidelines and compliance with prescribed medications to avoid decompensation and acute hospital admissions. Naylor, Brooten, Campbell, et al. (1999) confirmed that geriatric case management not only reduces short-term readmissions but also lengthens the time between discharge and readmission and decreases the costs of providing health care. Philbin (1999) reviewed the literature to evaluate the effect of comprehensive, multidisciplinary management programs on patients with congestive heart failure. By emphasizing compliance with therapeutic regimes, patient education, and patient surveillance, these programs improved functional status, reduced the risk of hospital admission, and lowered medical costs.

Discussion

The Medicare program has provided access to medical services for many Americans who lack the employment-based insurance available to most working families. Although the original Medicare entitlement criteria corresponded to the Social Security retirement age of 65, subsequent expansions included permanent disability and onset of renal failure. Together, these entitlement criteria have situated Medicare as a safety net that pays the bills for many long-standing, debilitating, and even life-threatening, chronic illnesses.

Financial pressures in the health care industry have focused attention on population-based prevention activities, early intervention, and aggressive case management of high-cost patients. For several reasons, the private sector may not be the best arena in which to carry out these activities: First, the relevant time horizon ought to be a person's entire life span. For many insurers and providers struggling in competitive situations, large investments often must pay for themselves within several months, or at least within a few years. Second, competitive pressures also can discourage insurers from enrolling or retaining high-cost patients. Although disease management activities may lower costs (eventually), their biggest short-term effects may be higher costs and disproportionate enrollment of patients who need and desire such services. Third, the

existence of Medicare coverage shifts the long-run consequences onto the individual and the public safety net.

The government's share of the nation's health care bill continues to grow inexorably: \$507 billion, or 46 percent of the total in 1997, up from 40 percent in 1990. As Iglehart (1999a) points out, this magnitude of public expenditures . . . is important because it indicates the amount of attention governments are likely to pay to the system and . . . its configuration." Moreover, public funding for the direct medical costs of chronic care is twice that for acute care (Robert Wood Johnson Foundation 1996). Medicare is the country's single largest insurer, protecting 39 million beneficiaries from the costs associated with illness. However, as Iglehart (1999b) also notes, except for the provision of a few preventive services, the benefit structure has remained largely unchanged since the program's inception, reflecting neither current health care standards nor the needs of a rapidly growing, aging population.

The Medicare program was established primarily to pay the medical bills for beneficiaries, but its mission has also included quality control and monitoring. As the health care industry continues to move in the direction of population-based approaches and disease management, Medicare should heed this opportunity to anticipate the future needs of beneficiaries and to intervene on their behalf. This includes adopting policies that encourage clinicians and managers to take advantage of opportunities to improve care for the populations they currently serve.

Although we have referred to interventions that were designed for chronic renal insufficiency and other diseases, we do not imply that they all are cost-effective. For example, a recent study of multidisciplinary case management of patients with renal insufficiency reported increased costs and higher utilization of services, but no effect on clinical outcomes (Harris, Friedrich, Luft, et al. 1998). Perhaps future evaluations that are based on more comprehensive programs, larger sample sizes, longer follow-up periods, and/or additional outcome measures might better demonstrate cost-effectiveness. However, the larger point remains that, in an era of cost constraints and evidence-based medicine, it will be important to evaluate proposed innovations before adopting them universally (Hornberger and Wrone 1997). At the same time, we should adopt the clinical interventions, administrative supports, and public policies that bring appropriate innovations to people who can benefit now and well into the future.

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