

Cost, Quality, and Value: The Changing Political Economy of Dialysis Care

Jonathan Himmelfarb,* Arnold Berns,[†] Lynda Szczech,[‡] and Donald Wesson[§]

*Maine Medical Center, Division of Nephrology, Portland, Maine; [†]St. Francis Hospital, Evanston, Illinois; [‡]Duke University Medical Center, Durham, North Carolina; [§]Texas A & M Health Science Center College of Medicine, Temple, Texas

J Am Soc Nephrol 18: 2021–2027, 2007. doi: 10.1681/ASN.2007020152

“One of the essential qualities of the clinician is interest in humanity, for the secret of the care of the patient is caring for the patient.” —Frances Weld Peabody, MD (1881 to 1927)¹

Clinical nephrology, perhaps more than any other medical subspecialty, has been shaped by a single medical procedure, namely the provision of dialysis. Several medical historians and students of the ESRD program in the United States have commented extensively on how legacies associated with Medicare’s funding of ESRD have helped frame policy choices made by Congress, Medicare, and the nephrology community.² Nephrology care as it exists today is a direct result of Congress’s establishing the Medicare entitlement for treatment of individuals with ESRD in 1972.³ It is interesting that congressional consent to this provision was partly predicated on a 1967 Gottschalk Committee report, which estimated an incidence of approximately 40 cases of ESRD per million persons per year, or roughly 12% of the current actual rate. The Gottschalk Committee estimates were based on the assumption that the treated ESRD population would be limited to individuals who were 14 to 45 yr of age and free of comorbid conditions.⁴ Table 1 describes many of the important landmark events that have shaped social, ethical, and economic relationships among dialysis patients, nephrologists, dialysis providers, and third-party payers. Rettig and Sadler⁵ recounted the fol-

lowing events and trends that were set in motion by the landmark 1972 Congressional action:

1. Preservation of equity of access to a life-preserving therapy
2. The near-immediate relaxation of stringency for patient selection for dialysis care
3. A geometric expansion in the incidence and prevalence of treated patients with ESRD
4. Steadily increasing costs to Medicare for the ESRD program
5. Rise of a proprietary, outpatient-based, for-profit dialysis provider industry
6. Rise in costs and profits associated with injectable pharmaceuticals as part of the dialysis procedure
7. Attempts at cost containment by Medicare through lack of adjustment for inflation in payments for dialysis care, resulting in diminished reimbursement in constant dollars
8. Systematic cost shifting from Medicare to private insurance

The political economy of care for dialysis patients is also certainly not immune to the global concerns in US health care delivery; indeed, the contrary is true. Historically, the ESRD Program has been a model for innovative health care policy, as a result in part of the readily tracked population of patients, the high associated costs of the program, the wealth of data available from databases such as the US Renal Data System, and the inherent high level of morbidity and mortality in

the patient population, which makes delivery of high-quality care compulsory. Overall, the secular trends in the economics of dialysis confirm steady decrease in reimbursement per treatment in constant dollars, whereas the providers have succeeded in preserving profits largely as a result of increased productivity, shift in professional mix favoring less expensive labor, use of cheaper disposables including reprocessing of dialyzers, and increased revenues from injectable medications that are administered at the time of dialysis. Nonetheless, there is an overall increase in cost to the system as a result of geometric expansion in the number of treated patients (Figure 1).

In the United States and other nations, the care of dialysis patients is a component of a societal debate because harsh economic realities intersect with the needs of a vulnerable and growing patient population. Currently, the US health care system is on a dangerous and unsustainable path that has been described as a “toxic combination of high cost, uneven quality, frequent errors, and limited access to care.”⁶ Per capita health care costs and the compound annual growth rate for health care

Published online ahead of print. Publication date available at www.jasn.org.

Correspondence: Dr Jonathan Himmelfarb, Maine Medical Center, Division of Nephrology, 22 Bramhall Street, Portland, ME 04102. Phone: 207-662-2417; Fax: 207-662-6306; E-mail: himmej@mmc.org

Copyright © 2007 by the American Society of Nephrology

Table 1. Landmark events in dialysis care

Year	Event	Implications
1967	Gottschalk Committee Report	Optimistic projections on dialysis prevalence set the stage for 1972 Congressional action
1968	Incorporation of National Medical Care	Initiates a proprietary for-profit dialysis chain
1972	Public Law 92-603, Section 2991	Authorized Medicare payment for dialysis and kidney transplantation
1978	Public Law 95-292	Paved the way for establishment of a composite rate of payment
1981	Editorial: Where are the data? In <i>New England Journal of Medicine</i>	Helped establish field of outcomes research
1988	Establishment of USRDS	Created a robust, comprehensive data set on dialysis clinical outcomes
1989	Dallas Conference on Mortality in Dialysis	Emphasized high mortality in US dialysis population
1989	Coverage of erythropoietin	Injectables a new cost center in hemodialysis care
1991	Institute of Medicare Report: Kidney Failure and the Federal Government	Facilitated a quality movement in dialysis care

expenditures in the United States are far higher than most Westernized countries. Despite high expenditures, the proportion of US patients who do not get treatment or medication because of cost is also high; as a result, there is a large gap between recommended appropriate care and delivered

care for many common medical problems.⁷ Surprisingly, these data often indicate an inverse relationship between Medicare spending and quality of delivered care.⁸ Recognized shortcomings in the US health care system have led to calls to transform health care by focusing on simulta-

neously enhancing quality and controlling costs so as to increase value for patients. How best to increase value for patients, defined as health outcomes per dollar of cost expended, will likely be the dominant factor in a changing health care environment. These ongoing changes in the health

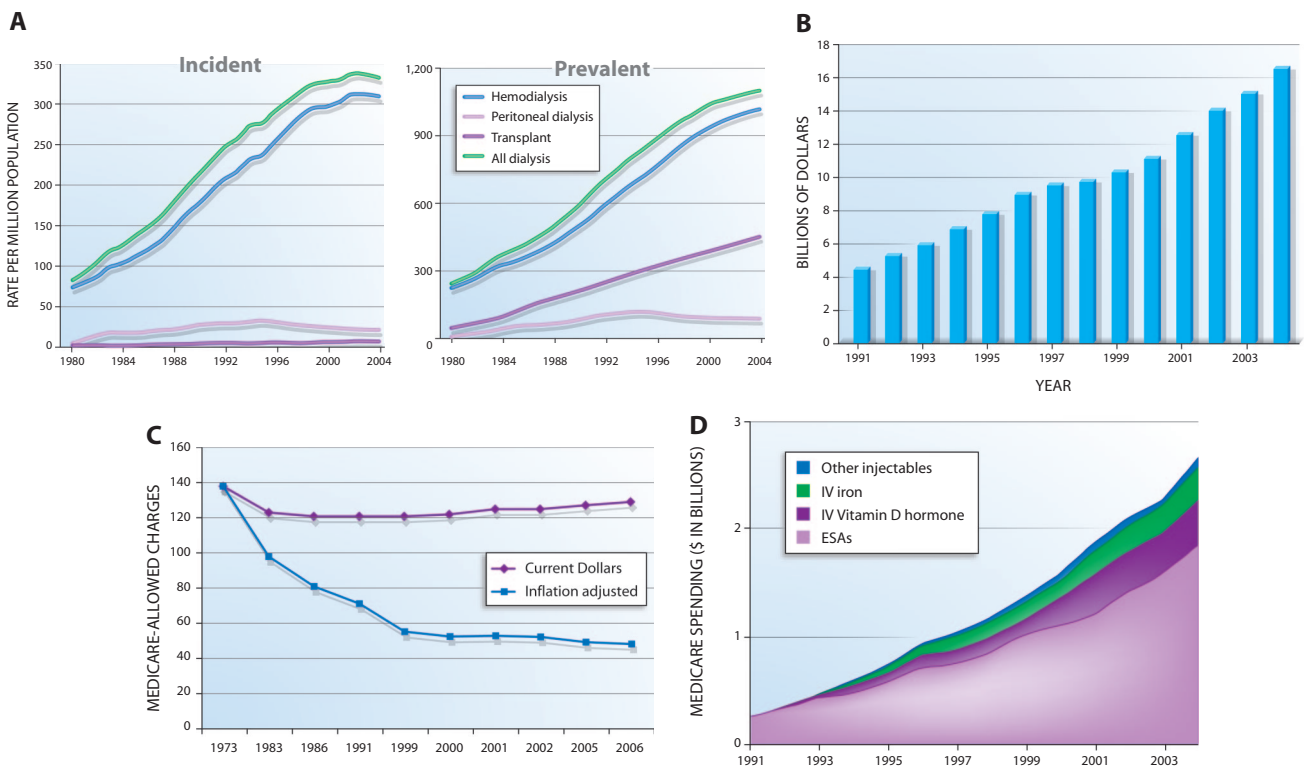


Figure 1. (A) Trends in the number of treated ESRD patients. (B) Trends in total direct Medicare spending for dialysis services. (C) Trends in average Medicare payment per dialysis treatment in real and constant (inflation-adjusted) dollars. (D) Trends in Medicare spending for dialysis injectables. Source for A, B, and D: 2006 United States Renal Data System Annual Data Report. Source for C: *Kidney Failure in the Federal Government* and gross domestic product inflation data from the US Department of Commerce: Bureau of Economic Analysis, courtesy Elliott Sloan.

care industry are now converging to frame the debate over the care of dialysis patients. In this article, we discuss how trends toward payment for quality in dialysis care, additional bundling of payments into the dialysis composite rate, consolidation of large dialysis provider organizations, the need for nephrologists to care for a large population with chronic kidney disease (CKD), and a worsening manpower shortage in nephrology all have the potential to affect dramatically the dialysis patient–nephrologist relationship. We discuss the need to preserve core values that are encompassed in the patient–physician relationship.

PAYMENT FOR QUALITY

An obvious approach to increasing value for patients who require dialysis care is to pay physicians and providers more when a higher quality of care is delivered, particularly if this results in better patient outcomes. The focus on improving quality has been led by the Institute of Medicine, beginning with its 1991 report on kidney failure.⁹ Payment for quality programs, also known as pay for performance (P4P), are rapidly growing in the private sector.¹⁰ In the public sector, the Medicare Payment Advisory Commission has recommended linking payments to quality of care in the dialysis setting, and the ESRD program is likely to be an early P4P focus for the Centers for Medicare and Medicaid Services (CMS). The value; feasibility; pitfalls; and appropriate risk-adjusted, standardized, evidence-based quality metrics for a P4P program in dialysis care are being vigorously debated within the nephrology community.^{11–13} Even though evidence to support a linkage among development of clinical performance measures, P4P measures, and improved clinical outcomes is, at best, modest,^{14,15} sufficient momentum has gathered that implementation of a P4P system in dialysis care is perhaps inevitable. Nonetheless, considerable challenges exist in developing payment systems that use validated measures of cost, quality, and outcomes while aligning incentives for optimized patient care.

Perhaps the most important and con-

Table 2. Freestanding dialysis units^a

Parameter	Year			Annual Percentage Change	
	1995	2000	2005	1995 to 2000	1995 to 2005
Total no. of					
dialysis facilities	2721	3805	4540	7	5
hemodialysis stations	40,578	59,480	78,870	8	7
% of all facilities					
hospital-based	26	18	14	0	–1
freestanding	74	82	86	9	7
For profit	65	78	78	11	7
Nonprofit	35	22	22	–3	0

^aNonprofit includes facilities that are designated as either nonprofit or government. Source: Compiled by MedPAC from the 1995 and 2000 Facility Survey files from Centers for Medicare and Medicaid Services (CMS) and the 2005 Dialysis Compare Database from CMS.

tentious element of the current P4P debate has to do with whether performance should be measured using process measures (e.g., adequacy of dialysis, achieving target hemoglobin) or outcome measures (e.g., hospitalization, mortality rates). Many have argued that payment for achieving process measures to physicians and providers is more fair, because medical decision making can have a more direct impact on process measures than patient outcomes. However, Porter and Teisberg⁶ argued that a focus on process rather than outcome measures inevitably results in creating systems that provide payment for compliance rather than performance. They provocatively stated that the net result of payment for process measures will be to increase overall costs, discourage innovation in health care delivery, and not add value for patients. It is likely that at least initially, P4P systems in dialysis care will incorporate a mixture of process and outcome measures.

CONSOLIDATION OF THE DIALYSIS INDUSTRY

In the past decade, the landscape of the dialysis industry has rapidly evolved as a result of the explosive growth and consolidation in the for-profit sector and a corresponding contraction of market share for independent units (Table 2).¹⁶ With the completion of the DaVita acquisition of Gambro in 2005 and the Fresenius acquisition of Renal Care Group in 2006, the dialysis industry has evolved into a classical oligopoly in which a few providers deliver

the majority of services. These two large dialysis organizations now have a national dialysis clinic market share of approximately 70%.¹⁷ How this industry consolidation affects patient care and clinical practice will have an impact on the specialty of nephrology in the United States for the foreseeable future.

Consolidation is certainly not unique to the dialysis sector of the health care industry and is driven by universally applicable and compelling market forces. Indeed, dialysis industry consolidation was predicted by Rettig and Sadler⁵ at the beginning of the decade. The potent business and financial advantages that accrue as a result of consolidation in a market-based system include volume-based cost efficiencies (often referred to as economies of scale), technical efficiencies,¹⁸ improved information and tracking systems, access to affordable capital, vertical integration of service and product, the ability to offer attractive one-partner solutions to payers, professional lay management, and many economies of globalization. Consolidation allows dialysis providers to maintain profit margins in the face of declining constant dollar reimbursement (Table 3).

Industry consolidation also offers demonstrable clinical advantages, including the potential for improved compliance with process and protocol, structured accountability, standardization of care across a large national system, robust quality improvement, and integrated information and reporting systems, all of which can translate into

Table 3. Medicare margin for dialysis care (includes composite rate services and dialysis drugs)^a

Parameter	Medicare Margin (%)
Year	
2003	2.0
2004	3.9
2005	8.4
2007 (projected)	4.1
Medicare margin in 2005	
provider type	
affiliated with the two largest chains	10.7
not affiliated with the two largest chains	2.6

^aData courtesy Nancy Ray from the 2007 MedPAC Report to Congress: Outpatient Dialysis Services.

better care with improved outcomes. Selected quality metrics, including adequacy of dialysis, anemia management, vascular access management, and prevalent mortality rates, all have improved in the past decade.^{13,16,19} Recent data suggest that a greater proportion of patients in for-profit dialysis units meet benchmarks of care in anemia management, dialysis adequacy, and nutritional status, albeit with similar mortality risks.²⁰ Although it has been suggested that it is the chains that deserve the credit for these improved outcomes,²¹ a more balanced view is that improved outcomes are the result of the productive synergy between structure and process. The structure is provided by the chains themselves with their many business, technical, and clinical advantages. Process incorporates algorithms for the delivery of care, using clinical and laboratory benchmarks established by the professional community of nephrologists, as enumerated in clinical practice guidelines, such as the Kidney Disease Outcomes Quality Initiative (KDOQI). This positive synergy and extensive cooperation between the professional and the corporate communities account for substantial patient benefits that have been realized in the past decade.

Consolidation is not without its hazards and disadvantages, however.²² Problems that are intrinsic to any large corporate entity can include a large bureaucracy that by its very nature tends to react slowly to change, compartmentalization of personnel and function with limited cross-talk, and centralization of decision making with inefficient and in-

complete flow of information downstream from the board room to the clinic. As a result, clinical nephrologists, many of whom now function in a dialysis-centered practice setting, may see themselves as a small cog in a big machine (not unlike Charlie Chaplin in the 1936 classic movie *Modern Times*). With industry consolidation, multiple legitimate stakeholders with competing interests converge at the point of care. Corporate leadership and management with fiduciary responsibilities to shareholders, shareholders with an expectation of fair return on their investment, patients with an entitled expectation of the highest possible quality care, payers with an interest in cost containment, and the pharmaceutical and equipment industry all have a vested interest in the provision of dialysis. At the nexus of these competing stakeholders are the patient care providers—nephrologists, nurses, social workers, dietitians, and other members of the patient care team—who are obligated by a moral, ethical, and social contract to provide the highest possible quality patient care on a day-to-day basis.

One of the more subtle risks of consolidation is the evolving relationship between the large dialysis organization and the nephrologist. The transition to corporate ownership of the vast majority of dialysis units has virtually eliminated the model of physician-owned dialysis units. Physician ownership of facilities combined with self-referral and care of patients presents potential conflicts of interest, analogous to current concerns over physician-owned specialty hospitals.^{23,24} As medical directors of corporate-

owned dialysis units, many nephrologists who function as medical directors are now directly compensated by dialysis providers. Historically, nephrologists have usually had an arm's-length relationship with corporate providers, serving as independent contractors rather than actual employees. However, in the current era of more extensive and aggressive consolidation, a new business model has emerged with nephrologist as chain employee. This new employment and practice model risks loss of professional independence and may present unavoidable conflicts of interest for the nephrologist. As an employee, the nephrologist will depend on the good will of the dialysis corporation for his or her livelihood and the next contract renewal but must be willing to advocate consistently for the best interests of his or her patients.

BUNDLING OF PAYMENT FOR DIALYSIS SERVICES

Another form of “consolidation” that may have a further impact on dialysis patient care is the potential for bundling Medicare's payment for drugs and other services with payment of all ESRD services. Since 1983, Medicare has reimbursed dialysis providers through a composite rate that is designed to cover the cost of services that are associated with a single dialysis treatment, including nursing and other clinical services, social services, supplies, equipment, and certain laboratory tests and drugs. Under the composite rate, dialysis providers receive a fixed payment irrespective of the actual costs incurred in the delivery of these services. The composite rate for routine dialysis-related services was the first of Medicare's numerous payment systems designed to set broadly a fixed prospective rate of reimbursement for clinically related services. Currently, payment for certain drugs and laboratory tests that have become a routine part of the care of dialysis patients since 1983 are covered separately by Medicare (Table 4).

In recent years, the General Accounting Office, Medicare Payment Advisory Commission, and CMS all have recommended expanding the bundled payment for dialy-

Table 4. Separately billable injectable ESRD drugs used by dialysis facilities in 2005^a

Separately Billable Drugs Used in Dialysis Treatments	Compound	% of Medicare Expenditures for Separately Billable ESRD Drugs
Injectable iron ^b	Iron sucrose	5.3
	Sodium ferric gluconate complex	3.3
	Iron dextran	0.1
Injectable vitamin D ^c	Paricalcitol	11.4
	Doxercalciferol	2.8
	Calcitriol	0.4
Epoetin ^d	Epoetin α	70.0
	Darbepoetin α	3.7
Other separately billable drugs used in dialysis facilities	Levocarnitine, alteplase, vancomycin, vaccines, etc.	3.0
Total		100

^aSource: General Accounting Office analysis of CMS data and drug information from FDA.²⁵

^bIron is used in the treatment of anemia in conjunction with epoetin.

^cVitamin D is used to prevent osteomalacia by promoting bone mineralization.

^dEpoetin is used in the treatment of anemia by promoting the formation of red blood cells by the bone marrow.

sis services to include separately billable drugs and possibly other services.²⁵ The Medicare Modernization Act of 2003 requires CMS to design a system that would bundle payment for drugs together with other ESRD services under a single rate and to design a model demonstration project to test the feasibility of further bundling for the ESRD program. The General Accounting Office and others have noted that a bundled rate could achieve efficiency and clinical flexibility by removing financial incentive for facilities to choose one treatment over another²⁵ and by removing potential incentives to overprescribe drugs during dialysis to increase profit margins. However, if bundling is embraced, then steps must be taken to ensure that care will

not be compromised for the sake of profit. In addition, the physician's medical fee should remain separate and distinct and not be folded into the larger facility reimbursement, only to be later redistributed by the dialysis provider to the physician. This is necessary to ensure that nephrologists be allowed to remain independent from the providers, because it is independent professional advocacy that allows for a bond of trust between the patient and the doctor.

PHYSICIAN WORKFORCE

A discussion of the changing landscape of dialysis care needs to include physician workforce assessment. An Ad Hoc Committee on Nephrology Manpower

Needs, assembled in the mid-1990s, estimated a need to train between 202 and 661 additional nephrologists per yr, depending on ESRD growth assumptions.²⁶ These estimates conservatively projected a gradual leveling out of the number of needed new nephrologists, which in retrospect may be inaccurate (Table 5). Although the number of nephrologists who currently are being trained is not available, the number of trainees who receive initial board certification in nephrology is likely a good surrogate. Examination of these rates indicates that each year, the number of certifying nephrologists consistently falls short of the targeted goal. The net result is a cumulative deficit (in addition to whatever deficit existed in 1997) of an aggregate 1000 nephrologists. Although the projections and estimations to date have focused entirely on the *number* of patients in the ESRD program, additional complexities must be brought into the scope of concern. The fastest growing group of patients who are beginning dialysis are older than 65 yr. Given the growing comorbidities of the ESRD population, projections for future workforce need should include adjustment for greater time per patient to allow for the proper care of this increasingly complex population. Primary care and care for non-dialysis-related problems in many circumstances are also provided by nephrologists.

Furthermore, the focus on the CKD population and the mechanism to provide care for this group has received tremendous attention since the initial projections on the workforce deficit were

Table 5. Graduated change in projections^a

Year	Projected Growth in ESRD Population (%)	Actual Growth in ESRD Population (%)	ESRD Mortality Relative to Current Levels (%)	No. of Nephrologists Needed to Train per Year	No. of Nephrologists Receiving Their Initial Board Certification ^b
1996 to 1998	+6	+5	100	497	283 and 296
1998 to 2000	+5	+5	90	480	313 and 333
2000 to 2002	+5	+3	90	442	359 and 376
2002 to 2004	+5	+3	80	484	386 and 400
2004 to 2006	+3	—	80	359	—
2006 to 2008	+3	—	70	395	—
2008 to 2010	+3	—	70	395	—

^aData collated from US Renal Data System¹⁶, Neilson et al.,²⁶ and American Board of Internal Medicine.³⁴

^bThe two numbers represent the numbers of nephrologists receiving their initial board certification for each year in the 2-yr interval depicted in that row.

made. Estimates of the number of Americans who are living with CKD vary substantially. Analysis from the Second and Third National Health and Nutrition Examination Surveys (NHANES II 1976 to 1980 and NHANES III 1988 to 1994) reveals that the number of adults who are aged 20 to 74 yr and have stage 3 to 4 CKD grew from 2.6 to 3.9 million, an increase in prevalence to 2460 per 100,000.²⁷ However, examination of NHANES data from 1999 to 2000 suggests that the prevalence of CKD in the US population is stabilizing.²⁸ Since then, knowledge of the tremendous mortality rate of these patients²⁹ as well as a potential benefit to survival that is associated with earlier referral to a nephrologist has resulted in an increased focus on access to care.³⁰ This population is growing, is at high risk for mortality, may benefit from seeing a nephrologist sooner, and is the subject of much discussion with respect to the logistics of the provision of care. To date, CKD care has not been included in a systematic assessment of the need for growth in the nephrology workforce. Similarly, the need for nephrologists to care for growing populations of patients who have received kidney transplants or who experienced acute kidney injury must be taken into account. With the number of open positions for nephrologists already double the number of nephrology fellows who are entering practice,³¹ new workforce assessments are urgently needed to reanalyze predictive models. Newer models of shared care within a team approach and use of technologies to allow a more efficient delivery of quality care should be fostered, vetted, and rewarded on a national level.

PRESERVING THE NEPHROLOGIST-DIALYSIS PATIENT RELATIONSHIP

The doctor-patient relationship is the essence of the practice of medicine, recognized as fundamental since the time of Hippocrates. A century ago, William Osler taught, "The good physician treats the disease, but the great physician treats the

patient who has the disease."³² Or, as noted by Carola Eisenberg, "The satisfaction of being able to relieve pain and restore function, the intellectual challenge of solving clinical problems, and the variety of human issues we confront in daily clinical practice will remain the essence of doctoring, whatever the changes in the organizational and economic structure of medicine."³³ The rapid pace of political and economic change in health care has the potential to alter dramatically the doctor-patient relationship in the dialysis unit. If the nephrologist becomes consumed with simply conforming to process and meeting laboratory quality metrics and as physician autonomy and independence are compromised through changing relationships with large dialysis organizations, then there is a real danger that the nephrologist will lose sight of the patient as an individual. As nephrologists are pulled away from the care of dialysis patients and redirected toward the larger population with CKD, further pressure will be placed on the doctor-dialysis patient relationship.

It is the essence and foundation of clinical medicine that the physician act as the patient's advocate and in the patient's best interest at all times. The nephrologist should be the final arbiter of the complex interaction among the corporate provider, statutory regulators, and the pharmaceutical companies as they all relate directly to patient care. The physician and the patient care team uniquely understand the concerns of the individual patient and are aware of the day-to-day tangibles and intangibles that influence and determine the quality of life for the dialysis patient. It is essential that in the coming era, nephrologists strive vigorously to maintain the primacy of the physician-patient relationship and maintain the integrity and credibility of the patient-centered value system and therapeutic environment. This expectation is the very foundation of trust between doctor and dialysis patient. To accomplish this, nephrologists must be willing to play an active role in the redesign of care models and payment systems across the spectrum of kidney disease.

DISCLOSURES

None.

REFERENCES

1. Peabody FW: The care of the patient. *JAMA* 88: 877-882, 1927
2. Peitzman SJ: Chronic dialysis and dialysis doctors in the United States: A nephrologist-historian's perspective. *Semin Dial* 14: 200-208, 2001
3. Rettig RA: The policy debate on patient care financing for victims of end-stage renal disease. *Law Contemp Probl* 40: 196-230, 1976
4. US Bureau of the Budget: *Report of the Committee on Chronic Kidney Disease*, Washington DC, US Bureau of the Budget, 1967
5. Rettig RA, Sadler JH: The political economy of nephrology. *Semin Nephrol* 20: 505-515, 2000
6. Porter ME, Teisberg EO: *Redefining Health Care: Creating Value-Based Competition on Results*, Boston, Harvard Business School Press, 2006
7. McGlynn EA, Asch SM, Adams J, Keesey J, Hicks J, DeCristofaro A, Kerr EA: The quality of health care delivered to adults in the United States. *N Engl J Med* 348: 2635-2645, 2003
8. Baicker K, Chandra A: Medicare spending, the physician workforce, and beneficiaries' quality of care. *Health Aff (Millwood)* [Suppl Web Exclusives]: W184-W197, 2004
9. *Kidney Failure and the Federal Government*, Washington DC, National Academy Press, 1991
10. Rosenthal MB, Landon BE, Normand SL, Frank RG, Epstein AM: Pay for performance in commercial HMOs. *N Engl J Med* 355: 1895-1902, 2006
11. Himmelfarb J, Pereira BJ, Wesson DE, Smedberg PC, Henrich WL: Payment for quality in end-stage renal disease. *J Am Soc Nephrol* 15: 3263-3269, 2004
12. Andreoli SP, Brewer ED, Watkins S, Fivush B, Powe N, Shevchek J, Foreman J: American Society of Pediatric Nephrology position paper on linking reimbursement to quality of care. *J Am Soc Nephrol* 16: 2263-2269, 2005
13. Himmelfarb J, Klinger A: End-stage renal disease measures of quality. *Annu Rev Med* 58: 26.1-26.13, 2007
14. Rosenthal MB, Frank RG, Li Z, Epstein AM: Early experience with pay-for-performance: From concept to practice. *JAMA* 294: 1788-1793, 2005
15. Lindenauer PK, Remus D, Roman S, Rothberg MB, Benjamin EM, Ma A, Bratzler DW: Public reporting and pay for performance in hospital quality improvement. *N Engl J Med* 356: 486-496, 2007

16. US Renal Data System: *USRDS 2006 Annual Data Report: Atlas of End-stage Renal Disease in the United States*, Bethesda, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, 2007. Available at: <http://www.usrds.org/adr.htm>. Accessed January 3, 2007
17. Sullivan J: Merger mania. *Nephrol News Issues* July 2005, pp 49–50
18. Ozgen H, Ozcan YA: A national study of efficiency for dialysis centers: An examination of market competition and facility characteristics for production of multiple dialysis outputs. *Health Serv Res* 37: 711–732, 2002
19. *Outpatient Dialysis Services. Report to Congress*, MedPac, Washington DC, 2006, pp 105–129
20. Szczech LA, Klassen PS, Chua B, Hedayati SS, Flanigan M, McClellan WM, Reddan DN, Rettig RA, Frankenfield DL, Owen WF Jr: Associations between CMS's Clinical Performance Measures project benchmarks, profit structure, and mortality in dialysis units. *Kidney Int* 69: 2094–2100, 2006
21. Nissenson AR, Lazarus M, Lindenfeld S, Hakim R, Bander S: The current and future state of the end-stage renal disease program: A provider roundtable. *Semin Nephrol* 20: 543–555, 2000
22. Bosch J, Bander S: Dialysis care in 1999: Reality and challenges. *J Nephrol* 13: 57–59, 2000
23. Kahn CN 3rd: Intolerable risk, irreparable harm: The legacy of physician-owned specialty hospitals. *Health Aff (Millwood)* 25: 130–133, 2006
24. Iglehart JK: The uncertain future of specialty hospitals. *N Engl J Med* 352: 1405–1407, 2005
25. *End Stage Renal Disease: Bundling Medicare's Payment for Drugs with Payment for all ESRD Services Would Promote Efficiency and Clinical Flexibility*, US Government Accountability Office, Washington DC, 2006
26. Neilson EG, Hull AR, Wish JB, Neylan JF, Sherman D, Suki WN: The Ad Hoc Committee report on estimating the future workforce and training requirements for nephrology. The Ad Hoc Committee on Nephrology Manpower Needs. *J Am Soc Nephrol* 8[Suppl]: S1–S4, 1997
27. Hsu CY, Vittinghoff E, Lin F, Shlipak MG: The incidence of end-stage renal disease is increasing faster than the prevalence of chronic renal insufficiency. *Ann Intern Med* 141: 95–101, 2004
28. Coresh J, Byrd-Holt D, Astor BC, Briggs JP, Eggers PW, Lacher DA, Hostetter TH: Chronic kidney disease awareness, prevalence, and trends among US adults, 1999 to 2000. *J Am Soc Nephrol* 16: 180–188, 2005
29. Go AS, Chertow GM, Fan D, McCulloch CE, Hsu CY: Chronic kidney disease and the risks of death, cardiovascular events, and hospitalization. *N Engl J Med* 351: 1296–1305, 2004
30. Kinchen KS, Sadler J, Fink N, Brookmeyer R, Klag MJ, Levey AS, Powe NR: The timing of specialist evaluation in chronic kidney disease and mortality. *Ann Intern Med* 137: 479–486, 2002
31. Osinski M, Wish J: Physician workforce: Coming up short. Available at: <http://www.nephrologyusa.com/article5.html>. Accessed January 3, 2007
32. *The Cambridge History of Medicine*, New York, Cambridge University Press, 2006, p 124
33. Eisenberg C: It is still a privilege to be a doctor. *N Engl J Med* 314: 1113–1114, 1986
34. American Board of Internal Medicine. Available at: <http://www.abim.org>. Accessed January 3, 2007