Conclusions, Consensus, and Directions for the Future

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Summarizing >1000 PowerPoint slides and hours of presentations, punctuated with lively discussions, has led to consensus and conclusions from this landmark meeting. The Steering Committee has charted a new roadmap for discovery and treatment of ESRD, particularly focused on dialysis modalities. Statements, some bold and paradigm-shifting in character, will serve as the legacy for this seminal gathering of highly experienced experts, fully attuned to the realities of present day care of dialysis patients in the United States and the world.

The original mission of the meeting was to analyze the two decades of caring for patients with ESRD (by HD and PD dialysis) that have transpired since the landmark Dallas ESRD meeting of 1989 to determine our progress. If progress was found wanting, the mission was to outline what we must do to correct the errors of the past and move forward under a new strategy of care. As this document attests, this goal was achieved.

Before proceeding with the summary of the meeting and deriving conclusions, the Steering Committee expresses its sincere appreciation to the American Society of Nephrology, European Dialysis and Transplant Association/European Renal Association, International Society of Nephrology, National Kidney Foundation, and the Renal Physicians Association for their support and for endorsing the meeting and to the sponsors mentioned at the beginning of this supplement for their financial support. Without either, this meeting would not have received the international recognition that it even already has received.

The background, the prevailing milieu, in which this has occurred, is very important. The setting must be understood if we are going to introduce new scientific information that will dictate innovative models of care. We focus here on the facts that pertain to the United States:

- Mortality on dialysis exceeds 20%/yr
- Cost of $34,000,000,000/yr
- Less than 20% of patients rehabilitated
- Hospital costs per year exceed $20,000 per patient

- A total of 104,000 new ESRD patients entered care in 2005
- 97,143 in-center hemodialysis (HD) patients
- 6875 peritoneal dialysis (PD) patients
- 2424 preemptive transplants performed

Each of the individual papers is noteworthy for their lucid presentations for both current care and future directions. Taken collectively, they show a pattern of needed change, even build a linear story, and point the way for remodeling the care of our patients. Although there is a tacit acknowledgment of the manifest shortcomings of care to date, this final paper of the supplement, which represents a consensus summary of the meeting, will be more thematic and amalgamate papers and information to tell the story of what we now need to do—going forward. We outlined a road map for progress in treatment of ESRD by dialysis, recognizing at the outset that current care is stagnant, inadequate, and, by all standards, unsustainable.

We divided the summary and conclusions into two main categories: primary concerns and secondary concerns, with attendant potential solutions. Clearly, we do not intend for the one to be in the shadow of the other. They are all important. However, to save the most lives, provide the highest quality of life to the greatest number of patients, the primary concerns need to be addressed foremost and immediately.

Primary Concerns and Solutions

There needs to be no lengthy display of data to show the ongoing high mortality and hospitalization rates of patients undergoing traditional dialysis-oriented renal replacement therapy. Although modest improvements have occurred in the past 20 yr, since the 1989 “Dallas Morbidity and Mortality in ESRD Conference,” the ongoing high mortality and hospitalization rates of patients point out our shortcomings in prescribing and delivering dialysis. The average mortality rate of >20% exceeds that of certain cancers. This cannot be accepted as the best that can be achieved. Although there have been some improvements in mortality rates beginning after the second year of treatment, the mortality in the first 6 mo of dialysis treatment can be as high as 40%.

Vascular Access

Vascular access is the iatrogenically induced Achilles heel of dialysis care. The use of in-dwelling catheters in the United States for access (both temporary and permanent) is now the single greatest source of increased morbidity and mortality,
outside of cardiovascular-related issues. The two most common access complications are infection (sepsis) and thrombosis (requiring de-clot procedures). Knowing the hazards of catheter placement, how can we justify that 82% of ESRD patients in the United States initiate HD with a catheter (even in those with fistulas and grafts in the maturation phase)? Seeing a nephrologist more than a year before the initiation of dialysis leads to only a slight increase in early fistula creation (and only a slight increase in catheter avoidance). Fatal infections, primarily from catheters used for access, have equaled deaths from cardiovascular disease (CVD) in the first 3 mo of dialysis. Although the FistulaFirst initiative has increased the total number of fistulas created, too often, fistula placement is occurring well after initiation of HD and the primary failure rate for arteriovenous fistulas is increasing (perhaps a result of inexperience with surgical technique). An unintended consequence of the FistulaFirst initiative is the placement of more catheters in the first year of dialysis at the expense of graft creation (the second best option for access). With one catheter-related infection, there is an increased relative risk of dying that persists for 3 yr after this single event.

Vascular access infection is also a major determinant of chronic inflammation that plagues patients with ESRD. Chronic inflammation is a robust substrate for CVD in ESRD. Therefore, continued catheter use with subsequent infections amplifies the risk for adverse cardiovascular outcomes over ensuing years as well as the more immediate septic morbidity and mortality. Stated another way, it seems that excess catheter use indeed leads to higher infection and heightened inflammation, with its subsequent effect on nutrition, CVD, hospitalizations, and mortality.

The first of the primary concerns is, therefore, to minimize catheter utilization. Nephrologists, vascular surgeons, hospitals, and dialysis providers, including large dialysis organizations, need to be accountable for solving this problem. The harm to our patients is avoidable. Let’s be clear. This is an iatrogenic disease. This problem can be resolved by responsible behavior without additional funding or resources. Catheter avoidance, whenever possible, should become a mantra of dialysis caregivers and providers.

With regard to infection control, complications related to influenza and pneumonia are also associated with an increased relative risk of death for a prolonged time beyond the initial infectious episode. The prevalence of vaccinations for influenza and pneumococcal pneumonia needs to be well above 90% in the ESRD population. The current practice in the United States is well below this goal.

The triad of catheter–infection–inflammation segues into the story of CVD in ESRD. The pathobiologic pathways intersect at multiple points.

**Cardiovascular Disease**

Persistent inflammation is a known pro-atherogenic risk factor in chronic kidney disease (CKD) and ESRD, and its presence modulates effects of concurrent vascular and nutritional risk factors. Less well appreciated is its effect elsewhere on the cardiovascular system, beyond atherogenesis.

During the conference (and confirmed by many others), the presentations on left ventricular hypertrophy/left ventricular mass index (LVH/LVMI) and cardio-myocyte fibrosis emerged as a major culprit associated with premature death in the ESRD (dialysis) population. Such alterations in myocardial mass and tissue fibrosis can develop independent of ASCAD. By excessive attention to those factors thought to be associated with ASCAD, such as dyslipidemia, disorders of mineral metabolism, and the like, we focused on an aspect of care that has less impact on morbidity and mortality than the issues of LVH and myocardial fibrosis. Many clinical nephrologists do not understand or appreciate the significance of the association of LVH and myocardial fibrosis with mortality and morbidity. Dilated cardiomyopathy, congestive heart failure, and arrhythmogenic sudden cardiac death are direct consequences of accelerated ventricular hypertrophy and myocardial fibrosis. Poor BP control and failure to achieve euvolemia contribute to these events but other factors are also involved. It seems very clear that our current “standard” HD prescription of thrice weekly, 3- to 4-h treatments does not adequately alleviate this potentially lethal problem. However, it seems likely that increased LVMI is potentially reversible with longer and more frequent dialysis exposure. This conjecture is being formally tested in the randomized controlled NIH sponsored trial (The Frequent Hemodialysis Network Trial), with results anticipated by the ASN annual meeting in 2010. The effects of aggressive anemia treatment with erythropoiesis-stimulating agents (ESAs) on LVH and CVD have been very disappointing. Although treatment of severe anemia with ESA can blunt LVH, restoration of normal or near normal levels of hemoglobin has little or no additional benefits on LVH. The introduction of ESAs into the mainstream of therapy in ESRD has reduced blood transfusions dramatically and improved the quality of life in ESRD but has had very little positive impact on mortal events. There is a need for development of a new class of pharmaceutical agents directed at modulation of LVH and cardiac fibrosis in ESRD, in addition to anti-hypertensive drugs. Perhaps these new pharmaceuticals (e.g., aldosterone antagonists, direct renin inhibitors, toxin absorbents, and molecular pathway inhibitors) may yet play a major preventative role in ESRD by altering myocardial remodeling and ameliorating myocardial fibrosis. Exciting new experimental data support future study into the use of mammalian target of rapamycin inhibitors (Sirolimus and related compounds) to retard LVH and cardiac fibrosis, but questions remain as to whether these advances in the laboratory can be translated safely to humans. Until then, if we can decrease the LVMI by an improved dialysis prescription, thus providing better control of factors such as BP and intravascular (extracellular) volume, we offer the possibility of immediately reducing the risk of cardiovascular mortality in this group of patients. We should now move more toward preventing and controlling LVH and cardiac fibrosis while still maintaining vigilance about atherogenesis related coronary artery diseases (ASCAD).

The importance of intravascular volume on BP, and their paired and complementary roles, in LVH is of paramount importance, especially with conventional HD. Lowering body weight slowly (no more than 1 kg/wk decrease) is associated
with a fall in BP and a reduction in anti-hypertensive medication use. A near normalization of BP is associated with better cardiovascular outcomes and this, too, is best accomplished through longer dialysis and/or more frequent dialysis sessions (with shorter interdialytic intervals). Normalization of BP and intravascular volume is often difficult to achieve with conventional dialysis therapy. A major focus of clinical effort should be to reduce interdialytic weight gain, requiring sodium and fluid restriction, repeated dietary counseling, and a high degree of patient compliance.

In the dialysis clinic setting, the physician and nursing staff have used newer technical applications such as sodium modeling to control intravascular volume. This has had a mixed effect. Increased exposure to sodium through sodium modeling compounds a high sodium oral intake. A vicious cycle is created, with intravascular volume overload, stiffening of vasculature, release of vasopressors and digitalis-like compounds (marinobufagenins), and augmentation of LVH and cardiac fibrosis, at the very least. Removing volume through sodium-induced osmotic equilibration may turn out to be a bad idea after all.

The conundrum of lipid therapy in ESRD was well documented in the presentations. Perhaps it is driven by the desire to simply do something. Despite a dramatic lowering of total cholesterol and low-density lipoprotein (LDL) cholesterol blood levels, both the 4 D and AURORA trials showed no mortality benefit (or harm) from “statin” therapy in patients with dialysis-dependent ESRD. However, it is important to note that many patients with ESRD at baseline have normal or even low LDL cholesterol values, probably related to malnutrition and/or inflammation. Other dyslipidemic conditions may be more atherogenic in the uremic milieu (e.g., hypertriglyceridermia associated with retention of lipoprotein remnants). One might consider use of a fibric acid derivative for hypertriglycerideremia, along with prolonged-release nicotinic acid (to increase the high-density lipoprotein [HDL] cholesterol), as a potentially improved therapeutic approach. This suggestion has to be proven by appropriately controlled trials in the ESRD population, and it presumably that lipid-rich vulnerable plaques in coronary arteries are the major culprits in mortal events seen in ESRD patients. This may not turn out to be the true state of affairs.

Vascular calcification (or more correctly “ossification”) is an area still under flux. Although emphasis in the past has been placed on the role of phosphorous in accelerating vascular calcification, the issue is much more complex. The interaction of fibroblast growth factor-23 and the klotho gene may be more of a prominent factor than phosphorus alone in the development of vascular calcification in the ESRD patient. Coronary artery calcification may best be predicted by aortic or pulse wave velocity (or even more simply by pulse pressure), showing a general “stiffening” of the major arterial vessels. And here we go again: Short daily or nocturnal HD may be one of the best ways to control accelerated vascular calcification.

At this point in our conclusions, it is evident that two patterns are emerging. We must avoid catheters, except in exceptional situations, placing them at the rear of our “therapeutic cabinet” of access options. To prevent the number one mortal progenitor, we must move beyond conventional thrice weekly relatively short dialysis and focus on control of LVH and cardiac fibrosis.

Secondary Concerns and Solutions

Although the term “secondary” implies a lesser or subsidiary concern, the intertwined issues discussed below are also important. Addressing these areas of concern has the potential of saving thousands of lives and also to contribute to a better quality of life.

Incident Dialysis Patient

Careful attention to patient issues beginning within 2 wk after initiation of dialysis can have a striking impact on future morbidity and mortality in the first year of treatment. The initial period of care for the incident patient is critical to ablation of the aforementioned 40% 3-mo mortality rate. The critical roles of nutrition, rehabilitation, psychologic, and social adaptation to dialysis, access, and anemia management and coordination of the complex care during this high vulnerability period is essential. At 3 mo and lasting for 1 yr, significant improvements in morbidity and mortality are noted with an intensive “Right Start” support that focuses energetically and diligently on these details.

After any hospitalization an initiative to comprehensively review the dialysis prescription, medications, iron, and ESAs and supportive interventions will likely reduce the incidence of unintended and disruptive “round trip” re-admissions to the hospital, and even subsequent mortality. Preliminary observational data support the positive impact of this initiative. The mortality rate can likely be reduced by such intense and easy to achieve interventions. Paying attention to the changing individual needs (rather than just resuming the prehospitalization dialysis prescription) can impact the quality of care and even decrease mortality. There needs to be a re-evaluation of volume status, nutritional needs, anemia management, and hence dialysis prescription after each hospitalization.

This conference did not sufficiently emphasize predialysis CKD care. However, intensive management during the period of progressive CKD, done in a coordinated fashion, can deliver a healthier patient to properly ESRD therapy. It is certain that optimal preparation for ESRD (dialysis) care means a coordinated team approach and cannot be adequately performed by the solo nephrologist practitioner in the current model of care and reimbursement.

Dialysis Prescription

Measurement of $Kt/V$ is probably not the best way to base the prescription for dialysis nor to assess adequacy of dialysis, despite it being the most commonly used measure for such purposes. The discrepancies and interactions in outcomes for $K$, $t$, and $V$, all of which determine, independently, outcomes has, after 20 yr, now been shown to be insufficient to be used primarily for prescription or management. $Kt/V$ is rapidly becoming obsolete in its current formulation. Like catheters it should be relegated to the back shelf of the dialysis nephrolo-
gist’s tool box. Until we have a better and more precise method for prescribing dialysis therapy, adjusting dose for body surface area, rather than volume of distribution of small water-soluble, non–protein bound solutes, may allow for appropriate adjustment in individual dialysis prescriptions. Use of volume in the current dialysis dose-determining paradigm seems to shift the quantity of dialysis provided in precisely the wrong direction, in terms of the dialysis needed to lead to optimum outcomes. Time on dialysis and therefore the time between dialysis sessions in terms of their effects outcomes have not been sufficiently understood. The emerging new dialysis therapy regimens (e.g., short time, more frequent, or nocturnal dialysis) have thus far empirically shown the positive effect of time on dialysis relative to outcomes. It is always the hope that further attempts to redefine the formulaic approach for prescribing dialysis, using further iterations and modifications of the $\text{Kt/V}$ conceptual formulation will gain clarification in emerging literature. However, new formulas will not abrogate the individual survival traits of size on the one hand, time between and on therapy on the other, and finally small- and middle-molecule clearance. The current “one size fits all” approach to dialysis therapy needs to be rendered obsolete and disappear. But what are we left with?

Should we not enter into an interim period of empirical therapy based on emerging therapies that provide a strong potential for longer survival, even in the absence of specific guidance from a new dosing formula? Perhaps, then, a new paradigm of standard treatment will emerge, based on the evidence gained from large observational studies and from randomized controlled trials, some of which are now in progress.

**Daily and Nocturnal Dialysis**

The goals of treatment should be to increase the dialysis dose and time (and thereby decrease the interdialytic interval), reduce inflammation, decrease LVH and cardiac fibrosis, maintain proper fluid balance and BP, control metabolic perturbations, optimize iron and anemia management, augment rehabilitation, improve sexual function, and reduce depression. Most of this can apparently be accomplished with increasing the dose of dialysis (which involves increasing total time of dialysis delivery).

Summarizing with broad generalizations, with short daily dialysis (SDD) regimens there is an attendant decrease in systolic BP, improvement in anemia, increase in serum albumin, and an improved health-related quality-of-life index. No statistical improvement is noted in serum phosphorous or the amount of phosphate binders used. Also, there is no change in vascular access dysfunction with a SDD regimen. Viewed in a retrospective analysis, the 10-yr survival of a SDD cohort is ~42% (two to three times higher than the conventional HD group). Ultimate survival is 2.3 to 10.9 yr longer with daily HD sessions, at least in observational studies projecting life expectancy (with possible hidden confounding unmeasured variables).

Nocturnal HD (either at home or in-center) is also associated with a decrease in the systolic BP or mean arterial pressure. The number of anti-hypertensive agents is decreased. Serum phosphorous and the use of phosphate binders have shown variation between different studies (ranging from no change to improved parameters). Anemia management is improved because of an upregulation of genes responsible for hematopoietic progenitor cells. The health-related quality of life is shown to improve and there is a decrease in the left ventricular mass index with Nocturnal HD.

More frequent and longer in-center HD treatments would likely increase ESRD program costs, and a transition to a higher percentage of home-delivered therapies might be needed to offset increased costs associated with more dialysis. This could, in part, be accomplished in-center if regulations acknowledged that less intense staffing might be required, therefore reducing one component of the in-center costs of these therapies.

Clearly there needs to be a better understanding, communication, and coordination of outpatient and hospital components of care and costs (Part A and B of Medicare) to better understand the offsets.

**Peritoneal Dialysis**

An in-depth analysis shows that outcomes for PD are steadily improving. Why we are not doing more PD in the United States needs to be better understood. The earlier the patient is informed about PD compared with HD, the more likely that the use of PD will be chosen by the patient as the initial treatment modality on a nearly equal basis to HD. Compared with the HD group, the long-term survivability is greater with the PD group, but selection biases may be operative here. However, there is no increased comorbidity when comparing PD with HD factored by diabetic status. Five-year survivability is better in the chronic PD population compared with an HD population. In particular, first year mortality is much lower in the PD cohort, and the adjusted 5-yr survival by first modality continues to favor PD.

Patient transfer from PD to HD because of peritoneal infections or catheter malfunction has been decreasing steadily over the past several years. The probability of remaining free of mechanical flow obstruction at 24 mo has been significantly increased by newer techniques for PD catheter placement. With advanced laparoscopy placement, the probability of no obstruction is 99.5% at 2 yr. Patients transplanted from PD have a 3% lower risk of graft failure and a 6% lower risk of recipient death compared with HD. Also, there was less likelihood for delayed graft function if transplantation occurred from PD instead of HD.

In summary, PD in contrast to HD is associated with an early survival advantage, less serious infections, improved graft and patient survival for transplantation, better quality-of-life issues, and lower costs.

So why are we not using more PD? PD requires greater up-front cost for training. Physician knowledge about the procedure is lacking, and nephrology fellows are not being well trained in PD. Therefore, they are less likely to recommend and use this modality once they go into practice. Government-sponsored research funding for PD studies is less than that for
HD, and studies funded by the pharmaceutical industry favor HD.

Recommendations to increase the use of PD are the following:
1. Consider consolidation of home PD training units (fewer units with improved resources and outreach per unit)
2. Improve current Nephrology fellowship training programs in PD
3. Educate patients early in the course of CKD regarding the PD option
4. Consider using a combination of both HD and PD to advance clearances

A word of caution, however. Most, if not all, contemporary studies compare PD with what we have already described as inadequate conventional HD. Should the dialysis community respond to the increased HD dosing strategies, PD will have to compare its outcomes to a better and higher standard of HD therapy. Perhaps it, too, can find the methodologies and models to deliver more dose, but in the final analysis, PD must measure up to the “best” that HD has to offer and not the worst. Comparing two “inadequate” strategies of dialytic care makes no sense at all.

**Malnutrition and Inflammation**

Malnutrition from insufficient lack of oral intake of calories and protein is relatively uncommon in the dialysis-treated ESRD population. Rather, malnutrition associated with inflammation is much more prevalent. It is more important that patients consume adequate protein and calories and the dose of dialysis adjusted to the level of intake rather than putting patients on a nondescript, but restrictive “renal diet.” Part of the approach to improving nutrition is to decrease metabolic acidosis-enhanced protein degradation. Correction of even mild metabolic acidosis has a salutary effect in reversing protein degradation. The lasting role of parenteral or oral nutritional supplements and intensive diet counseling in reducing mortality risk and improving quality of life is still unproven, but oral supplements are not associated with any adverse risks. Therefore, oral supplements should be considered in the patient who needs to correct protein-calorie malnutrition, but good scientific data to support this statement are lacking.

Serum albumin concentration has been the traditional marker used to assess visceral nutrition status, and serum creatinine levels have been used as an index of somatic nutrition status. The serum albumin level is too unreliable for pinpointing the precise cause of visceral malnutrition, and body mass index may give misleading information about somatic malnutrition. Dual energy x-ray absorptiometry scanning may provide a useful adjunct to serum creatinine levels and creatinine appearance rates for an assessment of somatic nutrition. The bottom line for the ESRD patient is to eat, eat, eat, and just restrict sodium (and phosphorous) exposure (off and on dialysis), while avoiding those factors that lead to inflammation (i.e., get the plastic out and prevent infections). There is emerging evidence that the alternative forms of dialysis, short daily and slow nocturnal, may, in part, also ameliorate inflammation and help nutrition compared with thrice weekly conventional 3- to 4-h HD.

**Technological Advances**

A conference such as this, attempting to create a road map for progress in the foreseeable future, needs to examine the prospects for future technological advances that might help in save lives or improve well being at affordable costs. In the area of renal replacement therapy, current machine accessories as online monitoring, even feedback alteration of the then current dialysis session, such as dialysis dose and vascular access function, represent examples of “advances at the margin.” The ultimate goal is to design an artificial kidney that functions as close as possible to a normal kidney in the area of filtration, transport, metabolism, and endocrine function. There is a great and unfilled need to escape from our current dependence on diffusion and convection and the problems of the blood–membrane interface.

The immediate goal is to develop a wearable artificial kidney that could transition into a totally implantable device. The wearable artificial kidney, based on HD, is now in early stages of development, and we must await clinical trials to understand how widespread its use could be in the chronic dialysis population. At the same time, a wearable PD device providing dialysate regeneration should be able to work in the same manner.

Because renal epithelial cells have diverse effects, including an immunoregulatory role, any renal assist device should replicate the renal epithelial cells full spectrum of biologic effects. Nanotechnology provides the opportunity to have an effective monolayer–molecular membrane that could mimic normal kidney function, the end result being the creation of a wearable continuously functioning artificial nephron. Microelectromechanical systems can have exact dimensions, have uniform pore size and shape, reduce hydraulic resistance, and be biocompatible. All of these remarkable technological advances seems far off in the distant future, but their achievement at the practical level would transform dialysis therapy as we know it today.

**Summary**

If we were to attempt to give the nephrologists, dialysis providers, and payors a list of what they should and should not do, based on the discussion and revelations from the Boston ESRD Conference, our goals of management would include the following.

1. Offer the best approximation of euvoemlia with excellent BP control (systolic BP, 130 to 140/70 to 80 mmHg), using to a greater extent nocturnal or quotidian dialysis and careful management of interdilatic weight gain. Euvolemia is very, very difficult to attain with traditional in-center thrice weekly, short-duration HD.
2. Focus on LVH/LVMi and cardiac fibrosis, which very likely requires more dialysis therapy than conventional HD. Determine who has LVH and cardiac fibrosis and do something about it. Attempt to prevent LVH by better management in the pre-ESRD stages of CKD.
3. Use a fistula first, catheter last strategy and engage an experienced and expert surgeon who knows and cares. Every time a catheter is placed, the person placing it must acknowledge that this patient is more likely to die earlier of infection or CVD.

4. Optimally manage mineral metabolism with an emphasis on a lower predialysis phosphorous. The above new approaches to more frequent and/or prolonged HD, more rather than less, should be able to address this issue. At the same time maintain the intact parathyroid hormone level to <500 pg/ml but not to low levels (<100 pg/ml). This should all occur while repleting insufficient vitamin D stores. Anemia should be managed to approximate agreed on guidelines, using iron and ESA. More frequent and/or longer dialysis sessions should be able to achieve anemia targets at lower doses of ESA.

5. Routine evaluation for occult sources of inflammation (e.g., periodontal disease or foot infections (with interventions to reduce inflammation). It would be nice if each dialysis facility had a dentist and podiatrist that would round systematically on the patients.

6. Improve nutrition by encouraging the patient to eat a prudent diet containing appropriate amounts of calories and protein, with the least number of restrictions (except for salt and possibly phosphorus) and adjust the dialysis dose accordingly.

7. Provide to individual patients an opportunity to fully understand the potential benefits and risks of each modality of dialytic care for ESRD so that they may make an informed choice of modality.

8. Advocate for experimental and clinical studies in the use of aldosterone antagonism, mTOR inhibition, absorbents, vitamin D and calcimimetics, and other agents that potentially might safely decrease myocardial hypertrophy and/or fibrosis.

9. At all times pay attention to the quality of life of the individual patient. This is our paramount goal. We need to differentiate between palliative dialysis and aggressive management. One size does not fit all.

Now we are left with how to implement all of this, given the constraints of the payment process, the huge investment in conventional dialysis facilities and equipment, the lack of training in the emerging therapies, the intrinsic resistance to change that is prevalent in the medical community, and the need for education of patients about the benefits and risks of currently available and newly emerging therapies. Let us propose three paths, along at least one of which each of us should be treading.

Nephrologists, dialysis facility staffs, and dialysis providers know the path that needs to be taken to provide the best therapy for our patients: providing longer and more frequent therapy without catheters. We have abdicated leadership to regulations, out-of-date guidelines, and regulators adhering to tired clinical performance measures that need to be upgraded. The patient has no advocate if not us. We must assume the passionate leadership in expressing our dismay over the tens of thousands of patients that die each year because of therapy that is delivered to them under our guidance and oversight. The first impulse is simply to express our rejection of obsolete practices of the past and to begin to prescribe and insist on more and better for our patients. We can do no less. Today.

The second path is to help those who are the stewards of the federally and privately allocated funds for dialysis treatment to understand the issues and the value to our patients of changing the models of reimbursement to maximize the benefits of individual care. It is uncertain as to what will emerge from this dialogue. We need to engage the Center for Medicare and Medicaid Services, White House Office on Health Care, policy makers in the executive and legislative branches of government, insurance companies, all payors, and the dialysis industry as a whole. All of us in ESRD care have played a role in the failure to achieve the full promise of appropriate treatment for this vulnerable dialysis population.

The third path is to convince the National Institutes of Health (NIH) and other governmental agencies (such as the Agency for Health Research and Quality) that support innovative translational research and comparative effectiveness research to acquire a sense of urgency about this enormous problem. What NIH-sponsored basic and clinical research approaches are needed to generate new knowledge and to foster translation of advances in science to the bedside (including randomized clinical trials)? The NIH should specifically address those issues that will save thousands of lives and not participate at the edges, as they look at the comparative effectiveness of therapies. At the Agency for Health Research and Quality, what analysis of existing knowledge is needed to create preferred new treatment paradigms/regimens? For other agencies, and organizations involved in financial policies, what information is needed to address and correct reimbursement issues that constrain life- and cost-saving strategies of care? No longer should the nephrology community or the public tolerate older (and ineffective) methods of studying the problem, awaiting years for design and results, some of which are of questionable relevancy. The leadership of NIH and these other agencies must accept their role in addressing the unachieved goals of dialysis-based ESRD therapy in 2009, just as the rest of us are facing now.

Three paths—which of them will you follow, given where you sit just now? The Steering Committee, authors of the papers, and editors of this supplement are ready to walk (or run) with you.