Research on Problems of the Dialysis Patient

Dialysis patients represent the overwhelming majority of patients cared for by all nephrologists. This patient group represents complex medical problems, is increasing in number at an annual rate of 8%, and suffers from very high morbidity and mortality. This would seem to represent the ideal situation for an academic research faculty, i.e., a major and increasingly problematic health issue and a patient population of sufficient number and motivation about which to pose investigative issues. Curiously, a significant fraction of the nephrology world views dialysis purely as a technology necessary to insure survival but requiring little in the way of intellectual contribution. The record shows a failure of much of the academic community to become interested in the problems of the end-stage renal failure patient. In many academic circles, the tasks attendant to this procedure are often delegated to the most junior faculty members and research questions rarely present themselves at any higher level. That this attitude permeates the entire nephrology research establishment is shown by the very low level of research support for dialysis-related research by either the National Institutes of Health or Veterans Administration. Bear in mind that more than $5.4 billion is spent annually in the direct care of end-stage renal disease patients. There had been support for research relevant to morbidity and mortality of the dialysis population in the early 1970s. Many of the technological treatment advances of today, in hemodialysis and peritoneal dialysis, followed this period of activity. Unfortunately, this program was discontinued and no replacement was developed to fill the void.

In recent years, the principal areas of research have been in the development of products which improve the safety and efficiency of dialysis, including synthetic dialysis membranes and new delivery systems. Computerization of such machines with accompanying ability to produce and manipulate data is in its early stages. Similarly, work to develop machines which will provide on-line information useful in altering pressures, flows, and dialysate concentrations in response to patient needs is in its infancy. Essentially, all of these advances have been supported by industry.

Despite the undoubtedly value of much of these efforts, they are clearly based on commercial considerations and, with a few notable exceptions in the United States, are not supportive of areas in which profits are unlikely. It is noteworthy that of large manufacturers of dialysis equipment and supplies, only one is owned by the United States. Consequently, much of the work referred to above is performed in Europe and Japan, with consequent lack of stimulus for potential researchers in the United States.

Research relevant to the health of the dialysis patient has been largely neglected. The reasons for this are complex, but a small group of investigators, along with NIDDK, believed that part of the problem was the complexity of the problems and the lack of data. The result of their efforts was the establishment of the United States Renal Data System (USRDS), which has the specific purpose of developing the information necessary to identify biomedical issues which will facilitate research. The USRDS, developed in concert with the Health Care Financing Administration and the Renal Networks, is one part of a larger database on dialysis patients which has the capability of approaching issues such as the quality of care, cost-benefit ratios, etc. The annual report of the USRDS indicates that the prognosis for the survival of a 59-year-old patient on dialysis is 4.9 years (compared with 4.3 years for patients with carcinoma of the colon and 18 years for patients with carcinoma of the prostate). The report suggests the need for many inquiries relating to morbidity and mortality, e.g., the better prognosis of both blacks and females on dialysis.

This report also vividly illustrates the need and opportunities in both basic and clinical research. Almost every organ system is influenced by the development of renal failure, and these derangements are modulated by the type of treatment. Basic scientific studies include the effects of renal hormones and lack thereof, the effects of fluid and electrolyte derangements on cell and organ function, the organ specificity of these changes, the indicators of normal and abnormal body function which might have clinical utility, and the rate and type of change in body fluid exchange necessary for homeostasis.

There are an equally large number of unanswered questions at the clinical level. Many practicing nephrologists will agree that a fraction (perhaps a large fraction) of patients are underdialyzed. Evidence is available which links underdialysis and poor nutrition to increased mortality. Despite the availability of objective approaches to the prescription of dialysis, much skepticism exists as to the superiority of such methods to an arbitrary prescription on the basis of patient inspection and use of routine laboratory in-
vestigations. Other than those of the National Cooperative Dialysis Study, dialysis prescriptions have not been related to nutritional status, infections, or other causes of morbidity and mortality. The applicability of the National Cooperative Dialysis Study criteria to the era of high efficiency or high flux is also not established and needs to be, because an increasingly large fraction of patients are dialyzed with these new technological innovations. The problem may even be more acute with regard to peritoneal dialysis for which objective prescription criteria are hardly available. The overall situation regarding the dialysis prescription is unsatisfactory, particularly because some believe that nonobjective dialysis, i.e., without modelling, particularly when economic constraints are present, may often result in underdialysis.

The relatively recent use in the United States of dialysis membranes, which are more permeable to larger molecules than are cellulosic membranes, adds a new uncertainty to the evaluation of the dialysis treatment. Use of these new membranes, which are functionally closer to the permeability characteristics of the normal glomerulus, carries with it a need for high standards in water treatment and in the reprocessing of dialyzers. It remains to be determined whether the more open, highly permeable high-flux membranes, which appear in early reports to decrease morbidity and perhaps mortality, are advantageous because of these qualities or because of their more biocompatible properties.

Morbidity from failure of access patency remains an economic as well as a medical burden; yet, not only do we lack the facts as to their extent, but there is also very scant data on basic or clinical factors that influence this patency.

Nearly all other aspects of care for the renal patient, from the neurological and endocrine responses to dialysis to the effects of different dialysis modalities on lipid abnormalities and atherosclerosis, can be and need to be studied.

Thus, it is timely that the renal community, as a whole, address research on the dialysis patient population as the highest priority. The leadership of the Renal Physicians Association, American Society of Nephrology, National Kidney Foundation, and NIDDK have recognized the gravity of the issue and are developing a 5-year plan. The first step will be a comprehensive conference in late 1991 to present current information and to identify subjects for focused research. Participants will include basic and clinical academic scientists, community-based physicians, representatives from the pharmaceutical and technological industries, governmental agencies, and lay and patient groups. Several pertinent medical specialists, in addition to nephrologists, will also be invited, because most of the problems associated with illness and death in end-stage renal disease patients are no longer solely related to the kidney. The scene will be set for a renal community-wide impetus for increased emphasis on all types of research related to dialysis patients and their medical problems.

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