

END-STAGE RENAL DISEASE IN SELECTED GROUPS

Nephrology in China: A great mission and momentous challenge

SHANYAN LIN

President, Chinese Society of Nephrology, and Division of Nephrology, Department of Medicine, Shanghai Medical University, Shanghai, Peoples Republic of China

Nephrology in China: A great mission and momentous challenge. Nephrological work in China started in early 60s, but it was not until the middle of the 1980s before it became an independent discipline and linked with the international nephrology community. Due to the huge population and enormous territory, nephrologists are facing a great mission and momentous challenges. Most nephrologists reside in the coastal region, which has a higher education background than most of the rest of the country. Among them, Beijing, Shanghai, Guanzhong and Nangjing are the major centers for training graduate students to conduct basic and clinical research. Renal biopsy is widely performed in China. IgA nephropathy is the leading cause among the primary causes of glomerulonephritis that are diagnosed by renal biopsy, while lupus nephritis is the most prominent among the causes of second glomerulopathy. Though diabetic nephropathy now constitutes only about 10% of the cause of secondary glomerulopathy, the rapid rise of diabetes mellitus predicts a future prominent role of this disease in managing progressive renal failure in China. Both hemodialysis and peritoneal dialysis are widely used in China, with approximately a 40 to 50% survival rate in three years. About two thirds of the end-stage renal disease (ESRD) patients received erythropoietin; however, the hematocrit levels of most cases are less ideal. A variety of sources, mainly from the government, in several big cities provide financial support for ESRD dialysis, which has already become a heavy burden to public health. About 5000 patients receive renal transplantation every year in which the organs are mainly from brain dead cadavers. Renal disease registration has been established since 1999. Controlling the high incidence of diabetes and early treatment, studying the genetic and environmental mechanisms possibly related to the high incidence of IgA nephropathy in rural areas, and establishing a nationwide network to apply guidelines for dialysis and transplantation in a fashion relevant to real situations in China are major challenges to the Chinese nephrologists.

The practice of nephrology commenced in China in the late 1950s. For a period of about 12 years, from the mid 1960s until the late 1970s, because of changes in the wider political scenario, there were no further developments in nephrological practice. It was not until the mid

1980s that it was recognized as an independent discipline and links developed with the international nephrology community. The first committee of the Chinese Society of Nephrology (CSN) was established in 1980 and the Society held its first academic congress in 1982. The *Chinese Journal of Nephrology* was first formally published in Guangzhou in 1985. Efforts to develop a complete registration system for dialysis and transplantation in China began in 1998.

Nephrologists are faced with a great mission and momentous challenges in China, a vast country with a huge population of 1.3 billion and a broad territory of 9.6 million square kilometers.

WORK FORCE AND TRAINING

Because of the dictates of the distribution patterns of the population, and the more advanced education standards in the coastal region, most of the registered nephrologists are gathered there. The number of nephrologists, including those in training grades, in Beijing, Shanghai and Guangzhou are equivalent to at least 30 per million of the population [1]. Among the registered nephrologists, 15% have been specifically trained through post-graduate courses. In Beijing and Shanghai, more than 30% of the nephrologists hold masters degrees or doctorates. The latter are classified as clinical or research based. Those gaining the latter classification tend to specialize thereafter in basic renal research.

Residents who have completed three years training in general medicine thereafter may gain further experience in specialized renal units. They are required to complete their renal training in one of the major institutions in Beijing, Shanghai, Guangzhou or Nanjing. As yet there is no specialized renal qualification that can be gained by an examination, thesis or completion of a training program. Since 1995 the International Society of Nephrology has taken an active role in organizing continuing medical education (CME) courses in China.

Key words: ESRD, hemodialysis, China, training, dialysis.

© 2003 by the International Society of Nephrology

TRAINING OVERSEAS

About 30% of nephrologists who have gained post-graduate qualifications travel overseas for further post-doctoral training. Thirty percent return to China. Of the nephrologists with a principle commitment to clinical practice, about one fifth have the opportunity of traveling abroad for further study, usually for shorter periods of six to twelve months. Most return to China to work.

CLINICAL NEPHROLOGY

Renal biopsy is widely performed in the major renal centers in China. Until 1999, 100,000 such cases had been detailed, the majority in recent years [2]. Many hospitals have nephrologists on staff who also have their own renal pathology laboratory, and tissue is routinely examined by light and fluorescence microscopy. Electron microscopic analysis is available in hospitals affiliated with medical schools. Thus, a tissue diagnosis can be obtained promptly for the management of cases such as rapidly progressive glomerulonephritis or acute rejection following transplantation.

In China today, though, the natural history of many renal diseases has still not been demarcated, but the incidence of possibly associated infectious diseases has fallen tremendously. The incidence of hepatitis virus-related disease is still high. The positive detection rate for hepatitis B antigen on renal biopsy tissue is about 5 to 7%.

Only incomplete statistics are available, but among the primary causes of glomerulonephritis diagnosed by renal biopsy, IgA nephropathy is the leading cause, ranging from 30 to 40% of cases undergoing biopsy, and the incidence is still rising. Lupus nephritis is the most prominent among the causes of secondary glomerulopathy, which is in contrast to the findings in many developed countries. Currently diabetic nephropathy constitutes 10% of the cases of secondary glomerulopathy. Nonetheless, the rising incidence of diabetes (statistics for Shanghai show an incidence of 0.7% in 1965; 1.7% in 1985; and 1.9% in 1999) and the increasing proportion of cases of end-stage renal disease (ESRD) apparently caused by diabetes (4.9% in 1985; 10.6% in 1999 and 17.6% in 2000), and the increasing obesity in Shanghai and other major cities (<30% in children aged 8 to 12 in 2000 in Shanghai) suggest that the future predominance of diabetes among cases of progressive renal failure in China is assured, much as is the case in Western nations.

DIALYSIS

In the relatively economically developed areas of China, especially in the major cities, the incidence of ESRD is currently estimated to be 102 cases per million of the population. Fifty-five percent of these patients are currently receiving hemodialysis or treatment with continuous am-

bulatory peritoneal dialysis (CAPD). In small centers where there are fewer special facilities, peritoneal dialysis is more commonly employed. In larger cities, because of the relatively high cost of imported fluid for CAPD, which means that the costs are roughly equivalent, hemodialysis is now and is likely to remain the predominant mode of treatment. At the present time about 80% of patients are treated by maintenance hemodialysis and 20% by CAPD. There is universal use of twin bag systems for CAPD in the major centers.

The two and three year survival rates for dialysis patients are 50% and 40%, respectively. About 20% of patients survive for more than five years with a small number living for more than ten years. The average frequency of dialysis is 2.3 times per week. The adequacy of dialysis (Kt/V) ranges from 1.2 to 1.6 for hemodialysis.

In Shanghai, two thirds of ESRD patients are treated with erythropoietin (EPO). Although there are more than 20 bio-pharmaceutical companies producing recombinant human EPO (rHuEPO) in China, and the pricing is competitive—about one third of the cost of imported products—the hematocrit levels of most cases are less than ideal (average 28.2%). Aside from issues of availability, one of the more important reasons may be reduced responsiveness, as intravenous iron preparations have not been available in mainland China.

The leading cause of death among patients with ESRD is cardiovascular disease, accounting for 57% of 4010 cases. For patients on CAPD the main cause is death is as a result of infection.

The financial support for dialysis comes mainly from Government sources. Government employees, those who work for Government owned enterprises and those who can obtain enrollment in the Government Health Insurance Program are able to gain reimbursement for the costs of their treatment. In the large cities, in Shanghai for instance, more than two thirds of the patients with ESRD are available to afford the cost of dialysis by obtaining financial support from a variety of sources. Due to the increasing number of ESRD cases and hence the increasing expense, the upper limit of financial support for the cost of dialysis has been capped by the Government in most areas of the country. The average cost for hemodialysis in Shanghai is US\$7500 per patient per year and US\$9600 for peritoneal dialysis. These rates are clearly much cheaper than those available in more developed nations. Nonetheless, this is still a heavy burden on the public health and social security systems.

The principle reason for non-acceptance onto dialysis programs is the inability to afford treatment for those who do not have access to insurance programs. It is now quite rare to find areas in China where dialysis is not available for lack of trained staff and facilities.

RENAL TRANSPLANTATION

While most of the recipients of renal transplants are young, an inability to pay for the procedure is still a barrier to transplantation. For those with access to medical insurance, reimbursement of \$100,000 Yuan (US\$12,000) is available for the first year of treatment following transplantation. Cyclosporine, which is locally produced, together with mycophenolate mofetil and prednisolone constitute the most widely used immunosuppressive regime, but tacrolimus and sirolimus also are available for use, and the cost of these agents can be reimbursed also. Monoclonal antibodies are available, but the cost of their use is not reimbursed.

Renal transplantation units are not Government run, and a number of private clinics are being established to provide the necessary services. The principle source of organs is from brain dead cadavers. There are laws enacted to govern this process and there is strict adherence to these in the major cities. Signed consent is required from the closest relative and in the case of renal donation following execution, from the donor and the closest relative.

There were 5040 transplant operations in 2000 and 4130 in 2001. Less than 10% of these were from living related sources. The 12 month graft survival is >80%, although there are regional differences. These and other related data are published annually by the Chinese Dialysis and Transplantation Association [3]. Renal transplantation is performed by specialist surgeons, most of whom have a background in urology.

DISEASE REGISTRATION

The registration system has been established, although it is still in its infancy and the available data are incomplete. Data for the years 1999 and 2000 were published in the *Chinese Journal of Nephrology* in 2001.

RESEARCH

Funding is mainly sourced from National Science Foundation, and the Ministries of Health and Education. The Science Foundation supports basic research, and Ministry of Health funding is directed more toward research

in clinical nephrology. Funding from the Ministry of Education supports doctorate training in the universities. There is intense competition for these sources of funding. As in other parts of world, promotion in nephrology is closely linked to success in the pursuit and publication of research. Funding also is directed toward research into nephrological aspects of traditional Chinese medicine. As China's economy has strengthened, so the funds available for research have increased, particularly in the area of basic science.

INTO THE FUTURE

The future priorities for the nephrological community in China include: enhanced advocacy of lifestyle modification, aiming to reign in the increasing incidence of diabetes; acquisition of much more complete epidemiological data in relation to progressive renal disease; the promotion of registries for processing information relating to dialysis and transplantation; the subsequent dissemination of information about renal disease among the Chinese people; further studying the genetic and environmental mechanisms of common clinical problems that are found in high prevalence, such as hepatitis B and IgA nephropathy; enhancing the care programs for common diseases such as lupus nephritis; intensifying and expanding the training programs for nephrology, especially in rural areas; and establishing an efficient nationwide nephrology network that will have as one of its important activities the formulation and modification of diagnostic and therapeutic guidelines. This would include guidelines for hemodialysis, peritoneal dialysis and renal transplantation in a fashion that is relevant for modern China.

*Reprint requests to Shanyan Lin, M.D., Division of Nephrology, Department of Medicine, Shanghai Medical University, Hua Shan Hospital, Shanghai 200040, Peoples Republic of China.
E-mail: shanyan_lin@hotmail.com*

REFERENCES

1. LIN S-Y: Nephrology in China. *Hong Kong J Nephrol* 2:63-67, 2000
2. ZHENG CH, CHEN HP, WANG YU, LI LS: Epidemiologic analysis of renal disease in China based on 22 years of renal biopsy. *Chin J Nephrol Dial Transplant* 9:3-8, 2001
3. Chinese Dialysis and Transplantation Registration Report in 2000. *Chin J Nephrol* 17:72-104, 2001