

CURRENT STATUS OF HEMODIALYSIS TREATMENT IN BEIJING, CHINA

Introduction: Since the Beijing Hemodialysis Quality Control and Improvement Center was established in 2002, some registration work on hemodialysis (HD) has been done. We report here the current status of HD in Beijing, the capital of China.

Methods: Data collection forms were distributed to all HD centers in Beijing, and data from 2003 and 2004 were collected for analysis of incidence, prevalence, causes, and mortality of end-stage renal disease treated by HD.

Results: Beijing has 122 HD centers. The point prevalence was 235.9 per million population at the end of 2003, and this number increased to 268.9 per million population by the end of 2004. The most common cause of ESRD was chronic glomerulonephritis, followed by diabetes and hypertension. The percentage of patients who met the target of Kidney Disease Outcome Quality Initiative guidelines for Kt/V, hemoglobin, and calcium-phosphate product were relatively low.

Conclusions: This report describes the current status of HD treatment in Beijing. The result shows that the prevalence and incidence of HD are increasing. Thus, for better prevention of ESRD, efforts should be made to clarify the reason for the increase. Also, the quality of health care provided needs to be improved for better quality of life for patients on HD. (*Ethn Dis.* 2006;16[suppl 2]:S2-31-S2-34)

Key Words: Hemodialysis, Prevalence, Incidence, End Stage Renal Disease

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INTRODUCTION

A nationwide registration of dialysis and transplantation was conducted in 1999. According to this registration, 41,755 patients with end-stage renal disease (ESRD) were on dialysis therapy in 1999, with 19 268 of these individuals classified as new starters.¹ The response rate was <50%,¹ which probably resulted in an underestimation of the prevalence and incidence rate of ESRD in China. According to the data from Beijing for this registration, the total number of patients on dialysis was 3,676, with 1,966 new starters in the year 1999,² but since only 66 hemodialysis (HD) centers evolved, and the response rate was <80%,² the prevalence and incidence rate of ESRD in Beijing may have been underestimated.

In order to gain complete information on HD, the Beijing Health Bureau established the Beijing Hemodialysis Quality Control and Improvement Center (BJHDQCIC) in 2002. The mission of the BJHDQCIC is to improve the quality of HD service. The BJHDQCIC collects information from all HD centers and summarizes the information to form an annual data report to the Beijing Health Bureau. The summarized information is also fed back to individual HD centers to guide their improvement of HD service. The BJHDQCIC also provides training programs for HD staff members. In this paper, the current status of HD in Beijing was reported, including the causes of ESRD, the prevalence, incidence, and mortality of patients on HD and the quality of patient management.

METHODS

Registered HD Centers and the Data Collection Form (DCF)

In 2004, a total of 122 HD centers were registered in Beijing. The DCF was designed by the BJHDQCIC expert group, most of whom are professors from different hospitals, and was distributed to all the HD centers. The response rate was 90%. The contents of the DCF include information for prevalence and incidence calculation, the causes of ESRD, and the causes of death. Data on management of anemia, renal bone disease, and adequacy of HD were also included.

Calculation of Prevalence, Incidence Percent Causes of ESRD, and Causes of Death

According to government reports, the population of Beijing at the end of 2003 was 14.56 million, and this number is expected to increase to 14.93 million by the end of 2004. These figures were used to calculate point prevalence and the annual incidence rate. Patients who were not local residents of Beijing were excluded in prevalence and incidence calculation. But in calculation of mortality rate, percent causes of ESRD, and percent causes of death, all patients who had been on HD for more than three months were included. Prevalence and incidence data were compared with those of 2002 and 2003. Causes of ESRD were compared between the years 2003 and 2004.

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Table 1. Prevalence and incidence of hemodialysis treatment in Beijing*

	2001	2002	2003	2004
Number of patients at the end of last year	–	2586	2907	3435
Number of new patients of the year	–	–	1925	2587
Number of patients at the end of the year	2586	2907	3435	4014
Annual incidence of the year	–	–	132.2	173.3
Point prevalence at the end of the year	187.3	205.0	235.9	268.9

* Only local residence was used for incidence and prevalence calculation.

Quality of Management of Anemia, Renal Bone Disease, and Adequacy of HD

The percentage of patients who had met the Kidney Disease Outcome Quality Initiative (K/DOQI) clinical practice guideline targets for Kt/V, hemoglobin, and calcium-phosphate product were calculated and reported.

RESULTS

Prevalence and Incidence of Patients on HD

At the end of 2003 (December 31), 3,435 resident patients were on HD, the point prevalence then was 235.9 per million population (pmp). In 2004, 4,110 new cases of ESRD were diagnosed, of which 2,587 cases were Beijing residents, resulting in an annual incidence of HD treatment of 173.3 pmp. At the end of 2004, 4,014 resident patients were on HD, and the point prevalence increased to 268.9 pmp. The detailed comparison of these years' prevalence and incidence are shown in Table 1.

Characteristics of Patients on HD and Causes of ESRD

In 2004, 7,545 patients (51.1% male) were treated in 110 HD centers; 50.4% of the patients were 20–60 years old, and 48.5% were >60 years old. All these patients were included in an etiology analysis. In 2004, the most common cause of ESRD was glomerulonephritis, which accounted for 47.3% of the cases; diabetes was the second leading cause (18.1%); hypertension,

the third (12.9%); and chronic tubular interstitial nephritis, the fourth (5.7%). Figure 1 compares the causes of ESRD between 2003 and 2004.

Mortality of Patients on HD

A total of 790 patients died in 2004; the mortality rate was 10.5%. The leading cause of death was congestive heart disease; cerebrovascular disease came in the second place; and infection third (Figure 2). Other reasons for dropping out of HD included transplantation, dialysis modality change from HD to peritoneal dialysis, and giving up dialysis treatment (Table 2).

HD Practice and Patient Management

Permanent dual lumen catheters were used in only 5.2% of the patients. The most frequently used blood access was arterio-venous fistula (94.8%). A total of 61.9% of the patients were dialyzed 3 times per week and 28.5% twice a week; 91.2% were dialyzed 3.5 to 4.5 hours per session. A total of 73.3% of the HD centers monitor Kt/V regularly, and 68.1% of the HD centers measure Kt/V in less than eight-week intervals.

The percentage of patients with Kt/V 1.0–1.2 and >1.2 was 28.6% and 66.3%, respectively. The percentage of patients with hemoglobin levels 6–9, 9.1–11, 11.1–12, and >12 g/dL was 28.2%, 40.3%, 20.0%, and 6.7%, respectively. The percentage of patients with calcium-phosphate product <55, 56–70, and >70 mg²/dL² was 54.8%, 35.4%, and 9.8%, respectively. A total of 34.1% of patients had their intact

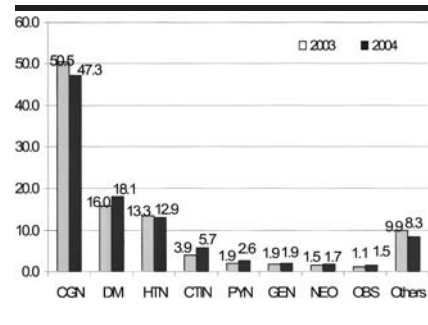


Fig 1. Causes of end-stage renal disease of patients on hemodialysis. CGN, chronic glomerulonephritis; DM, diabetic mellitus; HTN, hypertension; CTIN, chronic tubular interstitial nephritis; PYN, pyelonephritis; GEN, genetic kidney disease; NEO, urinary neoplasm; OBS, urinary tract obstruction

parathyroid hormone (iPTH) level monitored regularly, and the percentage of patients with iPTH levels <100, 100–300, and >300 pg/mL was 31.1%, 42.7%, and 36.2%, respectively. The percentage of patients with albumin level <30, 30.1–35, 35.1–40, and >40 g/L was 10.3%, 29.3%, 40.9%, and 19.5%, respectively.

Most patients had been on HD for <5 years (82.1%); the percentage of patients who had been on HD treatment for >5 years was 14.3%, and 3.4% of the patients had been on HD for >10 years.

DISCUSSION

HD is developing rapidly in Beijing. The Dialysis and Transplantation Registration conducted in 1999, as part of

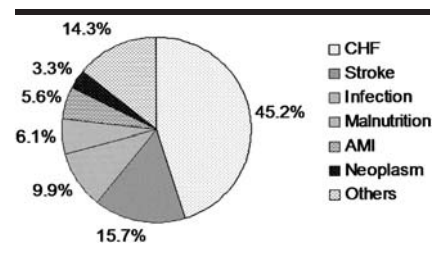


Fig 2. Causes of death of patients on hemodialysis. CHF, congestive heart failure; AMI, acute myocardial infarction

Table 2. Reasons of drop out from hemodialysis

	2003	2004
Medical-related death (%)	581 (41.6%)	790 (50.0%)
Renal transplantation (%)	465 (33.3%)	647 (41.0%)
Change to peritoneal dialysis (%)	80 (5.7%)	111 (7.0%)
Gave up or missing (%)	271 (19.4%)	429 (27.2%)

the national registration, was the first to be conducted.^{1,2} However, the results of that registration were somewhat unreliable for the following reasons: 1) the response rate was low, which may have underestimated the prevalence and incidence rate; 2) the distribution of medical resources was imbalanced, with diagnosis and treatment technologies considered to be better in big cities than in medium and small cities, encouraging some patients with ESRD to come to Beijing, the capital of China, for further management of the disease. This may have contributed to inflated prevalence and incidence rates in the 1999 registration. In the current report, by contrast, the response rate was 90%, and non-Beijing patients were not included in the calculation of prevalence and incidence rates, thus providing more accurate data.

We found an increasing incidence and prevalence of patients on HD, which reflected the total number of ESRD patients, because renal transplantation and peritoneal dialysis are also increasing.³ Besides the increasing prevalence of diabetes and hypertension, other factors may contribute to the increasing trend of ESRD: 1) the development of the economy and medical insurance in China has made HD treatment more affordable for more ESRD sufferers; 2) improvements in patient care, such as initiation of dialysis at higher glomerular filtration rates because of the nationwide popularity of clinical practice guidelines such as K/DOQI,⁴ which have been translated into Chinese.

Although annual incidence is increasing, it is still lower than that reported by other Asian countries, such as Japan.⁵ We assume that this finding

is due partly to the relatively lower economic condition in China and postulate that some ESRD patients do not undergo renal replacement therapy. This finding highlights the need for screening programs and other strategies to prevent and treat chronic kidney disease. A preventive approach will decrease the incidence and prevalence of ESRD and its burden on family and society.

The leading cause of ESRD for patients on HD in Beijing was chronic glomerulonephritis. This finding apparently differs from that in US Whites and African Americans, for whom the leading causes of ESRD are diabetes and hypertension. Compared with results from 2003, the role of chronic glomerulonephritis as a cause of ESRD is decreasing slightly, with diabetes increasing slightly in 2004. However, we could not conclude that the increased incidence and prevalence of ESRD was due to the increase of diabetes because both are on the increase in count.

Nowadays, diabetes-induced ESRD is increasing faster in other Asian countries.^{5,6} As shown in Figure 1, we found a slight increase of diabetic nephropathic ESRD. As the prevalence of diabetes increases,⁷ measures should be taken to improve glycemic control of diabetes in the primary care setting to diminish the increasing trend of diabetic ESRD.

Nearly half of the patients on HD are >60 years old, in comparison with the general population, in which only 13% are >60. The increasing percentage of the elderly population will cause an increasing ESRD burden. Measures should be taken to treat the reversible risk factors of ESRD in the elderly population.

For the management of patients on HD, quality needs to be improved.

About one fourth of the patients' Kt/V was <1.2, a ratio that is slightly higher than that reported by United States Renal Data System.⁸ The Asian population generally has lower body weight compared with US Whites and Blacks. The reasons for low Kt/V could be due to a higher urea distribution or "V" in the equation. It might also be caused by the low "K" due to small dialyzer, low blood flow rate, low dialysate flow rate, or dialyzer coagulation during dialysis. The low Kt/V might also be caused by short dialysis time "t" in the equation because of HD complications during sessions that force the doctor to slow down the pump rate or other dialysis-related acute event that temporarily stops the session. Luckily, BJHDQCIC provides HD staff members with training programs, which were hoped would help increase the "K" to an adequate level, decrease intra-dialysis complications, give the patient the prescribed "t", and improve the Kt/V.

A study conducted in China showed that most nephrologists are familiar with K/DOQI guidelines for anemia management.⁴ But only one fourth of the patients reached the hemoglobin target of 11 g/dL, the target recommended by K/DOQI guidelines.⁸ The quality of hemoglobin levels was quite different among HD centers in Beijing. In some centers, most patients reach the hemoglobin level recommended by K/DOQI guidelines, while others have poor hemoglobin control. This might be due to 1) inadequate iron and recombinant human erythropoietin prescription in certain HD centers; 2) poor patient compliance; or 3) complications that cause refractory anemia. Efforts should be made to find out the reasons for poor anemia control in Beijing HD patients.

In our reported patient groups, quite a number had higher calcium-phosphate product levels than are recommended by K/DOQI guidelines.⁹ Strict guidelines have been proposed for the management of alterations in bone and

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mineral metabolism for patients on HD, but sustaining these practice guidelines for calcium-phosphorus products and parathyroid hormones was difficult with calcium-based phosphate binders.¹⁰ New therapeutic agents, such as non-calcium-containing phosphate binders, will help with the control of phosphorus and hyperparathyroidism, minimize the calcium load, and retard the progression of cardiovascular calcification.¹¹

Continuous quality improvement efforts are being made in HD centers in Beijing in patient management. That is the mission and objective of BJHDQCIC. Also, clinical practice guidelines for the management of CKD and ESRD have been introduced to renal caregivers, including the translation of K/DOQI clinical practice guidelines into Chinese, as well as the establishment of training programs provided by BJHDQCIC. Patient education and consultation should be another aspect to improve quality of life and decrease rates of illness and death. For example, anuric patients who are dialyzed once or twice a week could be increased to three sessions per week after improvement of compliance.

The incidence and prevalence of HD treatment are increasing, partly

because of improved economic conditions in China. Chronic kidney disease (CKD) screening and prevention will be of special importance to eliminate the future burden of ESRD. On the other hand, as to patients on HD, quality of care needs to be improved, which can be achieved by staff education and patient consultation, so that not only rates of illness and death, but also the quality of life of HD patients, may be improved.

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REFERENCES

1. Dialysis and Transplantation Registration Group CSon. National Dialysis and Transplantation Report, 1999. *Chinese J Nephrol*. 2001;17:77-78.
2. Dialysis Transplantation Registration Group, Beijing. Dialysis and Transplantation Registration Report of Beijing, 1999. *Chinese J Nephrol*. 2001;17:79-82.
3. Wang T, Wan HY. Peritoneal dialysis in China: problem and prospects. *Chinese J Intern Med*. 2003;42:757-759.
4. Zuo L, Wang M, Wang H-Y. Habit of nephrologists in monitoring and treatment of

chronic kidney disease in China. *Chinese J Nephrol*. 2005;21:127-132.

5. Wakai K, Nakai S, Kikuchi K, et al. Trends in incidence of end-stage renal disease in Japan, 1983-2000: age-adjusted and age-specific rates by gender and cause. *Nephrol Dial Transplant*. 2004;19:2044-2052.
6. Tan CC, Chan CM, Ho CK, et al. Health economics of renal replacement therapy: perspectives from Singapore. *Kidney Int*. 2005;Suppl:S19-S22.
7. Cheng TO. Rising prevalence of diabetes in China. *J Natl Med Assoc*. 2003;95:1115-1116.
8. Collins A, Kasiske B, Herzog C, et al. Excerpts from the United States Renal Data System 2004 annual data report: atlas of end-stage renal disease in the United States. *Am J Kidney Dis*. 2005;45:A5-7.
9. Foundation NK. K/DOQI clinical practice guidelines for bone metabolism and disease in chronic kidney disease. *Am J Kidney Dis*. 2003;42:S1-S201.
10. Gonzalez EA, Al-Aly Z, Martin KJ. Difficulties in achieving the K/DOQI practice guidelines for bone and mineral metabolism. *Semin Dial*. 2005;18:171-174.
11. Nolan C. Phosphate binder therapy for attainment of K/DOQI bone metabolism guidelines. *Kidney Int*. 2005;96:S7-S14.

AUTHOR CONTRIBUTIONS

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Manuscript draft: Zuo

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