

Dialysis in Iran

Mohammad Aghighi,¹ Alireza Heidary Rouchi,¹ Mahnaz Zamyadi,¹
Mitra Mahdavi-Mazdeh,^{1,2} Shahram Norouzi,¹ Hamid Rajolani,¹
Sadegh Ahrabi,¹ Mozafar Zamani¹

¹Management Center for
Transplantation and Special
Diseases, Ministry of Health,
Iran

²Department of Nephrology,
Imam Khomeini Hospital,
Tehran University of Medical
Sciences, Tehran, Iran

IJKD 2008;2:11-5
www.ijkd.org

The increased prevalence of noncommunicable diseases such as diabetes mellitus and hypertension, and their complications, has drawn attention of physicians and healthcare authorities to kidney failure. Chronic kidney disease (CKD) and end-stage renal disease (ESRD) have become worldwide public health problems. These conditions increase patient morbidity and mortality risks and put major economic strain on the healthcare systems.¹⁻³ On the other hand, all countries even in the industrialized world are facing the problem of diminishing financial resources to deal with increasing healthcare costs brought on by the rise in welfare requirements and technological advances.^{4,5}

In order to facilitate effective future planning by healthcare authorities, reliable up-to-date information on the number of patients with ESRD, development trends, treatment modalities, and outcomes is indispensable.

DEMOGRAPHIC DATA ON IRAN

Iran lies in the Middle East and comprises 30 provinces covering an area of 1.65 million km² with 70 049 262 inhabitants (2006 census).⁶ Fourteen percent of the people in this country are younger than 14 years, 68% are between 15 and 64 years, and 4.9% are 65 years old or older.⁶ The population growth rate is 0.86% and life expectancy is 69.96 years.⁶ The total health expenditure of the gross domestic product and the gross domestic product per capita at purchasing power parity are 6% and US\$ 8900, respectively (2006 estimate).⁶ Accordingly,

the prevalence and incidence rates of ESRD has been increasing in Iran from 238 pmp and 49.9 pmp in 2000 to 357 pmp and 63.8 pmp in 2006. The coverage of different kinds of renal replacement therapies (RRTs) is 48.5% in hemodialysis and 3% in peritoneal dialysis (PD), and 48.5% of patients with ESRD undergo kidney transplantation.^{2,3} There are currently about 12 500 patients on hemodialysis treatment.

In Iran, there was a discrepancy in the availability of different RRTs, since the beginning of hemodialysis goes back to more than 30 years ago, while PD and kidney transplantation have been systematically available from 10 and 22 years ago, respectively. In 1974, to start a treatment program (hemodialysis) for ESRD, the Dialysis Center affiliated to Ministry of Health was established. Gradually, the number of patients on hemodialysis increased from 587 (106.7 pmp) in 1991 in Tehran to 12 500 (179 pmp) in 2006 in Iran.^{2,3} Currently, all patients with ESRD including renal transplant recipients belong to a group of patients called "patients with special diseases" and are eligible for government-provided medical insurance. Dialysis, because of its characteristics, is always managed governmentally in Iran. Even in medical services, governmental hemodialysis centers are more than private centers. As mentioned before, the establishment of Dialysis Center was in 1974 and through the years, structure and responsibilities of the center have changed. By changing the tasks, the name of the center was changed into Dialysis and Organ Transplantation Center, and in 2000,

into the Management Center for Transplantation and Special Diseases (MCTSD) with much more extended tasks rather than the management of kidney diseases. Now, the main responsibilities of the MCTSD are policy making, programming, supervising, and centralized managing in all related medical affairs of organ and tissue transplantation and special diseases.

The first hemodialysis center was set up in Imam Khomeini General Hospital in Tehran in 1975 (in commemoration of Late Dr Mansour Hashemi-Rad as the first chairman). Proportionately to extending of medical services, increased number of specialized and subspecialized human resources, and better case finding, the number of patients increased. Undisputedly, the increase in the number of patients with ESRD led to increase in hemodialysis centers and machines (Figures 1 and 2).

The mean age of patients on dialysis is 54.5 years (in contrast with the age of transplanted patients that is 38 years on average), and male-female ratio is 1.3:1. There has been no significant change in this ratio during this period. The advocated policy for younger patients in this country is transplantation.³ In Iran, like the other developing countries, diabetes mellitus and hypertension are the main causes of ESRD.^{1,7-9} Considering the number of patients with

ESRD in the past 10 years, it can be inferred that a rate of 12% has been the mean growth rate in this population. Regarding the foregoing fact, a 2-fold increase in the number of patients with ESRD in the country is predicted within the next 5 years. In the current struggle against the ESRD epidemics, the medical community and healthcare authorities face a triple challenge: to limit the incidence of kidney failure, to slow or detain progression of established CKD, and to ensure that access to quality RRT remains granted to all those who, despite all efforts, reach ESRD.

ASSESSMENT OF MANAGEMENT AND RESPONSE TO TREATMENT IN PATIENTS ON HEMODIALYSIS

Considering the characteristics of ESRD, dialysis can maintain the patients in a relatively good health condition when offered with a standard and acceptable quality. The standard therapy prevents disability and reduces the burden of the disease. Hemodialysis can be evaluated using 2 sets of indexes: (1) Quantitative indexes: these include the number and type of hemodialysis machines, weekly hemodialysis sessions, and patient-machine ratio. (2) Qualitative indexes: these consist of the kind of buffer, dialyzer type, and dialysis adequacy.

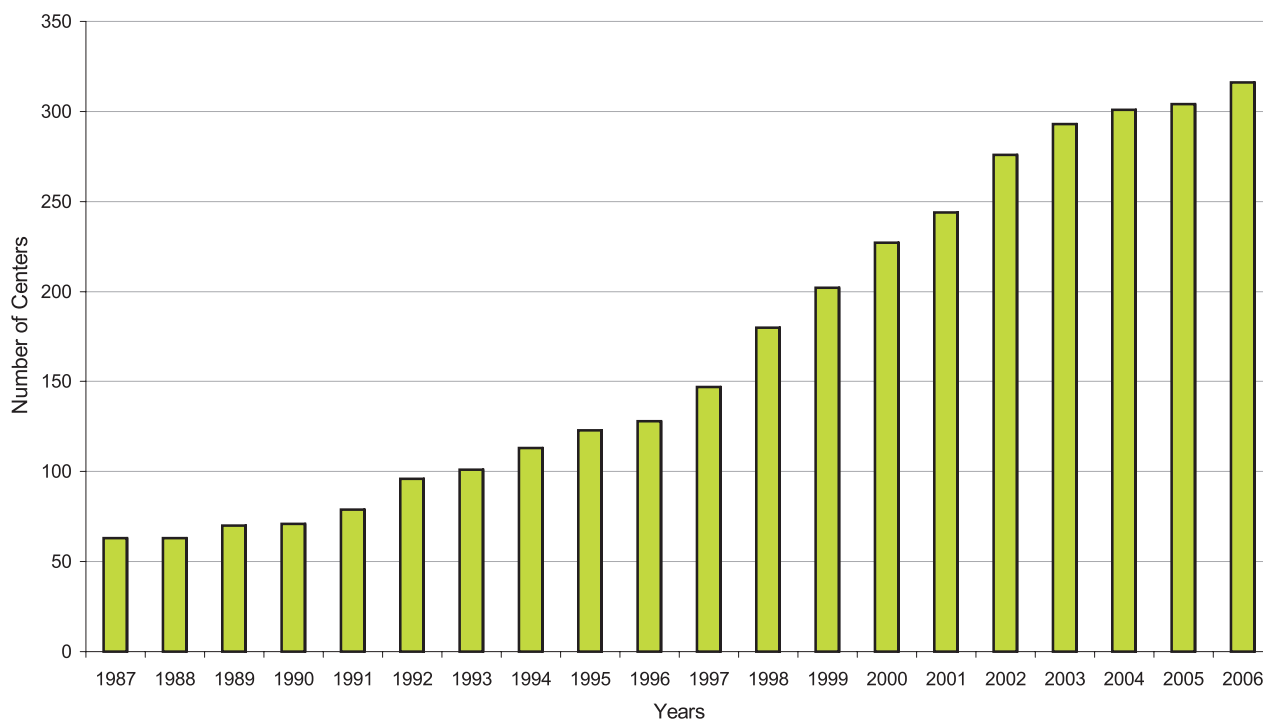


Figure 1. The number of hemodialysis centers in Iran from 1987 to 2006.

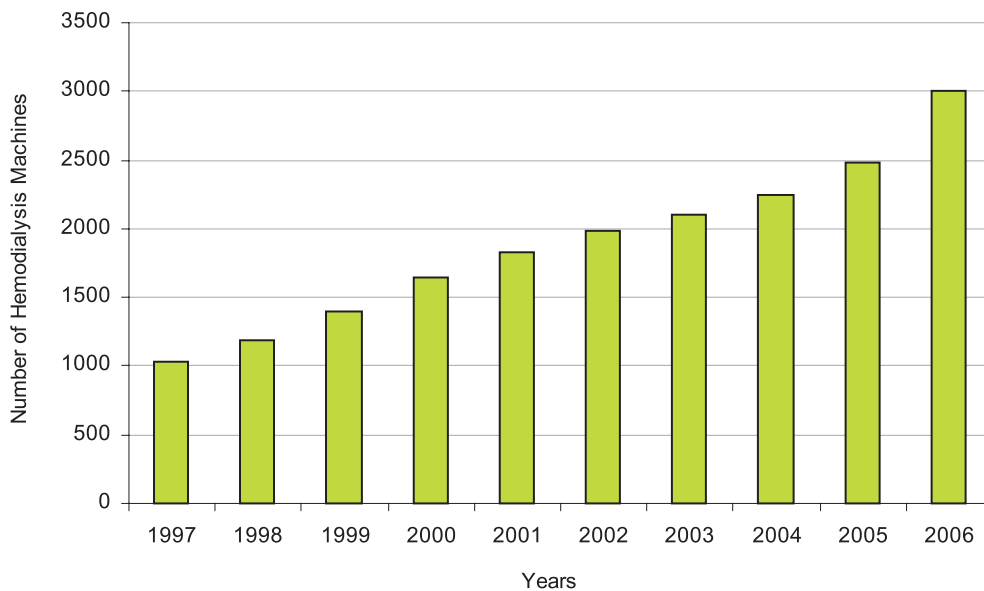


Figure 2. The number of hemodialysis machines in Iran.

Adequacy and Number of Hemodialysis Sessions

The most important quantitative index in the assessment of dialysis adequacy is the number of weekly sessions. Standard treatment is thrice weekly dialysis, while patients with 1 or 2 sessions per week are considered to be underdialyzed. The increase in the number of patients receiving hemodialysis has been mirrored by an increase in the number of dialysis centers (227 in 2000 to 305 in 2006) and machines. In the past 2 years, the number of patients on twice weekly dialysis has been reduced (Figure 3).^{2,3}

Quantitative indexes are helpful in general assessment of dialysis; however, they should have sensible reflections in qualitative aspects. Surveillance on assessment of dialysis adequacy is one of the programs at the MCTSD which was started in 2007. The main objective is to implement assessment of dialysis adequacy (Kt/V) in hemodialysis centers as a routine activity. In the study of Tehran province, it was shown that the duration of each dialysis treatment was 234.0 ± 17.4 minutes. The mean Kt/V , as a measure of adequacy of dialysis, was 0.97 ± 0.25 .³

Bicarbonate-Based Dialysis in Iran

Improvement of hemodialysis in Iran is one of the most important programs of the Ministry of Health of Iran. Adequate dialysis, in addition to patients' satisfaction, put the patients in a much

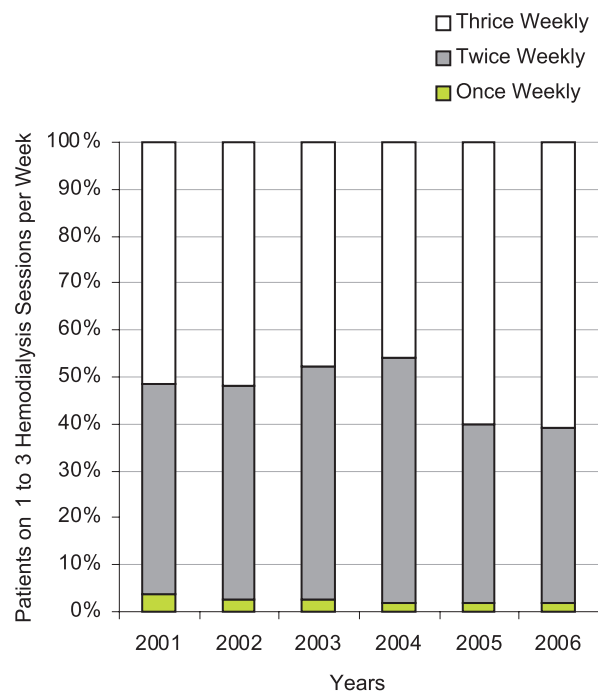


Figure 3. The proportion of patients with end-stage renal disease who receive hemodialysis once, twice, and thrice weekly.

better psychological status. In Iran, the necessity of bicarbonate-based hemodialysis as one improving intervention came to existence in 1999. Bicarbonate-based hemodialysis was started in 2000 as a pilot study in 9 dialysis centers, and the number of centers using bicarbonate increased gradually. Having received positive feedbacks of the centers,

the extension of this program accelerated.

In the 4th developmental strategic plan of the country, bicarbonate-based hemodialysis is considered as one of the important indexes in improvement of dialysis quality. In 2006, the coverage of bicarbonate dialysis in the country reached 63% as a rapidly progressive program.^{2,3} At present, out of 316 hemodialysis centers, 252 are fully equipped with bicarbonate dialysis solution and 32 are joining this program. The other centers, because of old machines, cannot support bicarbonate-based dialysis and there is a hope to upgrade them in the future by changing the machines. By this approach, the increase of dialysis blood flow rate is better tolerated and higher Kt/V is anticipated.

High-Flux Dialyzers

The next qualitative activity at Ministry of Health in the field of hemodialysis is the use of high-flux dialyzers. This program started in late 2006 with a 15% coverage of all hemodialysis sessions in selected centers. Hopefully, this program will be expanded upon receiving the feedbacks and favorable assessment of the patients' clinical conditions.

PERITONEAL DIALYSIS

Peritoneal Dialysis as one of the RRT modalities was started in Iran in 1997. This program was firstly started at Imam-Reza Hospital in Mashhad, Iran, and recently, 40 PD centers with more than 1000 patients are active in this field. In 2006, about 3% of the patients with ESRD were receiving PD, whereas the predicted coverage in the 4th developmental strategic plan of the country was 1.5%.

Of all patients on dialysis in Iran, 93.5% receive hemodialysis and 6.5% receive PD. In the face of increasing numbers of patients suffering from ESRD in the coming years, it is of concern that,

according to Mahdavi-Mazdeh and colleagues' study in Tehran province, more than half of the patients on hemodialysis are unaware of PD as a comparable and possibly cheaper modality of RRT.² The proportion of patients with ESRD treated by PD was less than 1% (2 pmp) in 2000 that reached 2.5% in 2005 (9.7 pmp).³ Because of the efficiency of PD treatment and satisfaction of patients receiving this modality, we believe that more patients should be fully acquainted with this treatment option, which may ultimately help us to support the increasing numbers of patients with ESRD.¹⁰⁻¹²

MILESTONE OF DIALYSIS MANAGEMENT IN IRAN

Previously, the related annual budget for dialysis was designated to the MCTSD. However, by definition of relevant services and specific tariffs, the budget for dialysis franchise was transferred to insurance organizations and budget for hemodialysis machines and water treatment systems were designated to the medical universities. In this condition, and away from ordinary tasks, the Ministry of Health has ample time for its main responsibilities concerning policy making in the country. The Table shows achievements of the MCTSD based on the indexes of the 4th developmental strategic plan of the country.

CONFLICT OF INTEREST

None declared.

REFERENCES

1. Modi GK, Jha V. The incidence of end-stage renal disease in India: a population-based study. *Kidney Int.* 2006;70:2131-3.
2. Mahdavi-Mazdeh M, Zamyadi M, Nafar M. Assessment of management and treatment responses in haemodialysis patients from Tehran province, Iran. *Nephrol Dial Transplant.* In press 2007.

Achievements of the Management Center for Transplantation and Special Diseases based on the indexes of the 4th developmental strategic plan of the country.

Activity	Index Title	Achievement Rate in 2006
Cooperation in hemodialysis machine supply	Patients/machines	4.7
Expansion of bicarbonate-based dialysis	Percentage of bicarbonate-based dialysis sessions	63%
Optimizing hemodialysis Sessions	Percentage of patients with thrice weekly hemodialysis	61%
Replacement of old hemodialysis machines	Percentage of machines with bicarbonate-based dialysis capability	80%

3. Mahdavi-Mazdeh M, Heidary Rouchi A, Norouzi S, Aghighi M, Rajolani H, Ahrabi S. Renal replacement therapy in Iran. *Urol J*. 2007;4:66-70.
4. Sisca S, Pizzarelli F. Cost-benefit analysis and choice of dialysis treatment in Italy. *Dial Transplant*. 2002;31:382-7.
5. Adomakoh S, Adi C, Fraser H, Nicholson G. Dialysis in Barbados: the cost of haemodialysis provision at the Queen Elizabeth Hospital. *Rev Panam Salud Publica*. 2004;16:350-5.
6. Wikipedia, the Free Encyclopedia [homepage on the internet]. Economy of Iran [cited 2006 March 9]. Available from: http://en.wikipedia.org/wiki/Economy_of_Iran
7. Zatz R, Romão JE Jr. End-stage renal failure and national resources: the Brazilian experience. *Ren Fail*. 2006;28:627-9.
8. Afshar R, Sanavi S, Salimi J. Epidemiology of chronic renal failure in Iran: a four year single- center experience. *Saudi J Kidney Dis Transpl*. 2007;18:191-4.
9. Barsoum RS. Chronic kidney disease in the developing world. *N Engl J Med*. 2006;354:997-9.
10. Ayazi K, Atabak S, Saghebi R, Ayazi S, Aryasepehr S. Evaluation of efficacy, survival rate and complications of peritoneal catheter placement of patients with end-stage renal disease. *Saudi Med J*. 2005;26:1391-3.
11. Shih YC, Guo A, Just PM, Mujais S. Impact of initial dialysis modality and modality switches on Medicare expenditures of end-stage renal disease patients. *Kidney Int*. 2005;68:319-29.
12. Mircescu G, Garneata L, Florea L, et al. The success story of peritoneal dialysis in Romania: analysis of differences in mortality by dialysis modality and influence of risk factors in a national cohort. *Perit Dial Int*. 2006;26:266-75.

Correspondence to:

Mitra Mahdavi-Mazdeh, MD
 Management Center for Transplantation and Special Diseases,
 Ministry of Health, Hafez St, Tehran, Iran
 Tel: +98 21 6676 0433-5
 Fax: +98 21 6676 0433-5
 E-mail: mmahdavi@tums.ac.ir

Received November 2007

Revised November 2007

Accepted December 2007