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Dialysis and Transplantation News

Nephrology Dialysis Transplantation

Nephrology, dialysis and transplantation in Turkey

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Abstract

The establishment of the Turkish Society of Nephrology (TSN) in 1970 coincided with that of many western European nephrology societies. The TSN organized the 15th ERA–EDTA Congress in Istanbul in 1978, earlier than many European Countries, and currently has 286 active members. At present, Turkey has 161 nephrologists, which equals 2.5 nephrologists per million population (p.m.p.).

The number of original articles submitted by Turkish authors to the journal *Nephrology Dialysis Transplantation* ranks 7th–8th amongst total submissions to the journal. Turkey also ranks 2nd–4th in the number of abstracts submitted to recent ERA–EDTA Congresses. With 18 063 patients undergoing intermittent haemodialysis treatment in 348 dialysis centres, Turkey has the 5th largest chronic haemodialysis patient population among European countries. In addition, 1903 patients are currently undergoing continuous ambulatory peritoneal dialysis. However, with a total of 4693 renal transplants since 1975, of which only 21.3% were of cadaveric origin, Turkey lags considerably behind other European countries in renal transplantation.

In Turkey, the prevalence and incidence of renal replacement therapy (RRT) are at present 358 and 52 p.m.p. respectively, and the expansion rate of the RRT stock is 17% (HD 18.5%, CAPD 6%, and transplantation 1.7%). The yearly gross mortality rate of the total RRT population is 9.4%.

The present priorities of the Turkish nephrological community include high-standard research activity and long-term, prospective clinical and epidemiological studies, an increase in the total number and percentage of cadaveric transplants, further improvement of the quality and cost-effectiveness of RRT, and finally the further development of scientific and educational collaboration with the world nephrological community.

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Keywords: dialysis; nephrology; registry; transplantation; Turkey

Introduction

Since 1990, the Turkish Society of Nephrology (TSN) has been collecting with its own resources data on nephrology, dialysis and transplantation in the whole of Turkey, and has published them as yearly booklets. These data constitute the only available comprehensive source on Turkish nephrology, dialysis and transplantation [1–5] and have become a reference for the scientific world [6–10]. According to ERA–EDTA reports in 1997 in western Europe, only 13 countries including Turkey were providing registry data based on a national nephrology registry [6].

In *Nephrology Dialysis Transplantation*, we have previously reported on the Turkish Nephrology Registry [7]. In this present article we would like to give more detailed information on Turkish nephrology, based on the registry data for the year 2000.

General information on Turkey

Turkey has a population of 64 337 000 according to the 1995 census. The Republic of Turkey was established in 1923 by Kemal Atatürk after a war of independence, following the fall of the 620-year-old Ottoman Empire. Notably, 99.5% of the population is Muslim, yet Turkey is the only secular country among the Islamic states and throughout its history has always tolerated and respected every religion within its boundaries. Turkey is a natural and historic bridge between the European and Asian countries. It is a republic with a multi-party parliamentary democratic system like most western democracies. It is a member of The Organization for Economic Cooperation and Development (OECD) and has been a member of the North Atlantic Treaty Organisation (NATO)

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Table 1. Some demographic data on Turkey

Territorial area	780 000 km^2
Population (1995)	64 337 000
Number of Universities (January 2001)	52 state, 19 private
Number of Medical faculties (January 2001)	35 state, 6 private
Number of physicians	81 988 (11 329 private) 36 854 specialists 45 134 general practitioners
Number of dentists	14 226 (9595 private)
Number of pharmacists	22 065 (19 006 private)
Number of nurses	70 270 (4020 private)
Number of midwives	41 271 (1280 private)
Per capita income (2000)	$3280/year (year 2000)
Per capita purchasing power (2000)	$6000/year (year 2000)
Female life expectancy (years)	71.6
Male life expectancy (years)	67
Birth rate	1.337/1000
Infant death rate	34.8/1000

Sources: The Ministry of Health of the Turkish Republic, 2000; High Education Commission (YÖK-Ankara), 2000; *The Economist*, The World in 2001.

for the last 50 years, protecting the southeastern borders of the western alliance. In 1959 and 1963, it signed a partnership agreement with the European Union (Ankara Agreement) and became an official candidate to the European Union in the EU summit at Helsinki in 1999. Some of the demographic data on Turkey are summarized in Table 1.

Historical and current information on nephrology in Turkey

The first independent and registered department of nephrology was founded within the Istanbul Medical Faculty in 1965 by Kemal Önen, who 5 years later also founded the TSN. The establishment of the TSN in 1970 coincided with that of many of the Western European nephrology societies. The TSN successfully organized the 15th ERA–EDTA Congress in Istanbul in 1978, earlier than many European countries. The TSN currently has 286 active members and Turkey at present has 161 nephrologists. This equals 2.5 nephrologists per million population (p.m.p.). To qualify as a nephrologist, specialization in internal medicine is a prerequisite. The nephrology training takes 3 years of clinical work, spent on a rotational basis in the nephrology ward and dialysis and transplant units. To qualify, a research-based doctoral thesis has to be submitted and accepted, and a notoriously difficult oral examination has to be undergone before a jury.

Regular haemodialysis was first introduced in Turkey in around 1965. The first successful renal transplantation in Turkey was performed in 1975 from a living related donor by Dr Mehmet Haberal at the Hacettepe University hospital. At present, renal transplantation is performed mainly in 16 centres by specialized transplantation surgeons. Regular haemodialysis is performed in 348 centres nationwide, and in the dialysis units there is room for almost anyone who needs dialysis. Some data related to nephrology are presented in Table 2.

Table 2. Some nephrological data on Turkey

Nephrology residency training programmes	22
Number of nephrologists	161 (2.5 p.m.p.)
Haemodialysis centres	348
Haemodialysis patients (centre)	18 063 (281 p.m.p.)
CAPD patients	1903 (29.7 p.m.p.)
Total dialysis patients	19 963 (312 p.m.p.)
Active kidney transplantation centres	16
Total number of kidney transplantations for 25 years (1975–2000)	4693 (73 p.m.p.)
Prevalence of RRT patients with functioning kidney grafts	2947 (46 p.m.p.)
Number of kidney transplantations in 2000	369 (5.7 p.m.p.)
Living donor transplantation in 2000	287 (%78.7)
Cadaveric donor transplantation in 2000	82 (%21.3)
RRT prevalence	358 p.m.p.
RRT incidence	52 p.m.p.
Expansion rate of RRT stock (%)	17 (HD 18.5%, CAPD 6%, Tx 1.7%)
Yearly gross mortality rate of the total RRT population (%)	9.4

Sources: Ministry of Health of Turkey, 2001; Registry of Turkish Society of Nephrology, 2000; p.m.p., per million population.

Clinical nephrology

According to the year 2000 Registry of the TSN, the yearly number of patients admitted to the nephrology wards is 17 126. Renal biopsy was performed on 1672 of these patients. At the end of the year 2000 there were 19 015 patients with chronic renal failure (CRF) (point prevalence 238.8 p.m.p.), 7941 of them being newly diagnosed in the year 2000 (incidence: 276 p.m.p.). The aetiology of CRF was chronic glomerulonephritis in 22.8%, hypertension in 15.2%, diabetic nephropathy in 15.1%, chronic interstitial nephritis in 4.8%, polycystic kidney disease in 4.4%, amyloidosis in 3%, urological, including VUR, stone disease and other obstructions in 9.6%, miscellaneous in 9.5%, and unknown in 15.6% [1].

In two articles analysing 426 Turkish patients with glomerulonephritis [11,12] the histological types were found to be distributed as follows: membranoproliferative in 103 patients (24%), membranous in 92 (21.5%), diffuse proliferative in 108 (25.3%), IgA nephritis in 26 (6%), mesangioproliferative in 53 (12.4%), focal segmental glomerulosclerosis in 15 (3.5%), minimal-change in 13 (3%), and crescentic in 8 (2%). Hypertension is encountered frequently in the nephrology outpatient clinics, 40% of patients being hypertensive, and of these 16% have CRF. For paediatric patients, the leading causes of out-patient admissions are urinary-tract infections and acute glomerulonephritis.

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Table 3. Haemodialysis centres in Turkey

Institutions	Facilities		Patients	
	n	%	*n*	%
Ministry of Health hospital centres	165	47.4	4777	26.4
University hospital centres	27	7.8	2138	11.8
Social Security Organization centres	29	8.3	1912	10.6
Other government-related centres	4	1.1	50	0.3
Private centres	123	35.3	9186	50.9
Total	348	100	18 063	100

Source: Ministry of Health of Turkey, 2001.

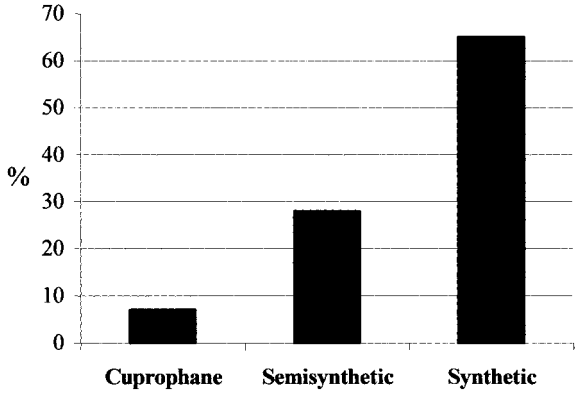


Fig. 1. Types of haemodialysis membrane used in Turkey in 2000.

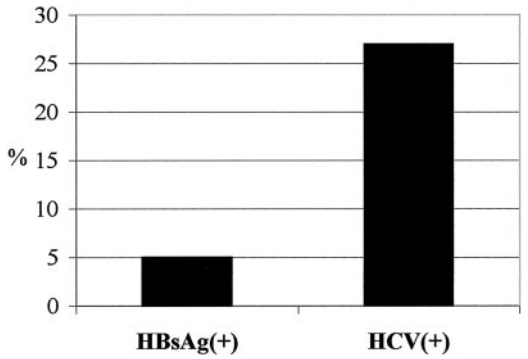


Fig. 2. Hepatitis serology of haemodialysis patients in Turkey in 2000.

In the year 2000, 1672 patients were dialysed because of acute renal failure (ARF) [1]. Three studies give information about the factors causing ARF in Turkey [13–15]. The earliest of these studies was carried out before medical abortion was legalized for pregnancies up to 20 weeks, and it cites septic abortion due to unwanted pregnancy as the leading cause of ARF. In these three studies, a total of 908 patients with ARF were investigated retrospectively: Of these, 136 had pre-renal ARF, 33 had post-renal ARF, 739 had acute tubular necrosis (ATN). The reasons for ATN were as follows: medical 343 (46%), surgical 195 (26%), obstetric 147 (19.8%), glomerulonephritis 77 (10.4%), and interstitial nephritis 4 (0.5%). The overall mortality of ATN patients was 26%. Of this 50% was surgical, 23.5% obstetrical, and 23% medical. On 17 August 1999 a major earthquake occurred at the eastern end of the Marmara region in north-western Turkey. A total of 639 patients (291 female, 348 male) with ARF due to crush injuries were hospitalized in 35 hospitals. Ninety-seven died (15.2%). This mortality rate was lower compared to previous major earthquakes, and was associated with thoracic and abdominal trauma and medical problems such as disseminated intravascular coagulation and/or adult respiratory distress syndrome, often in conjunction with sepsis [16]. This low mortality rate has also been acknowledged in most recent international publications [16–19].

Renal replacement therapy (RRT)

RRT is routinely applied throughout the country. Dialysis facilities cover all patients in need. However, the same cannot be said for transplantation. The overall data of RRT follow-up as of January 2001 are presented in Table 2.

Haemodialysis

In January 2001, 18 063 patients with CRF were treated by intermittent haemodialysis. The yearly expansion rate of patients receiving haemodialysis was 18.5% [1,2] (Table 2). The nature and affiliation of the haemodialysis centres attended by the patients are shown in Table 3. Home haemodialysis was not performed. The sex distributions of the haemodialysis patients was 43% female and 57% male. The types of dialysis membrane used in the year 2000 are shown in Figure 1. Seventy per cent of patients underwent thrice-weekly dialysis and 80% used bicarbonated dialysate. The percentages of patients with hepatitis B and C are given in Figure 2. The nutritional status of the patients as judged by serum albumin levels was satisfactory and only 18% had serum albumin levels less than 3.5 g/dl. Urea kinetic modelling was used in only 136 centres (40%) to measure dialysis efficiency. Vitamin D was used in 61.1% of the patients, orally in 33.9% and intravenously in 27.7%.

Peritoneal dialysis

As of November 2001, 1903 patients were managed with CAPD (53% female, 47% male). This number represents 12.4% of the number of patients treated by haemodialysis. The yearly expansion rate of the patients receiving CAPD treatment was 6% [1,2] (Table 2). Only 154 (6%) CAPD patients were under the age of 15 years. A total of 53 centres conducted CAPD, and 98% of these used the twin-bag system. As judged by their serum albumin levels, 76% of CAPD

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patients had a satisfactory nutritional status (i.e alb >3.5 g/dl), 52.2% used erythropoietin (compared to 70% of haemodialysis patients) and 50% used vitamin D analogues. The causes of mortality in CAPD were predominantly from cardiovascular disease (64%), followed by infection (13%).

Renal transplantation

To date, 4693 transplantations have been performed in Turkey since 1975. Of these grafted patients, 2947 were still alive in 2000 (Table 2). Unfortunately, the progress in transplantation has not reached the level achieved in dialysis. The annual transplantation rate for the last 4 years was close to 400. In the year 2000 it was 369. Of these, 66% (243) were males and 34% (126) were females. The recipient donor mismatch and age distributions are shown in Figures 3 and 4; 29.4% of the transplant recipients were HBsAg positive, and 11.8% were infected with HCV [1].

In Turkey, mainly living-related donor transplantation is performed (78.8% living related, 21.3% cadaveric). Paid donor transplantation is illegal. The yearly expansion rate for renal transplantation patients is 1.7% [1,2] (Table 2). Some patients were able to find both cadaveric and paid living donors in nearby countries such as India, Russia, Iran and Iraq, and have been transplanted in these countries. About 169 patients transplanted in this manner are followed up at present in the transplantation units in Istanbul.

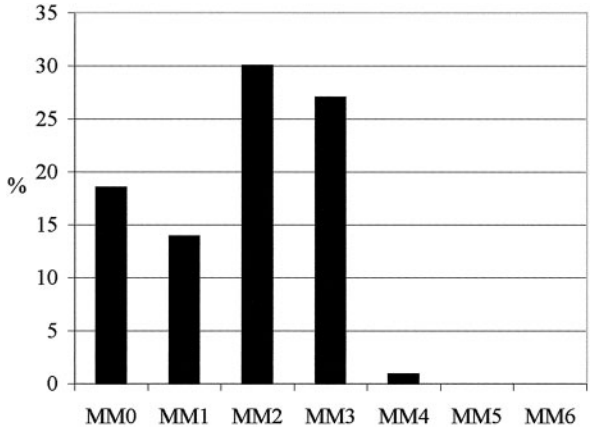


Fig. 3. Recipient/donor mismatch (MM) distribution in Turkey in 1995.

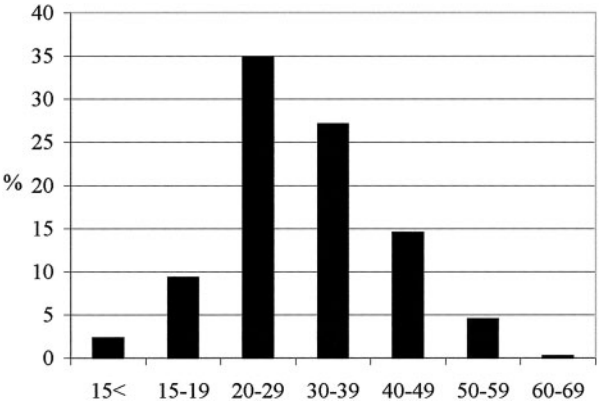


Fig. 4. Age distribution of renal transplant recipients in Turkey in 1995.

Survival in haemodialysis, peritoneal dialysis and transplantation patients

Cardiovascular mortality was by far the leading cause of mortality in haemodialysis and CAPD patients (Figure 5). The mortality rates for RRT are given as gross mortality rate [20]. In the year 2000, a total of 22 913 patients receiving RRT survived, while 2159 patients (Tx 30, HD 1979, CAPD 150) died [1]. Accordingly, the calculated gross mortality rate was 9.4% ($2159\times100/22913$).

The 10-year actuarial graft and patient survival for living-donor transplants in Turkey between 1984 and 1994 are given in Figure 6. The 5-year patient and graft survival are similar to the average figures of the EDTA for the same period. Causes of death in transplantation patients are given in Figure 7.

Cost and benefit of renal replacement therapy in Turkey

According to a new, unpublished study carried out in three medical faculties and a private dialysis unit, the total cost of renal replacement therapy in Turkey was $486 880 981 as of September 2001 [Erek E, Sever MŞ, Sarıyar M *et al*. Cost and benefit of RRT in Turkey. (Article in preparation).]. This amount was nearly 1% of the yearly export of the country. The yearly costs per patient were $22 644 for haemodialysis, $22 350 for CAPD, and $23 393 and $10 028 respectively for the first- and second-year of transplantation. Reuse of the dialyser has not been performed. However, some reuse initiatives have begun.

Scientific activities of the Turkish nephrology community

In 1978 the 15th EDTA Congress was held in Istanbul, hosted by the TSN. In 1997 the ISN-COMGAN update course, hosted by the TSN was held in Istanbul, with

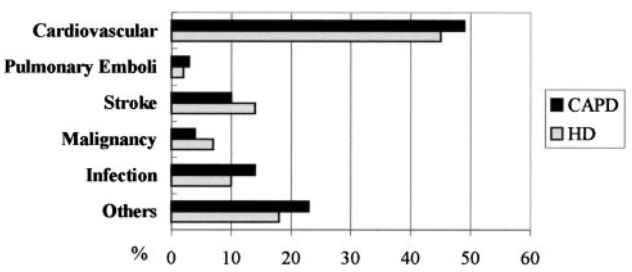


Fig. 5. Causes of mortality in Turkish dialysis patients in 2000.

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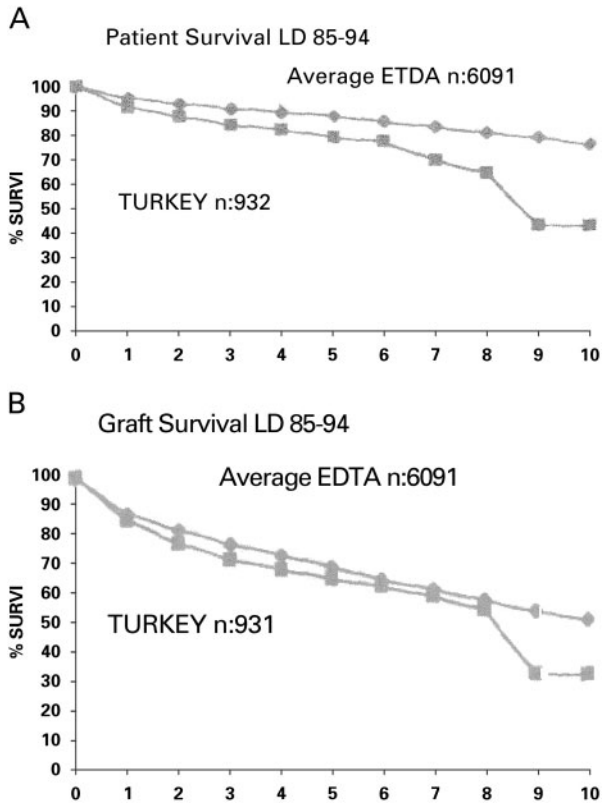


Fig. 6. Comparison of 10-year (**A**) patient and (**B**) graft survivals for living donor (LD) transplants between EDTA and Turkey (1984–1994). Squares, Turkey; diamonds, Europe. Based on data provided by the ERA Registry Office in London by special request in 1997.

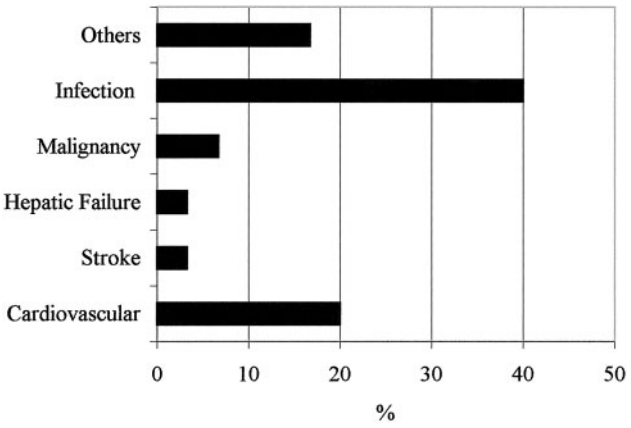


Fig. 7. Causes of death in renal transplant recipients in Turkey in 2000.

800 participants. In 1999, the 2nd BANTAO (Balkan cities) Nephrology Congress, hosted by the TSN, was held in İzmir. In 2000, an integrated course and meeting was held with the International Society of Nephrology (ISN) to celebrate the 30th anniversary of the TSN and the 40th anniversary of the ISN. In 2001, a CAPD update course was held by the International Society for Peritoneal Dialysis (ISPD) and the TSN.

In 1995 and 1998, the number of original articles submitted by Turkish authors to *Nephrology Dialysis Transplantation* ranked 7th and 8th respectively amongst overall submissions to the journal [21,22]. To each of the last four ERA–EDTA Congresses, more than 100 abstracts were submitted from Turkey, and in this respect Turkey ranked 2nd–4th among participating countries [23,24].

The TSN has been working on its RRT registry since 1990. Recently, at the 37th ERA–EDTA Congress held in Nice in September 2000, an oral presentation of the Turkish registry was given by a member of the TSN Registry Committee [10].

Comments

The number of nephrologists in Turkey is relatively small at present, at 2.5 p.m.p. The corresponding number for England has been reported to be 5 p.m.p., while those for Germany and Italy are 30 and 60 p.m.p. respectively [6]. There are differences between Turkey, the USA and Western Europe with respect to the distribution of the causes of CRF [1,25–27]. In Turkey, the first three most frequent causes of CRF are glomerulonephritis, hypertension and diabetic nephropathy. In the USA, however, the two most frequent causes of CRF are hypertension and diabetic nephropathy [27]. In Turkey, polycystic kidney disease accounts for only 2.3%. The number of unknown causes in our series is 15.6% [1].

According to two recent publications from France and England, glomerulonephritis and interstitial nephritis in that order are the two most frequent causes of CRF, and in 20% of cases the 'causes' remain unknown [25,26]. In Turkey, membranoproliferative and diffuse proliferative glomerulonephritis (28.2 and 24% respectively) are the most frequent types of primary glomerulonephritis. IgA nephritis on the other hand, constitutes only 7.1% of cases. This figure is much less than that of some European and Asian countries, especially Japan [28]. The role of geographical and genetic factors in the pathogenesis of primary kidney disease will probably be better understood in the future. Renal amyloidosis is seen at fairly high frequency and is mainly related to familial Mediterranean fever [29].

According to our registry, the yearly percentage of diagnostic renal biopsies in Turkey ranged between 10 and 25% during the last decade.

With respect to ARF in Turkey, medical and surgical causes rank 1st and 2nd respectively. Following the Marmara earthquake on 17th September 1999, the ratio of deaths encountered in crush syndrome-related ARF cases was 15.2%. This ratio was lower than the ones reported in previous earthquakes [16].

According to the annual ERA–EDTA report of 1996, Turkey is one of the five countries in Europe with the largest haemodialysis patient populations, the other four being Germany, Italy, France and the United Kingdom [30].

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The majority of dialysis treatments in Turkey are carried out in centres belonging to the Ministry of Health and in private centres. In the last decade, private centres have played an important role in providing sufficient beds for haemodialysis patients.

Turkey is 13th among the 35 countries that collect their data via national registries [6]. During the last decade there has been a significant increase in the number of patients treated with HD and CAPD. However, the same cannot be said for transplantation (Table 2). In Turkey, the number of the CAPD patients is 12.4% of the number of haemodialysis patients, a figure that is higher than in France and Germany but lower than in USA, Canada and England [1,31].

RRT is applied throughout the world at an increasing rate. It is gaining new dimensions and is constantly improving in quality. Differences in RRT findings exist not only between developing and developed countries but also between developed Western countries themselves (Table 4). In Turkey, the averages of RRT prevalence, RRT incidence and also the prevalence of transplant patients with functioning grafts are lower than in the USA, Japan and the European Union (EU). Turkish results correspond to the lower limit of the range of the results of the EU (Table 4). Turkey should take measures to increase renal transplantation. In Turkey, the expansion rate of RRT patients is higher than in the USA, Japan and the EU. This is thought to be due to the increase in the availability of RRT modalities throughout the country together with the tendency to start haemodialysis treatment earlier. Gross mortality rate was used to assess the RRT survival because of its simplicity of calculation [20,32]. Turkey has a gross mortality rate that is lower than that of the USA, but similar to that of the EU and Japan [32] (Table 4). Such a relatively low mortality rate, which is related to well-established RRT modalities was also observed in the ARF mortality following the last Marmara Earthquake (15.2%) [16]. It is noteworthy that despite their high cost, synthetic membranes are used in the majority of haemodialysis sessions (65.5%) in Turkey [1].

While the incidence of hepatitis B has fallen due to the use of vaccine, the figures for hepatitis C are still higher (27%) than those of Western countries. It is compulsory in our country to treat patients with hepatitis in separate rooms. As to erythropoietin usage, its frequency is 74% in HD and 55% in CAPD units.

Turkey lags considerably behind European countries in terms of cadaveric transplantation. Almost all of our living donors are relatives. Paid-donor transplantation is forbidden in Turkey. The survival results of living donor transplantation are quite satisfactory and in pace with EDTA averages (Figure 6).

As to the cost/benefit ratio of RRT, the cost is lower than in the EU and the USA [Erek E, Sever MŞ, Sarıyar M *et al*. Cost and benefit of RRT in Turkey (Article in preparation), 27]. Low staff salaries play an important role in such low costs, despite erythropoietin prices that are higher than in the USA [Erek E, Sever MŞ, Sarıyar M *et al*. Cost and benefit of RRT in Turkey (Article in preparation)].

RRT in Turkey is performed both in public and private centres. In this aspect it follows the Beveridge model [33]. In providing space for dialysis patients, private dialysis is relatively important (Table 3).

Conclusion

In recent decades, nephrology in Turkey has shown a great deal of progress, and the number of posters and oral presentations from Turkey presented at international congresses and seminars has increased considerably. Yet the number of publications related to long-term prospective clinical studies is not yet sufficiently high and lags behind European countries.

Turkey has sufficient haemodialysis centres at present. However, transplantation activity is still lagging behind that of European countries. Living to cadaveric donor ratio is the reverse of that in Western countries. The mortality rate of RRT is the same as in Western countries.

At present, the major goals of the Turkish nephrology community are to give a high priority to high-level research activities and long-term prospective clinical and epidemiological studies, to improve the quality and cost-effectiveness of ESRD treatment, and to increase the total number and percentage of cadaveric transplants.

Registry group of The Turkish Society of Nephrology

Ankara and Central Anatolia Region Co-ordinators: Şali Çağlar, Mehmet Haberal, Enver Hasanoğlu,

Table 4. Comparison of Turkish RRT data with the USA, Japan and the EU

	RRT prevalence (p.m.p.)	RRT incidence (p.m.p.)	Prevalence of RRT patients with functioning grafts (p.m.p.)	Expansion rate of RRT stock (%)	Gross mortality rate of RRT patients (%)
USA (1999) [27]	1298	336	385	9	19.7
Japan (1997) [28]	1336	225	26.7	7.8	9.3
EU (15 countries) [32]	644 (444–773)	120 (68–163)	209 (57–503)	8.2 (2.3–13)	10.4[a]
Turkey [1]	358	52	46	17[b]	9.4

[a]Death range on RRT in Europe (p.m.p.) is 35–89; [b]HD 18.5%, CAPD 6%, Tx 1.7%.

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