



Renal Transplantation in Iran Over the Past Two Decades: A Trend Analysis

M.-H. Noorbala, H. Rafati-Shaldehi, M. Azizabadi-Farahani, and S. Assari

ABSTRACT

Background. In this study, we have reported updated statistics of the Iranian Transplantation Registry, the status of the recipients and grafts, and a detailed time trend with respect to patient characteristics.

Methods. We retrospectively reviewed the Iranian Renal Transplantation Registry and information from the Dialysis and Transplant Patients Public Association, to obtain data on all kidney transplantations performed in Iran between 1986 and 2005. Data were gathered regarding the total number of transplantations, graft loss, recipient death, and donor and recipient characteristics, including demographic data, cause of end-stage renal disease (ESRD), and source of kidney. We assessed changes in variables on a biannual basis.

Results. A total of 19521 transplantations were registered over the study period, of which, 761 recipients (3.9%) had died and 2333 allografts (11.9%) had been lost. The source of the kidney in 2556 (13%) subjects was a living related donor (LRD), in 16234 (83%) a living unrelated donor (LURD), and in 831 (4%) cadaveric. During the study decades we noted an increase in the number of kidney transplantations (from 22 to 3690), age of recipients (from 30 to 40), male-to-female ratio of recipients (from 0.58 to 0.67), male-to-female ratio of donors (from 0.48 to 0.52), diabetes mellitus (from 0% to 27%), and hypertension (from 4% to 15%), as causes of ESRD, as well as the use of cadaveric kidneys (0% to 11%).

Conclusion. Analyzing renal transplantation data not only helps to evaluate the effectiveness of transplantation activities in a country, but also provides information to estimate future costs in the health care system.

THERE IS A GENERAL INTEREST in sharing national transplantation data between countries.^{1,2} A population-based registry with a national scope provides a suitable basis for epidemiological analyses.³ The last published report of the number of kidney transplantations in Iran showed 17,000 at the end of September 2004.¹

One of the benefits of data registration in health care is the possibility to monitor changes in patient characteristics. In the case of renal transplantation, simple donor and recipient demographics, end-stage renal disease (ESRD) course, and source of transplantations can influence the outcomes of transplantation and health care use.^{4–8} Several previous studies have reported time trends in renal transplantation in their own countries.^{3,9–11} In this study, using the Iranian renal transplantation registry, we have reported updated statistics of renal transplantation, graft loss, mor-

tality, as well as the time trend of demographic features of transplanted patients.

MATERIALS AND METHODS

In a retrospective study, we reviewed the Iranian renal transplantation registry data of all renal transplant patients in Iran between

From the Nephrology/Urology Research Center (NURC), Kidney Transplant Department (M.-H.N.), Baqiyatallah Medical Sciences University, Tehran, Iran; Baqiyatallah Medical Sciences University (H.R.-S.), Tehran, Iran; and Clinical Research Unit (M.A.-F., S.A.), Baqiyatallah Medical Sciences University, Tehran, Iran.

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Address reprint requests to Mohammad Hossein Noorbala, Nephrology/Urology Research Center (NURC), Baqiyatallah University of Medical Sciences, Vanak Square, Mollasadra Ave 19945-587, Tehran 1435915371, Iran. E-mail: noorbalam@gmail.com

1986 and 2005. We extracted data from Dialysis and Transplant Patients Public Association. We recorded data of kidney donors and recipients, including age, sex, donor type, and cause of ESRD such as diabetes and hypertension. Hospital-based data on the number of annual transplantations, rejection, and death were also collected.

Data were analyzed using SPSS version 14 for Windows. Trends within the years 1986 and 2005 were analyzed in 2-year categorizations. Analysis of variance and chi-square tests were used to evaluate changes in variables over time.

RESULTS

The 19,521 kidney recipients and donors, showed a mean age of 38.5 years (range, 30 to 40 years) and 28.86 years (range, 27 to 38 years), respectively. The source of the kidney was living related donor in 2556 (13%) cases, living unrelated donor (LURD) in 16,234 (83%), and cadaveric in 831 (4%). Among recipients, 12,063 (61.8%) were men and 7458 (38.2%), women.

Of all patients, 761 recipients (3.9%) died and 2333 allografts (11.9%) were lost. During the study decades, we noted an increase in the number of kidney transplantations (22 to 3690), age of recipients (30 to 40), male-to-female ratio in recipients (0.58 to 0.67), male-to-female ratio in donors (0.48 to 0.52), diabetes mellitus (0% to 27%), and hypertension (4% to 15%), as causes of ESRD and the use of cadaveric kidneys (0% to 11%).

The trend in donor and recipient characteristics and also changes in the rate of transplantation, rejection, and death are presented in Table 1.

DISCUSSION

According to the statistics presented here, at the start of 2006, among 19,521 kidney recipients, 16,427 subjects with functioning grafts were receiving health care services in Iran. The transplantation rate in our country shows an increasing trend, in line with the developments in transplantation, with some changes in demographic and clinical variables trending toward a higher age and a larger number of patients with complex causes of ESRD, such as diabetes mellitus and hypertension. We also noted an increase in the number of LURD transplants over the study period.

The development of transplantation activities in Iran over the recent two decades is concurrent with advancements in the Iranian primary health care system, becoming highly organized and efficient, which has resulted in a dramatic decrease in the mortality rate and in population growth, increased life expectancy, marked shift from communicable to noncommunicable diseases,¹² and an improvement in women's health.¹³

Similar rising trends in transplantation rate has been reported in developed countries, such as the United States,¹⁴ and also in developing countries, like Bangladesh, India, Indonesia, Korea, Pakistan, Philippines, China, and Thailand.¹⁵

This development in the transplantation system of Iran is partly due to the improved experience of transplant

Table 1. Characteristic of Iranian Transplant Patients, 1984–2005

Years	Recipient																	
	Demographic			Source of Kidney			Cause of ESRD			Event		Donor Demographic						
	Number of Transplantations	Male (%)	Age (mean)	LURD	LURD (%)	LRD	LRD (%)	Cadaveric	DM	DM (%)	HTN	HTN (%)	Rejection	Rejection (%)	Death	Death (%)	F/M Donor	F/M Donor (%)
1984–1985	22	14 (63%)	30	15 (68%)	7 (32%)	0 (0%)	0 (0%)	1 (4%)	0 (0%)	0 (0%)	0 (0%)	1 (5%)	1 (5%)	0 (0%)	0 (0%)	10 (45%)	10 (45%)	39.7
1986–1987	253	166 (66%)	38.5	197 (78%)	56 (22%)	0 (0%)	0 (0%)	12 (5%)	2 (1%)	2 (1%)	2 (1%)	14 (5%)	14 (5%)	10 (4%)	10 (4%)	124 (49%)	124 (49%)	38.1
1988–1989	654	448 (67%)	41.5	242 (36%)	402 (60%)	10 (4%)	10 (4%)	33 (5%)	13 (2%)	13 (2%)	13 (2%)	31 (5%)	31 (5%)	40 (4%)	40 (4%)	288 (44%)	288 (44%)	31.2
1990–1991	1047	691 (66%)	39	249 (24%)	792 (75%)	6 (1%)	6 (1%)	52 (5%)	10 (1%)	10 (1%)	10 (1%)	43 (4%)	43 (4%)	40 (4%)	40 (4%)	628 (60%)	628 (60%)	28.7
1992–1993	1482	914 (61%)	37.5	250 (17%)	1222 (82%)	10 (1%)	10 (1%)	74 (5%)	30 (2%)	30 (2%)	30 (2%)	77 (5%)	77 (5%)	63 (4%)	63 (4%)	1163 (78%)	1163 (78%)	28.0
1994–1995	1562	1022 (64%)	39	160 (10%)	1396 (89%)	6 (1%)	6 (1%)	78 (5%)	31 (2%)	31 (2%)	31 (2%)	125 (8%)	125 (8%)	86 (5%)	86 (5%)	922 (59%)	922 (59%)	28.9
1996–1997	2032	1223 (60%)	40.5	234 (11%)	1788 (88%)	10 (1%)	10 (1%)	102 (5%)	41 (2%)	41 (2%)	41 (2%)	224 (11%)	224 (11%)	90 (4%)	90 (4%)	1341 (66%)	1341 (66%)	28.1
1998–1999	2417	1474 (61%)	36	296 (12%)	2113 (87%)	8 (1%)	8 (1%)	145 (6%)	48 (2%)	48 (2%)	48 (2%)	322 (13%)	322 (13%)	135 (6%)	135 (6%)	1668 (69%)	1668 (69%)	28.1
2000–2001	3041	1855 (61%)	37.5	309 (10%)	2630 (86%)	102 (4%)	102 (4%)	791 (26%)	395 (13%)	395 (13%)	395 (13%)	496 (16%)	496 (16%)	139 (5%)	139 (5%)	2195 (72%)	2195 (72%)	28.3
2002–2003	3321	2042 (61%)	38	324 (10%)	2894 (85%)	263 (5%)	263 (5%)	963 (29%)	465 (14%)	465 (14%)	465 (14%)	497 (15%)	497 (15%)	105 (3%)	105 (3%)	2557 (77%)	2557 (77%)	28.3
2004–2005	3690	2214 (60%)	40	280 (8%)	2994 (81%)	416 (11%)	416 (11%)	996 (27%)	553 (15%)	553 (15%)	553 (15%)	503 (13%)	503 (13%)	62 (2%)	62 (2%)	2251 (61%)	2251 (61%)	27.8
Total	19,521	12,063	38.59	2556	16,234	831	831	3247	1588	1588	1588	2333	2333	761	761	13147 (67%)	13147 (67%)	27.6

LRD, living related donor; LURD, living unrelated donor; DM, diabetes mellitus; HTN, hypertension.

teams^{16,17} and the increased number of transplant teams (from two in 1986 to 23 in 2005)⁹ and transplantation centers.^{18,19} Financial support by the government, which includes providing laboratory facilities, scientific consulting staff, and necessary drugs,⁹ has also contributed to this development. Low costs of transplantation in Iran²⁰ may have also helped this progress. Significant growth in renal transplantation could also be due to the continuing rise in the number of living unrelated renal transplants,⁹ which is more available than cadaveric and living related transplants. In Iran, the government has been enthusiastically supporting kidney transplantation from living donors, both related and unrelated.¹⁸

Male-to-female ratio of recipients is not similar between different countries. This may be related to several factors, namely, cultural issues, epidemiology of ESRD in the country,¹⁸ and the characteristics of transplantation modei in terms of providing equal chance for male and female transplantation candidates. In Iran, although men have received more transplants than women, there is a slow trend toward an equal proportion of men and women. Women in the United States are 30% less likely to receive kidney transplants than men.²¹ This is not only the case with transplantation, but it is also seen in other aspects of women's health, including diagnosis and treatment of their diseases, and even research on their health issues.²² Possible explanations for this gender difference could be patient or physician preference for type of treatment, social or cultural factors, hospital policy, community size, and economic constraints.²³

In our country, most transplanted subjects are between 30 and 40 years of age and, similarly, most ESRD patients are middle-aged.¹⁸ As shown in this study, the mean age of transplanted patients is increasing. It has been reported that renal transplant recipients are getting older as a global trend,²⁴ which is partly due to the fact that elderly patients on dialysis are more frequently selected for transplantation these days.²⁵ As a result, day by day, a greater number of patients with medical complexities are placed on transplantation waiting lists, and transplantation centers face more difficulty in providing care for them.²⁶

In Iran, there has been an increasing trend in the proportion of LURD transplants, and overall, 83% of allografts have been harvested from LURDs. Many cultural, social, and organizational factors are believed to influence availability of donation from living donors.¹⁸ It is assumed that one reason for the increasing trend of LURD transplantation in our country is the adoption of country's cultural, religious, and socioeconomic backgrounds to this type of organ donation.⁹ This kind of donation offers a number of potential advantages, including avoiding long waits for a cadaveric transplant, ability to perform transplantation on an elective, predetermined schedule, and higher graft survival rates.²⁷ With advances in immunosuppressive therapy, the problem of matching the graft from a living unrelated donor with the recipient has improved substantially.²⁸

In our country, there is an increasing trend in the frequency of hypertension and diabetes mellitus as causes of ESRD in transplanted patients. A similar trend has been also reported in other countries, and approximately 40% of all new ESRD cases occur among individuals with diabetes.^{29,30}

Although we have described a trend analysis, we think that for estimating the impact of this trend on the outcomes of transplantation and health care costs, there is a need for a team of transplantation health system managers, transplantation physicians, epidemiologists, statisticians, and health economists.

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