

Chapter XII

International Comparisons of ESRD Therapy

Key Words:

Dialysis modality

ESRD incidence

ESRD-International comparisons

ESRD prevalence

ESRD registry

Renal transplantation

The establishment around the world of several national and international registries of patients on renal replacement therapy allows healthcare providers a unique opportunity to identify populations at risk of developing ESRD and to appraise current efforts and successes of delivering effective health care to patients with ESRD.

The data collected may be purposefully used for

- 1) Identifying trends in incidence and prevalence of ESRD across national boundaries.
- 2) Identifying the utilization and trends over time of various modalities of renal replacement therapy among countries.
- 3) Comparing the efficacy of currently available methods for renal replacement therapy.
- 4) Comparing survival rates in patients on different forms of ESRD therapy within and among countries.

However, the use of data from large renal registries to make important observations on the health of patients with ESRD is contingent upon certain prerequisites. First and foremost, the database should be a validated one, as the extent and accuracy of the data collected may vary widely and present a threat to external validity. The USRDS covers more

than 93 percent of all patients treated for ESRD in the United States through mandatory counts of patients paid for by Medicare. Non-Medicare patients are also included in the database as dialysis facilities in the United States are required to complete a HCFA Medical Evidence Form on all incident patients since 1995. Several international renal registries function on the basis of voluntary submission of data. As a result data collection may be more limited. The largest European Registry of ESRD patients, the European Dialysis and Transplant Association (EDTA) Registry, has been in existence since 1964. It provides data on 36 countries of European and Mediterranean coastal regions. The percentage of patients included in the database varies from country to country and so there may be under-representation of patient subgroups. Although voluntary submission of data may not be the optimal method for data collection, nevertheless some renal registries have received a 100 percent response rate to facility and patient questionnaires. The Japanese Society of Dialysis Therapy report a 99.8 percent response rate to their 1994 survey whereas the European registry reports an overall response rate of 66 percent to a center questionnaire and 55 percent to a patient questionnaire in 1994 (Valderrabano 1996).

International comparisons of data on ESRD patients and renal replacement therapy may not be valid because of differences in acceptance to therapy,

Treated ESRD Incidence Rate for Selected Countries, 1986-1996

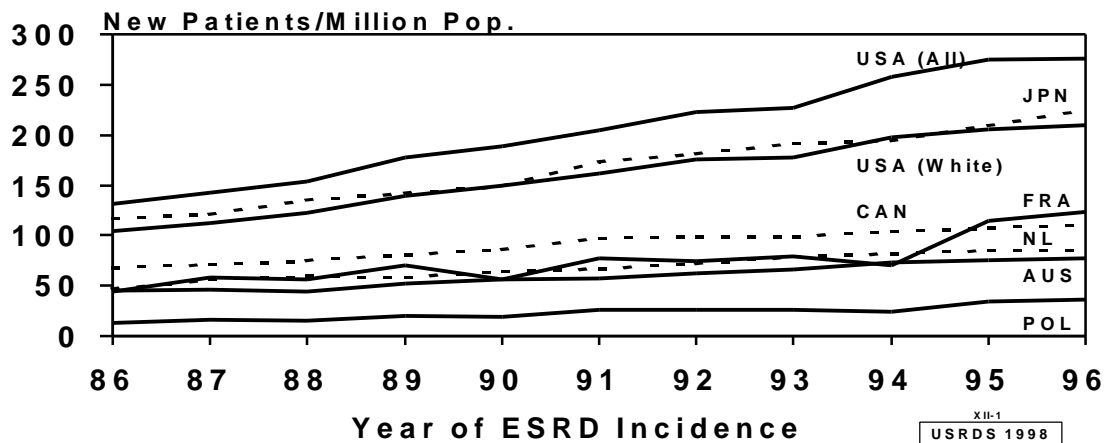


Figure XII-1

Treated ESRD incidence rates per million population (unadjusted) for Australia, Canada, selected European countries, Japan (dialysis patients only), and the United States (total and White patients only) for 1986-1996.

patient demographics, socioeconomic burdens and national healthcare legislature (Kjellstrand 1996). The access to different forms of renal replacement therapy, in addition to the quality and quantity provided, is in part dependent on the healthcare system of the country. Such variables cannot be adjusted for easily in most statistical analyses.

Data Source

The international data in this chapter are based on reports from the following renal registries; the Australian and New Zealand Dialysis and Transplant Registry (ANZDATA 1997), the Brazilian Dialysis and Transplant Registry (Noronha 1997), the Canadian Organ Replacement Registry (CORR 1997), the Chilean Dialysis Registry (Sociedad 1996), the Danish Dialysis and Transplant Registry (1997), the European Dialysis and Transplant Association (EDTA 1996) Registry, the Irish National Transplant Registry (1997), the Japanese Society of Dialysis Therapy (1996), the Netherlands Dialysis Registry (1996), the Polish Dialysis Registry (Rutkowski 1997), the Romanian Dialysis Registry (Ursea 1997) and the United States Renal Data System.

Incidence of Treated ESRD

The incidence of treated ESRD (counts of new patients per million population) continues to increase worldwide (Figure XII-1). The rates of newly treated ESRD vary from country to country, which may reflect differences in acceptance and referral patterns among countries. During 1996 the incidence rate was highest in the United States at 276 patients per million population. Japan and Germany have the next highest incidence rates. In all countries the number of new ESRD patients continues to climb annually, perhaps indicating greater acceptance of patients. In Poland the incidence rate of treated ESRD was low and is shown here as an example for rates in many developing countries. For better comparisons with European countries, the United States incidence rates are shown not only for the total but also for the White-only sub-population which is mostly of European descent. These rates are not adjusted for international differences in age distributions. An increase in international incidence rates of treated ESRD may reflect changes in acceptance to ESRD therapy, improved survival from other diseases (competing risk), and/or an increase in the incidence of renal disease.

A description of the fraction of incident ESRD patients whose cause of ESRD was diabetes serves to

Treated ESRD Prevalence Counts and Rates per Million Population for Selected Countries, 1996

Country	Code	Prevalence		Incidence	
		Counts (n)	Rate ¹	Counts (n)	Rate ¹
Japan ²	JPN	167,142	1,328	28,409	226
U.S.A.	USA	281,169	1,072	74,116	276
Italy	ITA	40,125	695	6,748	118
Germany	GER	55,762	683	12,524	153
France	FRA	36,620	634	7,109	123
Canada	CAN	18,920	628	3,293	110
Sweden	SWE	5,471	615	977	110
Austria	ÖST	4,787	590	1,102	136
Denmark	DEN	2,741	527	510	98
Netherlands	NL	7,910	511	1,332	84
Australia	AUS	9,280	507	1,405	77
New Zealand	NZ	1,757	482	285	78
Israel	ISR	2,265	412	742	135
Czech Republic	CZE	3,844	370	1,333	128
Chile	CHL	4,655	329	*	*
Poland	POL	5,650	146	1,407	37
Brazil ²	BRZ	29,984	179	*	*
Romania ³	ROM	1,301	57	459	20

¹ Patients per million population, no adjustments

² Dialysis Patients only

³ Data are for 1995

* Uncertain data

Table XII-1

emphasize two issues. First, the acceptance to ESRD therapy of sicker patients, and secondly, an indication of comorbid conditions among patients starting renal replacement therapy. Figure XII-2 shows the

percentage of new ESRD patients with diabetic nephropathy for selected countries. As the figure illustrates, there is a wide range from 4 percent to 42 percent.

Percent of Incident ESRD Patients with Diabetic Nephropathy for Selected Countries, 1996

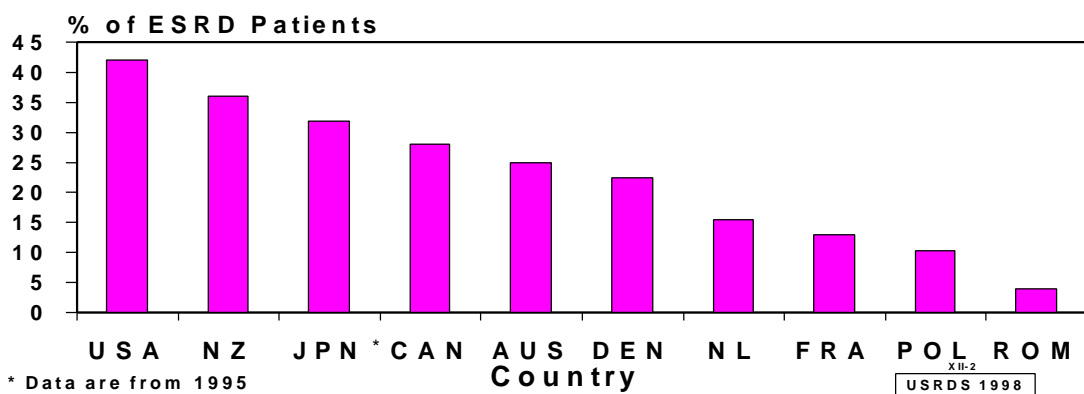


Figure XII-2

Percent of incident ESRD patients with diabetic nephropathy as a cause of ESRD for Australia, New Zealand, Canada, Japan, selected European countries, and the United States for 1996. (Data from Japan and Romania are from 1995.) See Table XII-1 for country codes.

Prevalence

The prevalence of ESRD is an indicator of the overall burden of disease on the health resources of a nation. Both incidence rates of disease and the survival rates (effectiveness of current available therapies) influence it. The point prevalence counts and rates of ESRD patients alive and registered on treatment as of December 31, 1996 are described for selected countries in Table XII-1. Japan records the highest prevalence rates during this period followed by the United States. Greater incidence rates of treated ESRD in the United States compared to Japan, in addition to a greater proportion of those treated with functioning renal allografts, would lead us to believe that the prevalence of disease in the United States should exceed that in Japan. That is not the case. This observation suggests a better survival among Japanese ESRD patients as has been reported in two previous studies (Held 1990; Held 1994). Interestingly in countries where incidence rates of treated ESRD are similar, in addition to patient demographics and transplant activity, a similar prevalence of ESRD is observed (Australia, New Zealand, Netherlands, and Denmark). Romania has the lowest prevalence of ESRD among selected countries reflecting its low treated ESRD incidence rate.

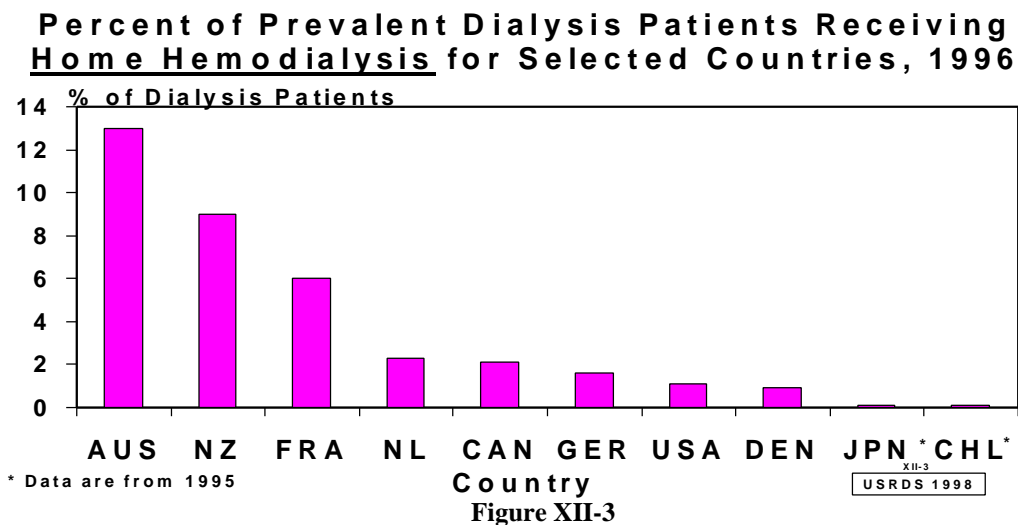
Dialysis Modalities

The optimal modality of renal replacement

therapy is the subject of some controversy with some favoring hemodialysis while others are the protagonists of peritoneal dialysis. Although many consider home hemodialysis the optimal treatment option, its use has been very low in recent years. Figure XII-3 shows the utilization of home hemodialysis among dialysis patients in selected countries. It demonstrates that there are large differences, ranging from 13 percent to less than 1 percent.

Over the last decade there has been a greater acceptance of peritoneal dialysis, particularly in New Zealand, Australia, Canada, and Denmark. Figure XII-4 illustrates the international differences in utilization of peritoneal dialysis as a treatment option as of December 31, 1996. In New Zealand, peritoneal dialysis remains the predominant mode of therapy in dialysis patients. While it remains a major form of renal replacement therapy in Canada and Australia, its acceptance in other countries, such as Japan and Germany, is less. National healthcare policies and geographic factors are likely determinants of its use in various countries.

Trends in the utilization of peritoneal dialysis have shown an overall increase from 1984 to 1994 as reported in the 1997 USRDS Annual Data Report. More recently, over the past 5 years, there has been only a modest increase in the fraction of prevalent dialysis patients using peritoneal dialysis among selected countries (Figure XII-5). Five of the nine selected countries demonstrate an increase in



Percentage of all prevalent dialysis patients being treated with home hemodialysis in Australia, New Zealand, Canada, Chile, Japan, selected European countries, and in the United States on December 31, 1996. (Data from Japan and Chile are from 1995.) See Table XII-1 for country codes.

Percent of Prevalent Dialysis Patients Receiving CAPD or CCPD for Selected Countries, 1996

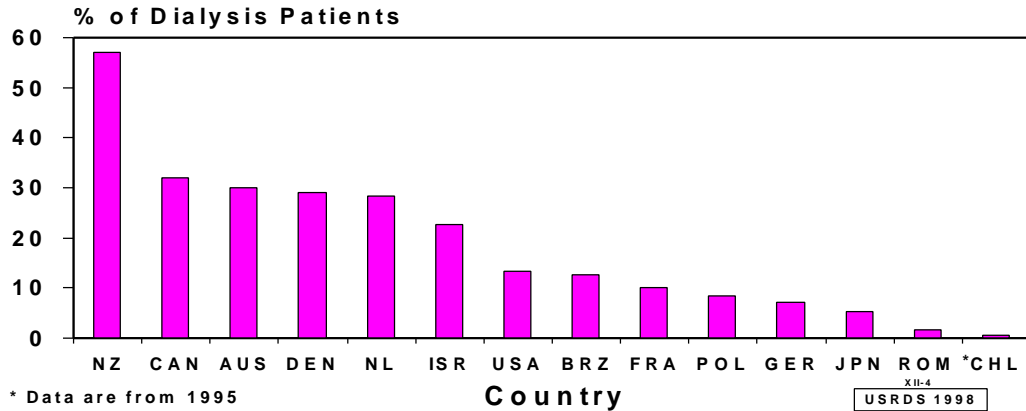


Figure XII-4

Percentage of all prevalent dialysis patients being treated with CAPD or CCPD in Australia, New Zealand, Canada, Japan, Brazil, Chile, selected European countries, and in the United States on December 31, 1996. (Data from Romania are from 1995.) See Table XII-1 for country codes.

peritoneal dialysis utilization. New Zealand and Poland have had the greatest increases. In Canada, France, Denmark and the United States a modest decline in the fraction of patients using peritoneal dialysis is observed. The increased availability of peritoneal dialysis as a form of renal replacement therapy in New Zealand is accompanied by a decline in the use of home hemodialysis. This trend is also

observed in other countries, as peritoneal dialysis becomes more available and home hemodialysis becomes less attractive (Figures XII-5 and XII-6). The international acceptance of peritoneal dialysis as a major form of renal replacement therapy suggests that peritoneal dialysis (with improved dialysis prescription) remains a good alternative to hemodialysis.

Change in Utilization of CAPD/CCPD for Selected Countries, 1991 versus 1996

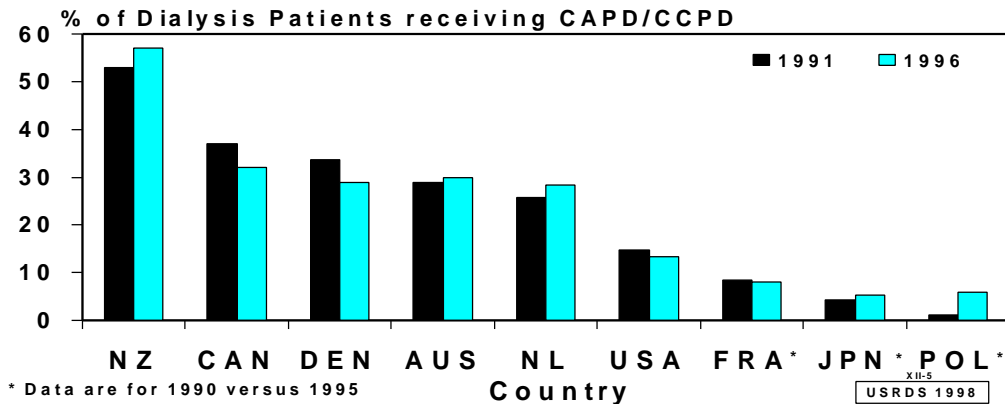


Figure XII-5

Percentage of total dialysis patients treated with CAPD or CCPD for Australia, New Zealand, Canada, Japan, selected European countries, and in the United States in 1991 and 1996. (Data from France, Japan, and Poland are from 1990 and 1995.) See Table XII-1 for country codes.

Change in Utilization of Home Hemodialysis for Selected Countries, 1991 versus 1996

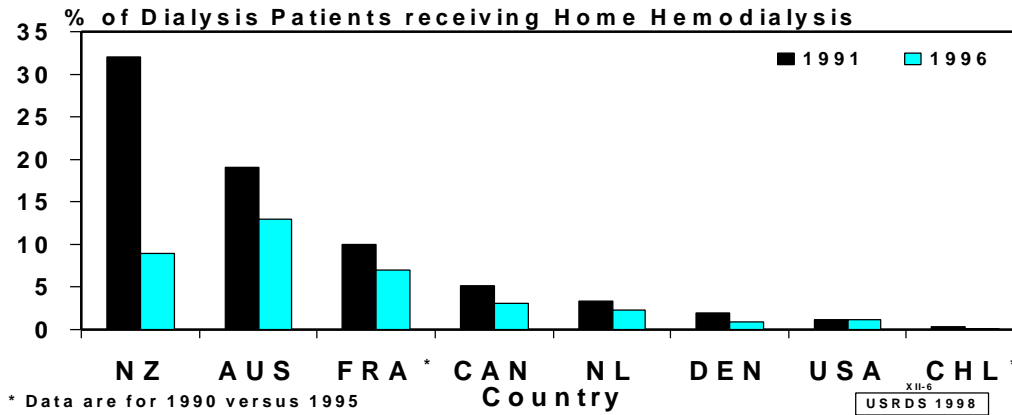


Figure XII-6

Percentage of total dialysis patients treated with home hemodialysis for Australia, New Zealand, Canada, Chile, selected European countries, and in the United States in 1991 and 1996 (Data from France and Chile are from 1990 and 1995.) See Table XII-1 for country codes.

Renal Transplantation

Kidney transplantation remains the most successful form of renal replacement therapy worldwide offering patients the greatest potential to return to a healthy productive life. Despite this, transplant rates vary worldwide and are dependent on cultural, legal, and socioeconomic factors. This report

uses the general population as the denominator for transplantation rates to allow better comparisons of the rates among countries that accept different proportions of older patients for ESRD treatment. Although there has been a trend towards transplanting older patients, only a small fraction is currently transplanted. If the count of prevalent ESRD patients was used as the denominator for the transplantation

Transplantation Rates for Selected Countries, 1996

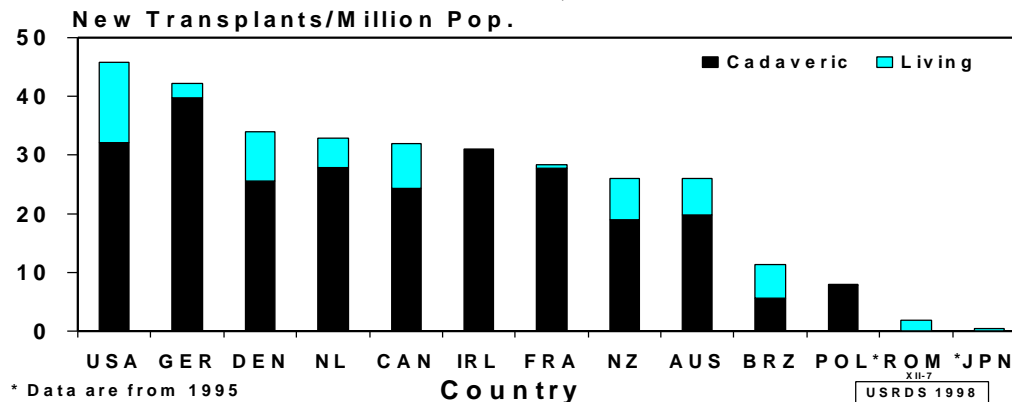


Figure XII-7

Transplantation rates (count of new renal transplants per million total population) in Australia, New Zealand, Canada, selected European countries, Japan, Brazil, and in the U.S. during 1996, by donor type (cadaveric or living donor). (Data from Poland and Romania are from 1995.) See Table XII-1 for country codes.

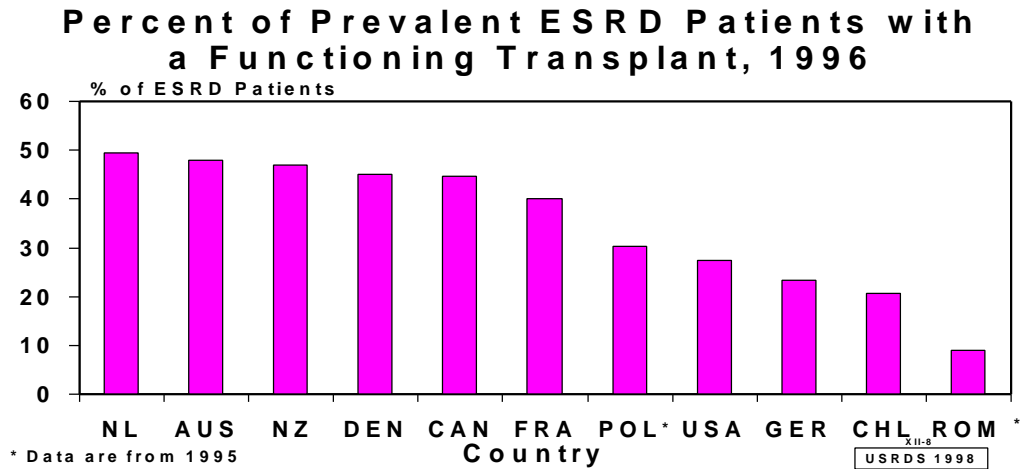


Figure XII-8

Percentage of prevalent ESRD patients with a functioning transplant for Australia, New Zealand, Canada, Japan, Chile, selected European countries, and the United States for 1996. (Data from Poland and Romania are from 1995.) See Table XII-1 for country codes.

rate, countries that accept higher proportions of older patients would have a lower rate. As of December 31, 1996, transplant activity was greatest in the United States with 46 new transplants per million population (Figure XII-7). Germany and Denmark had the next highest transplantation rates. Renal transplantation rates were lowest in Japan, which is likely a reflection of religious and cultural attitudes.

Cadaveric transplantation rates were highest in Germany and the United States. Ireland's high rate of transplantation is remarkable as there is virtually no living donor transplantation.

Living donor transplantation continues to account for a lesser fraction of the total transplant activity in most of the selected countries. However, there are exceptions to the rule. Japan and Romania rely

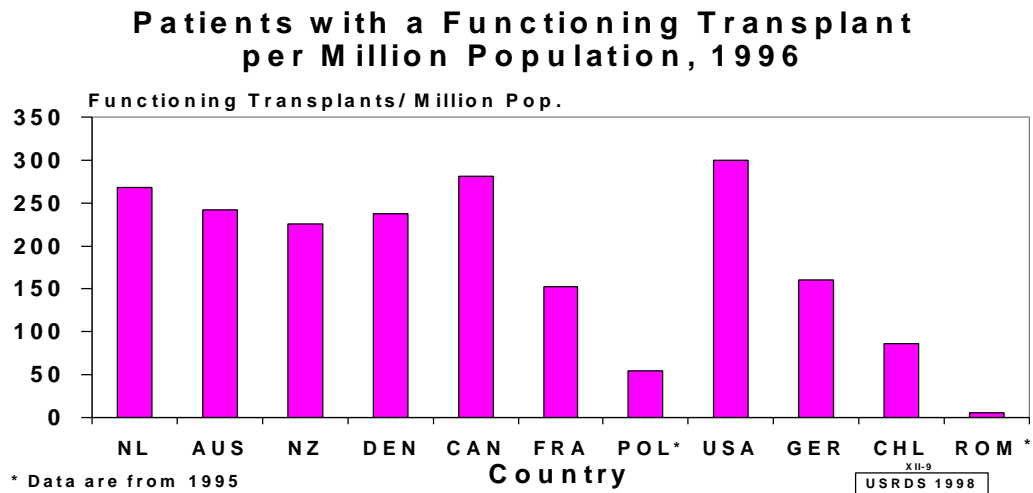


Figure XII-9

Patients with a functioning transplant per million population in Australia, New Zealand, Canada, selected European countries, and the United States for 1996. (Data from Poland and Romania are from 1995.) See Table XII-1 for country codes.

extensively on living donors for renal transplantation.

may also be a contributory factor.

Utilization of Transplantation

The percent of ESRD patients with functioning grafts on December 31, 1996 are shown in Figure XII-8. This percentage is dependent not only on successful transplant activity over previous years (giving rise to a large numerator) but also on the size of the prevalent dialysis population. Thus in countries where elderly patients make up a sizable proportion of the dialysis population, the percentage of functioning grafts may appear spuriously low. To allow for better international comparisons an analysis using the general population as the denominator is also included (Figure XII-9). The percentage of ESRD patients with a functioning allograft is between 45 and 50 percent amongst most industrialized countries, although in the United States and Germany much lower percentages are observed. There is a noticeable change in the rank order when the general population is used as the denominator. In this case, the United States and Canada lead the group with the greatest number of functioning transplants per million population. The prevalence of functioning transplants is similar in most other selected countries, although lower prevalence rates are observed in some countries. Lower transplantation rates may account for some of these differences. In addition an undercount of long term survivors in some countries

Trends in the Utilization of Renal Transplantation

As renal transplantation offers the best form of renal replacement therapy for patients with ESRD, it is desirable that a growth in this area continues world-wide. Figure XII-10 illustrates the changes in transplant rates (number of transplants per million population) for selected countries between 1992 and 1996. In some, notably the United States, Germany, and Canada, there has been an overall increase in transplantation rates. In Ireland and Poland the rate of transplant activity has remained stable. However in Japan, where living donor transplantation predominates, transplant activity during 1996 was much lower than during 1992. Such disparity in international transplant rates reflects differences in national efforts at promoting transplantation as well as cultural and socioeconomic factors.

International Survival Comparisons

Since large differences exist among countries in the utilization of treatment modalities and in the acceptance of patients, particularly for diabetics and older age groups, it is difficult to interpret observed differences in mortality rates (Kjellstrand 1994). Such

Trends in the Utilization of Transplantation for Selected Countries, 1992 versus 1996

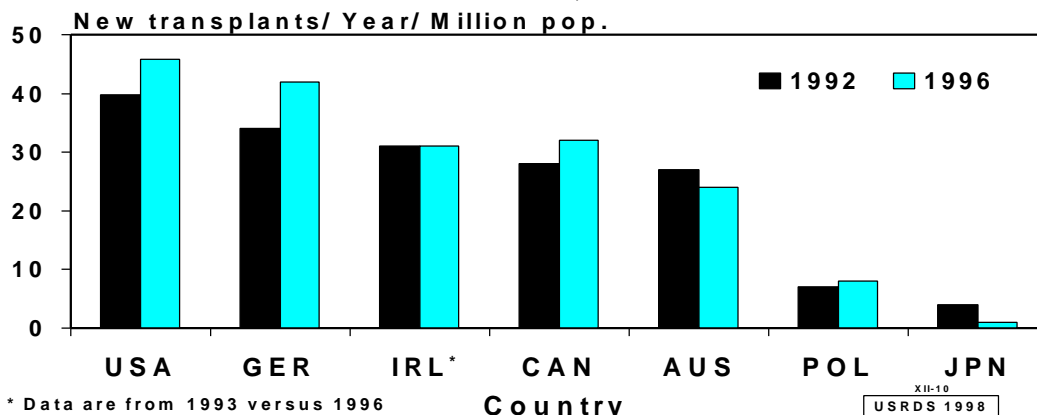


Figure XII-10

New transplants per year per million population for Australia, Canada, Japan, selected European countries, and in the United States for 1992 and 1996. (Data from Ireland are for 1993 and 1996.) See Table XII-1 for country codes.

survival analyses among countries must be approached with caution. Valid comparisons of data in national registries should only be attempted where adequate data collection methods exist and the accuracy of such information gathered can be attested. In addition reasonable international comparisons should be carried out with an understanding of patient demographics and the proportion represented in the database. To overcome the problem of differences in transplantation rates some studies have focused on the survival comparisons for all ESRD (combining dialysis and transplant) patients (Held 1990), while others have analyzed results for dialysis patients as well as for all ESRD patients (Held 1992). It is possible to attempt to adjust statistically for differences in patient characteristics and comorbid conditions. Such a study was carried out comparing patient survival among patients with treated ESRD at the USRDS and the Lombardy Dialysis and Transplant Registry (Marcelli 1996).

Future international comparative studies of survival will require a similar multivariate analysis with appropriate adjustment for differences in patient demographics, known risk factors and comorbid conditions. The accuracy of such adjustment is dependent on the quality and the uniformity of the data collected. There is increasing information regarding the data that are required in order to predict mortality among dialysis patients (Wolfe 1995). Future studies of this type will mandate prospective data collection among collaborating registries.

Important insights have already been gained from international comparisons of different health care systems (Held 1990, Nissenson 1993) and health care delivery (Held 1992). The current trends in ESRD growth worldwide and requirements for improved delivery of renal replacement therapy necessitate an ongoing commitment to outcomes analysis. The quantity and quality of care provided may be enhanced by future international comparisons.

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