ESRD – Differences in Treatment – A World-wide Overview – Update 2004

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End-stage renal disease (ESRD) is one of the steadily growing diseases around the world. For the patient, renal replacement therapy (RRT) with either kidney transplant or different treatment modalities of dialysis therapy is the only possibility to survive. While in 1996 approx. 1.000.000 patients received RRT and approx. 200.000 new patients started RRT(1), in end of 2001 more than 1.500.000 patients can be estimated to be on RRT world-wide (2) (Table 1).

International comparisons

International comparisons allow displaying the epidemiological data and the status of renal replacement therapy (RRT), its incidence and prevalence rates of several countries at a certain date or time period. This allows better interpretation and understanding of data and publications from other countries, but also allows an estimation of worldwide burden of the disease...

Unfortunately international comparisons do also have its drawbacks in validity as registration of ESRD and its modality of RRT is not mandatory in most of the countries. Data collection and interpretation is not standardized(1;3).

The validity and possibility to compare the international data is mainly influenced by:

- The existence of national renal registry
- Mandatory or voluntary data submission to the respective national registry
- Response rates of the dialysis facilities to the national registries.
- The inclusion criteria for treated patients are not standardized
- There is no consistency of data which are reported from the various sources for the same country

The reported data do not really display the current burden of the disease. We only see how the ESRD and RRT has been in the past. (in the first quarter of 2004 only data of the years 1999 to 2001 are available). Best response rates are obtained from the US (USRDS) with its mandatory system, but also Japan (JSDT), Canada (CORR) and Australia and New Zealand (ANZDATA) and Germany (Quasi-Niere) do have excellent voluntary reporting systems with response rates > 90%. Still good response rates are obtained from the European organisation (EDTA), some Asian Pacific countries and Latin America (SLANH). Unfortunately no good data are collected from other large population countries like China, India, Russia and other developing

countries. Here only estimation can be made. But it has to be mentioned that reporting of ESRD data became better in the past years and more data are available now. Part of this success is the constant work of the International Federation of Renal Registries (IFFR), the International Society of Nephrology (ISN), International Federation Kidney Foundations (IFKF), but also many other organisations.

Table 1 shows an estimate of the burden of ESRD patients around the World in 2001 by regions with largest prevalence rates in Japan, North America and the European Union. These data have been gathered by Moeller in 2002 from a survey in 120 countries(2).

			ESRD		Dialysis (HD&PD)	
Region	**Population (million)**	**GDP per capita (US$)**	**Patients (000)**	**Prevalence (pmp)**	**Patients (000)**	**Prevalence (pmp)**
European Union	380	21 700	298	790	196	520
Total Europe	804	12 000	393	490	269	330
Middle East	271	3 200	40	150	29	110
Africa	833	1 000	46	55	43	50
Latin America	512	3 800	156	310	131	260
Asia (excluding Japan)	3 316	1 100	177	55	146	45
Japan	127	37 600	232	1 830	220	1 730
North America	311	29 500	436	1 400	304	980
Global	**6 190**	**5 400**	**1 479**	**240**	**1 141**	**185**

Table 1. *Global and regional overview of ESRD patients at year-end 2001 (reproduced from Moeller 2002(2))*
[a] Includes only patients in countries considered in the study.
(GDP = Gross Domestic Product, pmp =per million population))

A prognosis on the future of progression of ESRD has been made by Moeller (2) and Woods(4). It can be expected that in 2005 approx. 2 Million and in 2010 approx 2,5 Million patients undergo RRT. The Asia–Pacific area its their large population and other developing countries will catch up and exceed the number of treated ESRD patients with the rest of the world until 2015(2;4).

Underlying disease:

There are large differences in the reported underlying disease which leads to the terminal renal insufficiency. While diabetes is the most common cause in the United States, glumerulonephritis was the primary cause in other registered patients. This might be caused by differences in life-style and nutrition.

Table 2 shows the most common diseases in 1996 in selected renal registries.

	Selected diseases / Registry	**USRDS (USA)**	**CORR (Canada)**	**ANZDATA (AUS / NZ)**	**JSDT (Japan)**
Incidence	Diabetes	**42%**	29%	19%	34%
	Hypertension	**26%**	10%	10%	7%
	Glomerulonephritis	11%	16%	**35%**	**38%**
Point-Prevalence	Diabetes	**32%**	23%	**30%**	22%
	Hypertension	**25%**	9%	12%	4%
	Glomerulonephritis	18%	20%	22%	**54%**

Table 2. *The most common diseases responsible for ESRD in selected renal registries in 1996 (1)*

When looking at recent data an increasing number of incident diabetic ESRD patients is noted around the world. Compared to Table 2 diabetic nephropathy raised in within 5 years as cause of ESRD to 45 % in the US, to 32% in Canada, to 30% in AUS/NZ and to 38% in Japan (2001/2002 data). This trend is the same in most countries worldwide(5-8).

Incidence:

The mean annual increase of ESRD is between 3 and 13% in the various countries with the highest reported incidence rates in the US with 336 per-million population (pmp), Taiwan (331 pmp), Quatar (272 pmp) and Japan (252 pmp)(6). The highest incidence rates in Western Europe are reported from Germany (184 pmp), Tschech Republic (163 pmp), Belgium (160 pmp), Spain (132 pmp) and Greece (151 pmp)(5;9). But also the Baltic countries report a relatively high ESRD incidence prevalence rates (172-213 pmp)(10). It has to be noted that there is a bias in the registration of the ESRD due to various factors; especially those patients who are not treated are not taken in account, so these figures do not represent the real occurrence of the disease.

Prevalence:

The ESRD prevalence rate shows the burden of the disease in the respective country. Highest prevalence rates are reported from Japan with more than 1.700 pmp, second and third from Taiwan (1.423 pmp) and the US (1.403pmp)(6;11). Countries like Qatar, Brunei or Puerto Rico report also such high prevalence rates as 1.111, 1.066 or 954 pmp (6;12). The highest prevalence rates in Europe are in Germany (919 pmp) followed by Belgium (891 pmp), Spain (848 pmp), Austria (799pmp), Italy (791 pmp), Greece (770 pmp)(5;9), but also France (760 pmp). Converted to the actual population 70 % of all ESRD patients in Europe (approx. 400.000 in 2001) are treated in the 5 countries Germany, Italy, Spain, France and UK.

RR Treatment modalities:

Worldwide haemodialysis represents the RR treatment option of choice with 69%, while 23% of the patients have received a transplant, but only 8% of the patient undergo peritoneal dialysis(2). (Figure 1)

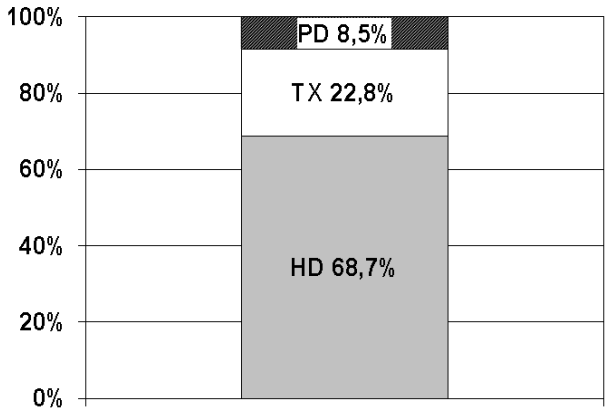

***Fig 1**. Treatment modalities of ESRD worldwide 2001*
(HD- Haemodialysis, TX – Transplants , PD – Peritoneal Dialysis) reproduced from (2)

There are large differences in treatment modalities between the countries. While in Japan, Israel and other mainly developing countries in the Middle and Far East there are very low kidney transplant rates, we can find a very high transplant prevalence in Northern European (DEN, SWE, NOR, ICE) with 55 to 75% and Commonwealth countries (UK, NZ, AUS) but also in the Netherlands (50%), Belgium (43%) or Spain (42%)(6;9;12;13). In France approx. 40% (6) of all ESRD patients are transplanted. Kidney donor sources are also widely variable depending on legal, ethical and religious considerations in different countries(14). Peritoneal dialysis does not play a large role (far below 10%) in most of the countries as treatment option except in HKG (64%), MEX (56%) and NZ (29%) and in some other countries like UK (16%), AUS (14%), NL (14%), CAN (13%).

In most countries haemodialysis is the treatment option of choice. The by far two largest haemodialysis populations are the USA (n=288.000) and Japan (n=220.000)(2). Next largest population is Germany with "only" 57.000 patients(5).

In order to maintain haemodialysis a constant access, a AV-fistula, vascular grafts shunt or a CV-catheter has to be created and maintained. The DOPPS data did give an excellent overview which kind of access is used in the large HD-populations(15).

The AV-fistula is prevalent in Europe with 81% and in Japan with 93%, but in the USA only with 24%. An overview of the other two access options "Vascular graft" and "CV-catheter" shows also great differences with highlights of 22% CV-catheters in UK and 17% in the USA(15). By far the highest number of vascular grafts (58%) is used in the USA for access resulting in almost 168.000 patients who are currently dialysed via a vascular graft.

Conclusions:

- ESRD is a steadily increasing disease around the world, with great differences in the underlying disease.
- Diabetic nephropathy increases all over the world.
- Incidence and prevalence rates, but also treatment modalities differ around the world due to various reasons.
- It very is important to set up mandatory RRT registers and other sources to get better and timelier information on the disease.
- It is very important to find solutions together with the health care institutions and politicians in the various countries to establish ESRD-support, -educational and -research programs.
- It is important to held national and international congresses on ESRD to exchange experiences regarding the different treatment modalities.
- To give best possible RRT to the patient a constant development of dialysis therapy and kidney donor- and transplant programs are necessary.

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