ANNUAL REPORT 2000

The
Norwegian Renal Registry

(Norsk Nefrologiregister)

This report will also be available on:
http://www.frick.ws/Nyreforening/Uremiregisteret/2000.html

Correspondence to:
Overlege dr.med Torbjørn Leivestad
Institute of Immunology, Rikshospitalet, N-0027 Oslo, Norway.
Fax: 47- 23 07 35 10. Tel: 47- 23 07 13 78.

Preface

The Norwegian Renal Registry (Norsk Nefrologiregister) was formally constituted in 1994 as collaboration between The Norwegian Renal Association (Norsk Nyremedisinsk Forening) and Rikshospitalet University Hospital, with the latter as the formal owner. National data on renal replacement therapy (RRT) had been collected within The Renal Association since 1980 in a less formalised manner, and the transplant centre had data on transplanted patients since the sixties. Further, Norwegian renal units had reported to the ERA/EDTA-registry since the late sixties.
According to its statutes, The Norwegian Renal Registry shall combine the handling of data for all these purposes. It shall present national statistical reports and form a basis for research. Reports for 1995 and 1996 (in Norwegian) and 1997, 1998 and 1999 (in English) have been distributed, the latter three have also been made available on Internet.

National organisation and policy

Norway has 4.5 mill. inhabitants (Oct. 2000) and 19 counties with populations ranging from 74000 to 509000. Each county, except one, has a central renal unit and some have additional unit(s) run in close contact with the central unit. There is only one transplant centre (two during 1963-83). Pre-transplant work-up, as well as post-transplant follow-up beyond 3 months, is handled by the county-centres.
Transplantation has always been considered the treatment of choice, if possible with a living related donor. Since 1984, also spouse donors have been used. Acceptance criteria for transplantation have been wide, strict age limits have not been applied. Over time, an increasing number of non-transplantable patients have also been offered life-long dialysis.

Incidence and prevalence calculations in this report are based on the national population data from Oct. 2000, although this in some instances may be slightly misleading since population changes have not been uniform in all counties during the period.

Incidence figures for 2000

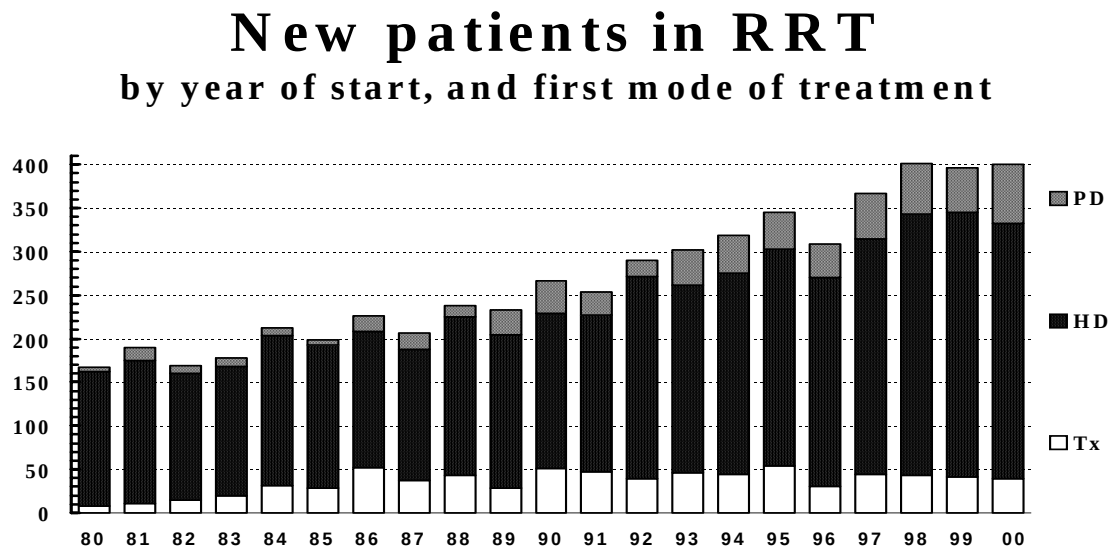
During 2000 a total of 400 new patients (in 1999: 396) entered renal replacement therapy (RRT), i.e. 88.9 per mill. inhabitants.
A majority of 66.0% were males and 34.0% females. Median age at start was 65.2 years, mean 61.5 years, ranging from 9 years to 88 years.

Tabulated by first mode of treatment, and age at start of treatment:

	< 15	15-24	25-34	35-44	45-54	55-64	65-74	75+	Total	in %
HD	2	7	9	18	38	55	94	70	293	73.3
PD	0	1	3	10	8	12	22	12	68	17.0
TX	3	1	1	9	12	8	4	1	39	9.8
Total	5	9	13	37	58	75	120	83	400	100
in %	1.3	2.3	3.3	9.3	14.5	18.8	30.0	20.8	100	

At start of treatment, 271 (67.8%) were considered by their nephrologist to be a potential candidate for transplantation, while 129 (32.3%) were accepted for life-long dialysis (constituting 39% of those starting with HD and 22% of those starting PD).
Among patients starting dialysis in 2000, 22% were previously unknown to the renal unit when they presented with terminal renal failure, 56% were known and started RRT as planned, while 22% were known but had a hastened RRT-start.

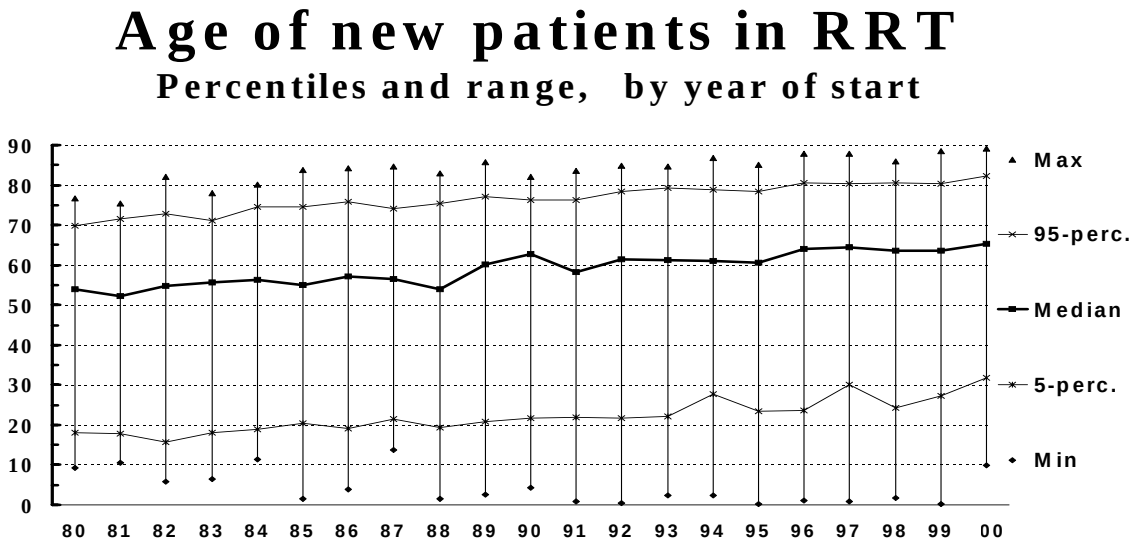
Incidence data: Changes 1980-2000



TL 07 /01

The figure may indicate that the incidence now is levelling off, during the nineties the mean yearly increase was approximately 6%.

Incidence data: Age at start



TL 07 /01

Since registration started in 1980 there has been a continuous shift in patient age. Both the maximum and the median age at start of RRT have increased. Also the 5-percentile and 95-percentile values (i.e. including the majority of patients) have increased with a similar number of years. At the same time, it appears that even younger children have been included. The number of children below 15 years has not changed during the period - it has ranged from two to eight per year.

Incidence data: Primary renal disease

	1980-84	1985-89	1990-94	1995-99	2000
Glomerulonephritis	34%	36%	31%	24%	19%
Pyelo/interstitial nephr.	16%	14%	11%	12%	11%
Polycystic diseases	10%	9%	9%	9%	8%
Diabetic nephropathy	13%	12%	12%	11%	15%
Amyloidosis	7%	6%	6%	4%	4%
Vascular/hypertensive	5%	8%	18%	24%	26%
Immune/systemic	4%	5%	4%	6%	4%
Kidney tumour	1%	1%	1%	1%	2%
Myelomatosis	3%	2%	1%	2%	4%
Other defined	4%	4%	4%	3%	2%
Unknown	3%	3%	3%	4%	6%
N:	912	1106	1419	1817	400

The main change over time has been an increase of vascular/hypertensive nephropathy and a relative reduction of glomerulonephritis and pyelonephritis/interstitial nephritis. Whether this only reflects changed coding practice or a true shift is not known.

Diabetic nephropathy has contributed 10-15% per year. Until 1995 sub-classification was not reliably registered. In 2000, 27 were registered as having Type I, 33 as Type II diabetes. In addition 27 patients with other types of primary renal disease were recorded having diabetes as a co-morbid factor (all were Type II), thus 22% of new patients were diabetics.

Cardiovascular disease is often present at start of RRT. Symptomatic heart disease was reported in 142; two out of these had a previous heart transplant. One had a lung transplant. Cerebrovascular disease was reported in 43 and peripheral arteriosclerotic disease in 56 patients.

Prevalence data: Status by 31.dec. 2000.

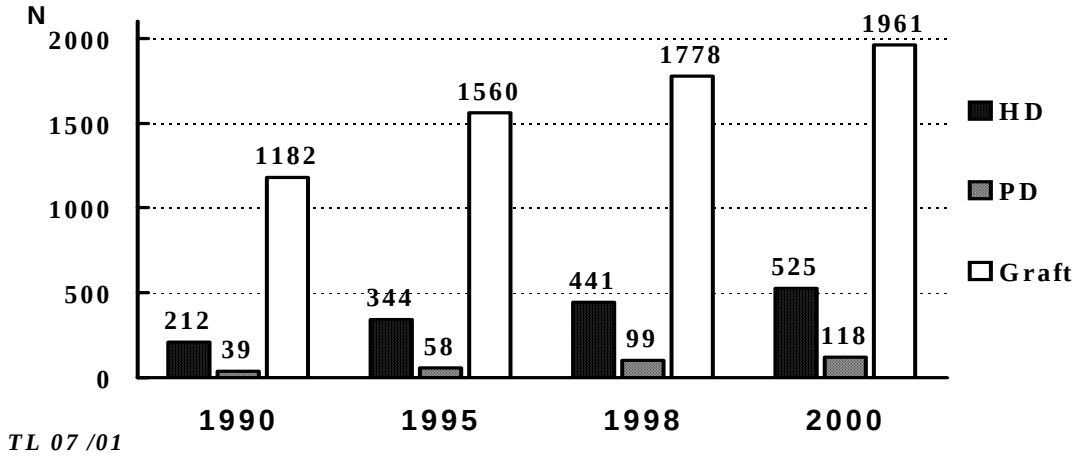
By the end of 2000, 2604 patients in Norway received renal replacement therapy, i.e. 578.7 per million inhabitants. This represents an increase of 139 patients or 5.6% since 1999.
Gender: 63.8% males and 36.2% females.
Median age by the end of the year was 54.8 years, mean 54.1 years and range 1.7-89.7 years.

Tabulated by last mode of treatment, and age by end of 2000:

	< 15	15-24	25-34	35-44	45-54	55-64	65-74	75+	Total	in %
HD	1	10	22	40	70	89	155	138	525	20.2
PD	0	0	7	12	20	23	28	28	118	4.5
TX	27	72	215	344	478	421	305	99	1961	75.3
Total	28	82	244	396	568	533	488	265	2604	100
In %	1.1	3.1	9.4	15.2	21.8	20.4	18.7	10.2	100	

Renal replacement therapy in Norway

Prevalence of treatment modes in 1990, -95, -98 and 2000.



Patient survival on RRT:

Patient survival as of June 2001 has been calculated by Kaplan-Meier method for all patients starting RRT in the period 1980-99. The observed one-, five-, and ten-year survival on RRT are given in the table. Further, the time until half of the patients have died ("half-life") has been noted, or extrapolated based on a semi-logarithmic survival curve plot (marked by *).

1: Survival by epoch:

Year of start	N	Mean age	1 year	5 years	10 years	"Half-life"
1980-99 **(all)**	5633	55.9 y.	75.1 %	49.3 %	35.5 %	58 months
1980-84	912	50.3 y.	73.2 %	46.2 %	32.6 %	48 months
1985-89	1106	52.9 y.	76.4 %	53.8 %	39.6 %	72 months
1990-94	1418	56.3 y.	75.5 %	50.0 %	37.3 %	60 months
1995-99	1817	59.1 y.	75.7%	49.3%		56 months

2: Survival by diagnosis group:

	N	Mean age	1 year	5 years	10 years	"Half-life"
Glomerulonephritis	1661	54.1 y.	83.8%	61.3%	45.6%	95 months
Pyelo/interstit. Nephr.	737	53.7 y.	77.5%	54.6%	42.8%	82 months
Polycystic diseases	522	52.4 y.	90.4%	72.7%	55.7%	141 months
Diabetic nephropathy	683	50.2 y.	71.8%	44.3%	29.7%	45 months
Amyloidosis	293	57.2 y.	58.6%	31.7%	19.6%	18 months
Vascular/hypertensive	925	67.8 y.	68.2%	29.2%	15.3%	25 months
Immunol./systemic	274	47.2 y.	76.5%	54.8%	47.0%	90 months
Kidney tumour	66	62.4 y.	64.8%	23.4%		19 months

3: Survival by initial evaluation and subsequent transplantation:

For patients starting treatment during 1990-99, both the patient evaluation and the treatment protocols have been relatively stable. For this cohort, we have compared the survival for those evaluated not to be transplant candidates with the potential candidates, and further divided the latter group according to whether they have actually received a graft (by July 2001) or not:

	N	Mean age	1 year	5 years	10 years	"Half-life"
Not Tx-candidate	806	72.8 y.	47.3%	6.9%		11 months
Potential Tx-candidate	2429	52.9 y.	84.9%	63.3%	47.7%	108 months
Tx-candidate, no Tx.	744	62.5 y.	56.8%	10.1%		15 months
Tx-candidate, transplanted	1685	48.7 y.	97.3%	84.4%	64.4%	* 16 years

As appears, patients not evaluated to be transplant candidates are generally older. It also seems that among the potential candidates, the likelihood to actually be grafted is higher in the younger group. We therefore repeated the calculation separately for those above and those below 65 years of age at start of RRT:

Tx-candidate	Transplanted	Age	N	1 year	5 years	10 years	"Half-life"
No		> 65 y.	696	48.3%	7.5%		11 months
Yes	No	> 65 y.	407	57.8%	9.2%		15 months
Yes	Yes	> 65 y.	323	94.1%	59.8%	22.0%	71 months
No		< 65 y.	110	41.8%	3.8%		9 months
Yes	No	< 65 y.	337	55.7%	10.9%		15 months
Yes	Yes	< 65 y.	1362	98.1%	90.2%	74.1%	* 22 years

Patients not considered being transplant candidates have a limited survival, seemingly even more limited in those below 65 years. The latter group probably includes more patients with severe complicating conditions. Patients considered potential candidates, but not transplanted will represent a negatively selected group. This group will mainly include those not transplanted due to early death of the patient or where complicating conditions are discovered or develop during RRT. With the high transplantation activity in Norway, a valid evaluation of survival in dialysis is impossible.

Death in RRT in 2000:

A total of 255 patients in renal replacement therapy died during 2000, i.e. 8.9% out of the 2864 persons at risk. Among these, 65% were males and 35% females. Median age at death was 71 years, mean 68.8 years, and the range 16-90 years. Median time from start of RRT until death was 24 months, with a range spanning from six days to 34 years.

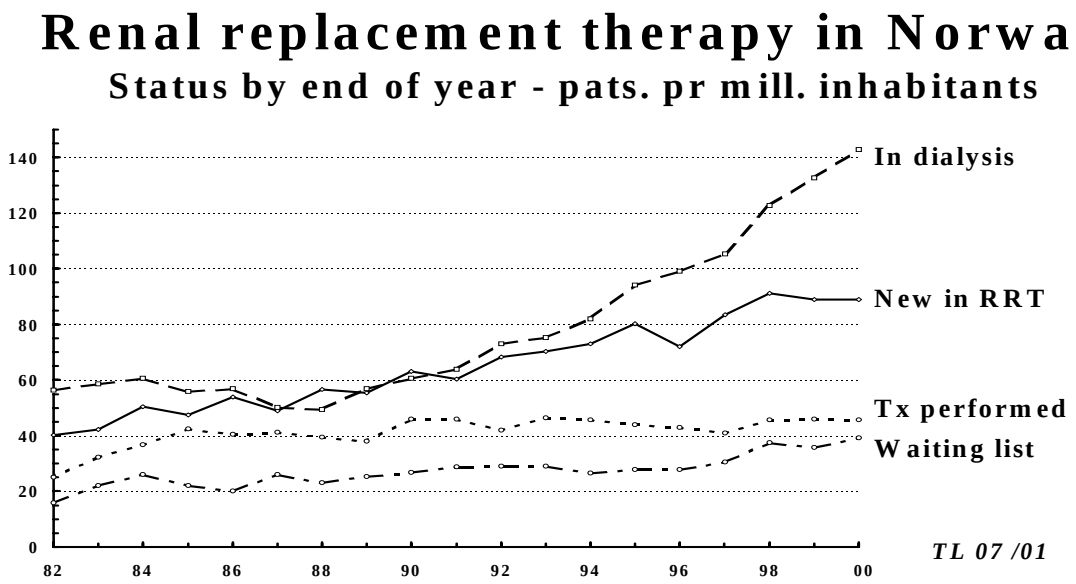
The final mode of treatment was HD for 169 patients and PD for 18, while 68 died with a more or less well-functioning graft. Four died within two months after graft loss; thus 72 deaths were termed 'TX-related'. 35 patients died following termination of treatment, five of those because the patient refused further treatment.

As in previous years, cardiac (34%) complications were the most frequent causes of death, followed by vascular complications (20%), infections (14%), and malignant tumours (13%).

Transplantation and waiting lists:

A total of 206 renal transplants were performed at Rikshospitalet University Hospital in 2000, i.e. 45.8 per million inhabitants. In 77 (37.4%) the graft came from a living related or spouse donor, 23 of the LD-graft recipients were grafted pre-emptively and 4 received a second graft after rejection of the first without new dialysis. 129 patients received a cadaveric graft, 17 were pre-emptively transplanted, while 3 had a second graft without entering dialysis. There were 177 first grafts (67 LD and 110 CD), 24 were second grafts (10 LD) and 5 third grafts.

By end 2000, 177 patients (39.3 per mill.) were on the active waiting list for a necro-kidney. This represented an increase of 16 patients (10%) since 1999. Among those waiting by Dec.31, median time on the list was 9 months. 36% had waited less than 6 months, 63% less than one year and 89% less than two years. The 129 recipients given a necro-kidney in 2000 had a median waiting time of 10 months and a maximum of 43 months at the time of grafting. Among the 643 patients in dialysis treatment by Dec.31, 259 (40%) were for various reasons not considered candidates for a new renal graft.



Patient status and treatment.

By the end of each year the registry distributes a patient questionnaire asking for patient status and actual treatment as well as complications during the treatment year. Data are requested for all dialysis patients starting RRT before Dec.1 and for all transplanted patients with more than 4 months observation since their latest transplant.
By now, the response rate for dialysis patients is 94% and for transplanted patients 95%. (One centre accounting for 75% of the missing reports).

Rehabilitation status: Five main groups have been defined:

	Working	Able to work	Self-caring	Need of assist	Need for care
Dialysis	9%	34%	37%	14%	6%
Transplant	50%	19%	26%	4%	1%

Blood pressure: Hypertension is a problem, both in dialysis and after transplantation. 75% of dialysis patients and 74% of the transplanted use one or more antihypertensive drugs (diuretics not included). The table shows blood pressure (BP) groups and the most widely used drugs:

	Dialysis	Transplanted
BP > 140/90	55%	32%
BP >130/80 and ≤ 140/90	21%	35%
BP ≤ 130/80	24%	33%
Beta-blocker	45%	32%
Calcium-blocker	40%	43%
ACE-inhib./AT-blocker	31%	35%

Erythropoietin (EPO): 90% of dialysis patients and 4% of transplanted patients use EPO.
D-vitamin: 72% of dialysis patients and 13% of transplanted use active vitamin D_3.

Statin: 34% of dialysis patients and 51% of transplanted patients either use a statin or participate in a double blind study ("Alert").

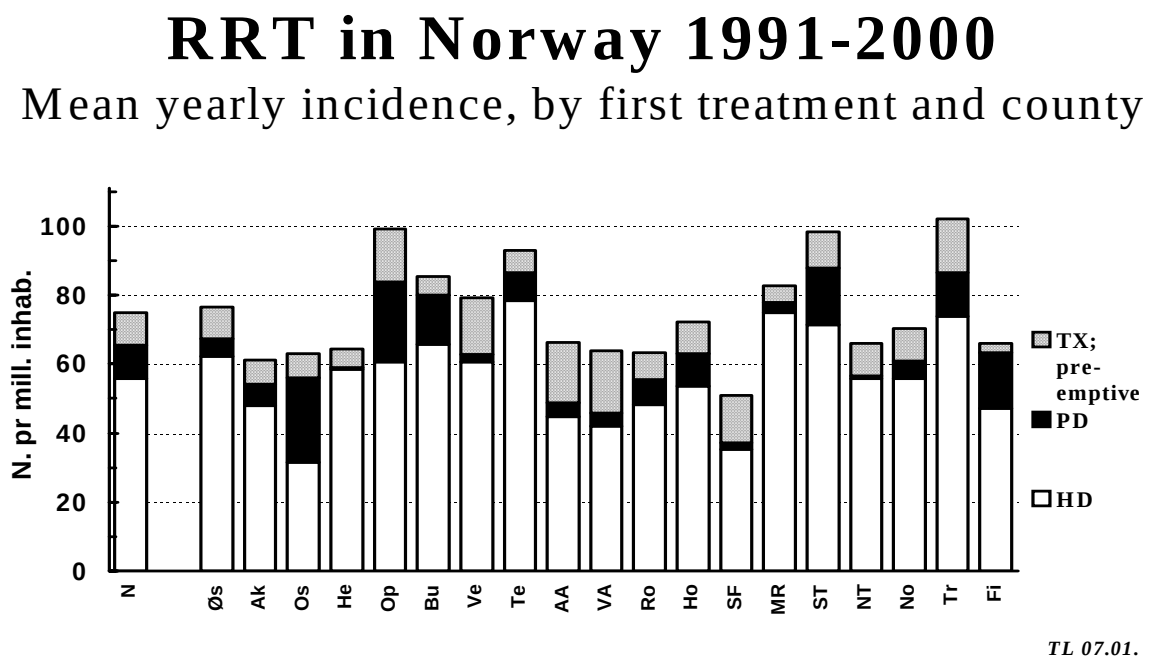
Immunosuppressive drugs: Until 1983 azathioprine with predisolone was standard therapy after transplantation. Since then, ciclosporine and prednisolone, most often combined with azathioprine, has been standard. During the later years mycophenolate and tacrolimus and also rapamycin have been used. Based on the 2000-reports, 84% use ciclosporine, 7% use tacrolimus, 65% use azathioprine, 12% mycophenolate and 1% rapamycin. 99% of transplanted patient use predisolone. Among those using a calcineurin-inhibitor only half have reached the daily prednisolone-dose of 5mg (or less) recommended for patients with stable function. In some few it has been deliberately withdrawn.

Graft function: Grouped by serum creatinine concentration, 19% have a value below 100μmol/L, 49% in the range 101-150, 21% 151-200, 6% 201-250 and 5% above 250. Serum creatinine below 125 (upper normal male value) was found in 44% of calcineurin-inhibitor users and in 68% of those without. The latter group mainly consists of patients transplanted before ciclosporine, and with a high proportion of HLA-identical sibling graft recipients.
For 7% of patients a diagnosis of chronic rejection has been made, in 72% of these this diagnosis has been verified by biopsy.

Dialysis treatment: Most HD patients (74%) receive 3 treatment sessions per week, 24% receive 2 sessions and 2% receive 4. 23% are treated for 15 or more hours/week, and 26% for less than 10 hours. KT/V would be a better indicator of dialysis adequacy; collection of this awaits a better standardisation.
Of PD patients, 31% use APD, none use IPD. Some 4% get additional HD, but are categorised as PD-patients. 19% of PD-patients are noted to have had one or more peritonitis episodes during 2000.

Regional differences within Norway

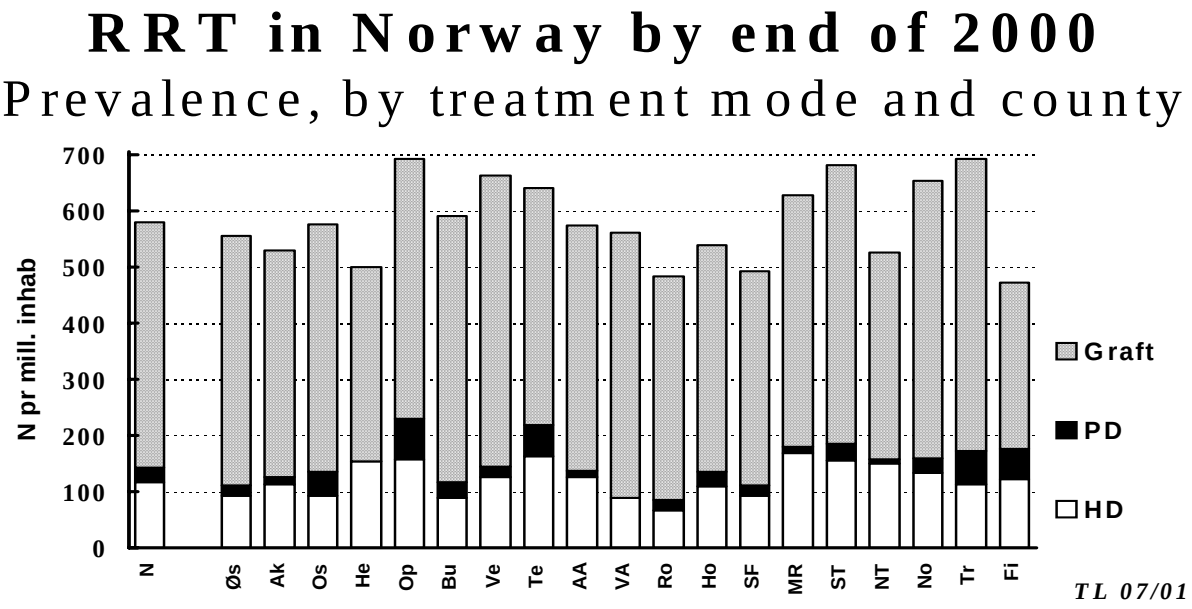
Incidence:
During all the years since data collection was started, the number of patients reported has differed substantially between centres, also after correction for population size. Further the first mode of treatment (HD, PD or pre-emptive transplant) for new patients varies considerably. In the following figure, patients were grouped by county of domicile at RRT-start and incidence calculated as a yearly mean for the ten-year period 1991-2000:



As appears, the mean yearly incidence of RRT-start varied from 51 to 102 pr. million. Noticeably, the county having the lowest incidence (Sogn og Fjordane) is also known to be where people live the longest and have the lowest general morbidity.
Although there is national consensus that pre-emptive transplantation is preferable, this was only achieved in 12.5%; in the individual counties this figure ranged from 4 to 28%.
In some counties PD is rarely used, in others up to 39% of new patients have this as first treatment mode. Close to 75% received HD as first treatment mode, in the counties this ranged from 50 to 91%.
The proportion of the new patients in 2000 who first presented in the renal unit with a terminal renal failure varied considerably between counties – from 8% and up to 50%. In the majority of these cases the diagnosis implies that renal failure has developed gradually over years. Thus, in most counties there must be a need for improved co-operation within the primary health service in order to achieve early referrals.

Prevalence:
Again, the data (fig. on next page) demonstrate great differences between the counties. In all counties the majority of patients have a functioning graft, constituting from 63% to 84% of the total RRT-population. The dialysis prevalence ranges from 85 to 229 per mill. inhabitants in the counties, indicating great differences in workloads and costs. In some counties, two out of three dialysis patients are not considered candidates for a new graft, in others this applies

only to 10-15%. But counties with high dialysis prevalence do not necessarily have a high prevalence of 'non-transplantable'.



Concluding remarks:

Even if it may seem that the incidence has reached a plateau, the prevalence of RRT-patients will continue to increase in the coming years. Unless a corresponding rise in kidney donation (both living and necro-donors!) is achieved, the number of patients in dialysis will rise and they will constitute an increasing proportion of the RRT-population.
Compared to the Swedish RRT-incidence (125 per million in 2000) and prevalence (712 per million), Norwegian numbers still are low. There are no clear reasons for such a difference between our two nations that are so similar in most respects. Therefore, the Norwegian health service needs to prepare for accommodating a significantly increased number of RRT-patients in the near future.

Report completed 03.08.2001
Torbjørn Leivestad M.D.