등록사업 보고

우리나라 신대체 요법의 현황
– 인산 민병석교수 기념 말기신부전 환자 등록사업 2012 –

대한신장학회 등록위원회

Current Renal Replacement Therapy in Korea
– Insan Memorial Dialysis Registry, 2012 –

ESRD Registry Committee, Korean Society of Nephrology*

=Abstracts=

Registry committee of Korean Society of Nephrology has collected data about dialysis in Korea through on-line registry program in KSN internet web site. The status of renal replacement therapy in Korea at the end of 2012 was as follows:

1) The total number of patients with renal replacement therapy (RRT) was 70,211 (hemodialysis : HD 48,531, peritoneal dialysis : PD 7,552, functioning kidney transplant :KT 14,128). Prevalence of RRT was 1,353.3 patients per million population (pmp). The proportion of RRT was HD 69.1%, PD 10.8%, and renal transplant 20.2%.
2) New RRT patients in 2012 were 11,472 (HD 8,811, PD 923, KT 1,738). Incidence rate was 221.1 pmp in 2012.
3) The most common primary cause of end stage renal diseases was diabetic nephropathy (50.6%), hypertensive nephrosclerosis (18.5%) and chronic glomerulonephritis (8.1%), in order.
4) The number of RRT centers was 691 and total number of HD machines was 18,910. Dialysis patients' individual data were collected from 68.2% of overall RRT centers.
5) Mean age of HD patient was 59.8 years old, of PD was 55.4 years old. Proportion of patients on HD more than 5 years' maintenance was 45%.
6) Mean BMI (body mass index; Kg/m^2) of HD patients was 22.07 Kg/m^2 and BMI of PD patients was 24.24 Kg/m^2. Mean blood pressure was 99.7 mmHg in HD and 98. 0mmHg in PD patients. Pulse pressure was 64.2 mmHg in HD and 52.2 mmHg in PD patients.
7) Mean hemoglobin of HD patient was 10.4 g/dL (hematocrit 31.6%), PD was 10.2 g/dL (Hct: 30.4%).
8) Mean urea reduction ratio was 67.9% in male HD patients and 74.1% in female HD patients. Mean Kt/V was 1.382 in male patient, 1.652 in female patients.
9) The common co-morbid diseases of HD patients were hypertension (45.9%), coronary artery disease (9.3%), hepatitis B (4.6%), and those of PD patients were also hypertension (55.3%), coronary artery disease (7.6%), congestive heart failure (5.0%).
10) Survey on rehabilitation status of dialysis patients showed that 24% of HD patients have full time job and 8% have part time job. 33% of PD patients have full time job 24% have part time job.
11) Overall patient survival of male dialysis patient in 5 years was 70.6%, female patients was 73.5%. HD patient's 5 year survival was 72.6% and PD was 63.8%. Five year survival of diabetic dialysis patients was 61.4%, chronic glomerulonephritis patients 86.4%, hypertensive nephrosclerosis patients 79.1%, respectively.
12) Common causes of death were unknown cause or not uremia associated cardiac arrest (16.0%), uremia associated

cardiac arrest (11.1%), pulmonary infection (10.8%), sepsis (8.9%), cerebro-vascular accident (7.9%) and myocardial infarction (6.8%) in 2012.

13) The number of kidney transplantation was 1,783 (deceased donor 768) in 2012.

Key words: renal replacement therapy, hemodialysis, peritoneal dialysis, prevalence, incidence, survival, dialysis adequacy

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Part 1. Prevalence & Incidence of ESRD (1)

Table 1-1. Prevalence of renal replacement therapy.

	HD		PD		Transplant		Total	
1986	1,335	(32.6)	573	(13.9)	621	(15.1)	2,534	(61.7)
1988	3,012	(74.0)	1,058	(25.2)	982	(23.4)	5,142	(122.7)
1990	4,311	(101.8)	1,130	(26.7)	1,866	(44.1)	7,307	(172.6)
1992	5,890	(135.3)	1,599	(36.7)	2,862	(65.8)	10,351	(237.8)
1994	7,387	(162.7)	2,284	(50.3)	4,116	(90.6)	13,787	(303.6)
1996	9,635	(207.5)	2,976	(64.1)	5,461	(117.6)	18,072	(389.2)
1998	13,473	(285.6)	3,912	(82.9)	6,515	(138.1)	23,900	(506.7)
2000	15,853	(330.4)	4,671	(97.4)	7,522	(156.8)	28,046	(584.5)
2001	17,568	(363.8)	5,489	(113.7)	7,957	(164.8)	31,014	(642.3)
2002	20,010	(412.4)	5,712	(117.7)	8,271	(170.5)	33,993	(700.6)
2003	23,348	(478.2)	6,807	(139.4)	8,635	(176.9)	38,790	(794.5)
2004	25,335	(516.5)	7,569	(154.3)	8,987	(183.2)	41,891	(854.0)
2005	27,246	(553.0)	7,816	(158.6)	9,271	(188.2)	44,333	(899.8)
2006	29,031	(585.0)	7,990	(161.0)	9,709	(195.7)	46,730	(941.7)
2007	30,907	(617.7)	7,649	(152.9)	10,119	(202.2)	48,675	(972.8)
2008	33,427	(663.3)	7,840	(155.6)	10,722	(212.8)	51,989	(1031.6)
2009	37,391	(738.3)	7,618	(150.4)	11,387	(224.8)	56,396	(1113.6)
2010	39,509	(768.1)	7,309	(142.1)	12,042	(234.1)	58,860	(1144.4)
2011	42,596	(823.6)	7,694	(148.8)	13,051	(252.4)	63,341	(1224.8)
2012	48,531	(935.4)	7,552	(145.6)	14,128	(272.3)	70,211	(1353.3)

( ): number of patients per million population, Population in Korea at the end of 2012: 51,881,255.

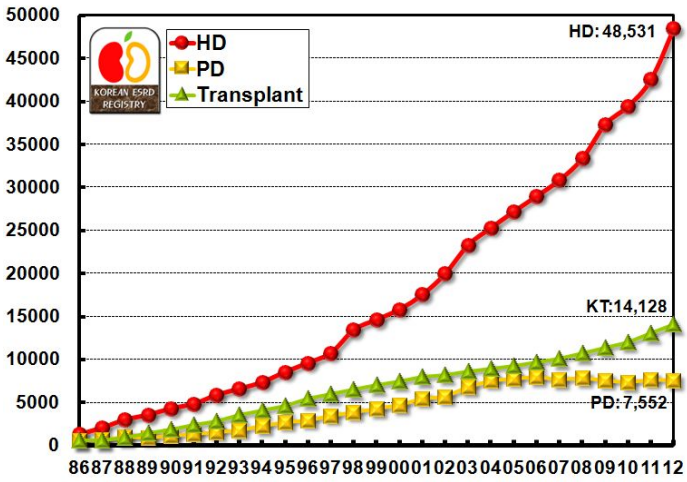


Fig. 1-1. Patient numbers of renal replacement therapy at the end of each year.

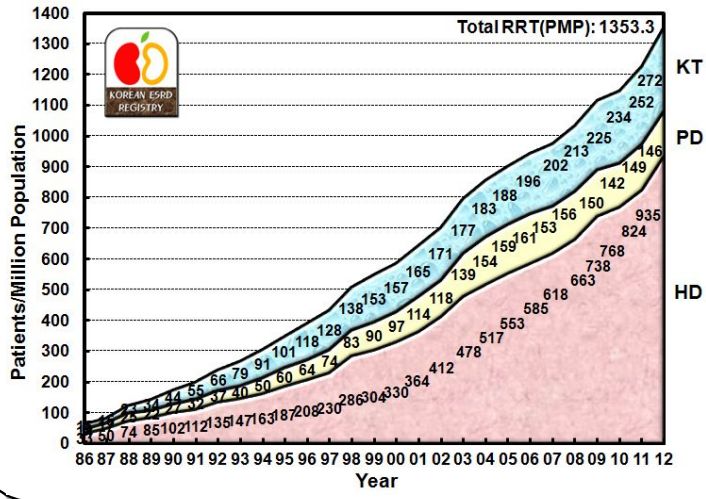


Fig. 1-2. Point prevalence of renal replacement therapy (Patients numbers per million population, HD: hemodialysis, PD: peritoneal dialysis, KT: kidney transplantation).

Part 1. Prevalence & Incidence of ESRD (2)

Table 1-2. Number of new renal replacement therapy patients.

	HD		PD		Transplant		Total	
1986	670	(16.3)	287	(7.0)	221	(5.4)	1,173	(28.7)
1988	1,516	(36.2)	375	(8.9)	428	(10.2)	2,319	(55.3)
1990	2,418	(57.1)	530	(12.5)	624	(14.7)	3,572	(84.3)
1992	3,083	(70.8)	705	(16.2)	765	(17.6)	4,553	(104.6)
1994	2,999	(66.0)	907	(19.9)	685	(15.1)	4,591	(101.1)
1996	3,670	(79.0)	1,388	(29.9)	919	(19.8)	5,977	(128.7)
1998	2,463	(52.2)	753	(15.9)	994	(21.1)	4,210	(89.3)
2000	2,736	(57.0)	1,021	(21.3)	683	(14.2)	4,440	(92.5)
2001	3,373	(69.9)	1,279	(26.5)	848	(17.6)	5,500	(113.9)
2002	3,878	(79.9)	1,666	(34.3)	739	(15.2)	6,283	(129.5)
2003	4,769	(97.7)	1,866	(38.2)	806	(16.5)	7,441	(152.4)
2004	5,279	(107.6)	2,246	(45.8)	853	(17.4)	8,378	(170.8)
2005	5,400	(109.6)	2,381	(48.3)	762	(15.5)	8,543	(173.4)
2006	5,694	(114.7)	2,568	(51.7)	935	(18.8)	9,197	(185.3)
2007	6,193	(123.8)	2,062	(41.2)	928	(18.5)	9,183	(183.5)
2008	6,415	(127.3)	1,619	(32.1)	1,145	(22.7)	9,179	(182.1)
2009	6,540	(129.1)	1,125	(22.2)	1,241	(24.5)	8,906	(175.9)
2010	7,204	(140.1)	867	(16.9)	1,264	(24.6)	9,335	(181.5)
2011	8,057	(155.8)	920	(17.8)	1,639	(31.7)	10,616	(205.3)
2012	8,811	(169.8)	923	(17.8)	1,738	(33.5)	11,472	(221.1)

( ): number of patients per million population. The population of Korea in 2012: 51,881,255.

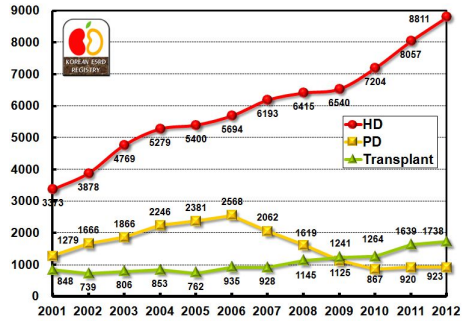


Fig. 1-3. New renal replacement therapy patients number in each year.

Table 1-3. Causes of end stage renal disease in new patients.

Causes	Percent (%)												
	1992	1994	1996	1998	2000	2002	2004	2006	2008	2009	2010	2011	2012
Chronic Glomerulonephritis	25.3	25.5	21.6	17.9	14	13.9	12.5	13.0	12.1	11.1	11.3	10.4	8.1
Not Histologically confirmed	19.7	20.4	16.7	13.6	10.6	10	8.6	9.0	8.2	7.5	7.7	6.9	4.5
Histologically confirmed	5.6	5	4.9	4.3	3.4	3.9	3.9	3.9	3.8	3.6	3.6	3.5	3.6
Diabetic nephropathy	19.5	26.1	30.8	38.9	40.7	40.7	43.4	42.3	41.9	45.4	45.2	47.1	50.6
Hypertensive nephrosclerosis	15.4	20.8	18.3	17.8	16.6	16	16.2	16.9	18.7	18.3	19.2	19.6	18.5
Cystic kidney disease	2.1	2.2	1.8	1.7	2.2	1.6	1.4	1.7	1.7	1.8	1.7	1.6	1.8
Renal tuberculosis	1.1	1.5	1.2	0.5	0.4	0.5	0.3	0.3	0.2	0.2	0.2	0.2	0.0
Pyelo/interstitial nephritis	1.3	1.1	0.7	1	0.8	0.6	0.6	0.6	0.5	0.5	0.4	0.4	0.5
Drugs or nephrotoxic agents	1.3	0.1	0.6	0.3	0.3	0.4	0.2	0.3	0.3	0.3	0.3	0.5	0.4
Lupus nephritis	0.8	0.7	1	0.5	0.9	0.8	0.6	0.6	0.6	0.6	0.5	0.5	0.6
Gouty nephropathy	0.7	0.7	0.6	0.5	0.7	0.4	0.5	0.3	0.3	0.3	0.4	0.2	0.3
Hereditary nephropathy	0.3	0.7	0.4	0.2	0.1	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.5
Kidney tumor	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3
Other	4.1	2.7	2.8	3.9	3	5.6	5.9	6.0	5.8	5.2	5.1	5.0	6.8
Uncertain	28.6	17.8	15.9	16.6	20.2	19	17.8	17.5	17.6	16.0	15.3	14.3	11.4

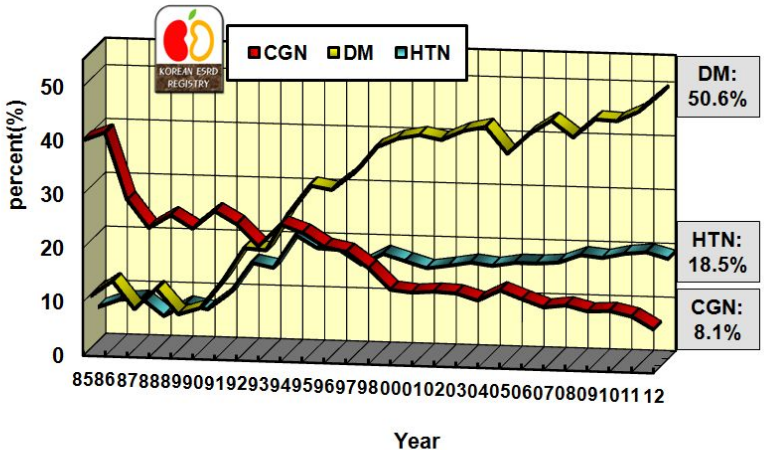


Fig. 1-4. Three major causes of end stage renal disease patients who were initiated renal replacement therapy in each year. (DM: diabetic nephropathy, CGN: chronic glomerulonephritis, HTN: hypertensive nephrosclerosis). Note increase of DM and decrease of CGN.

Part 2. Renal Replacement Therapy Modalities

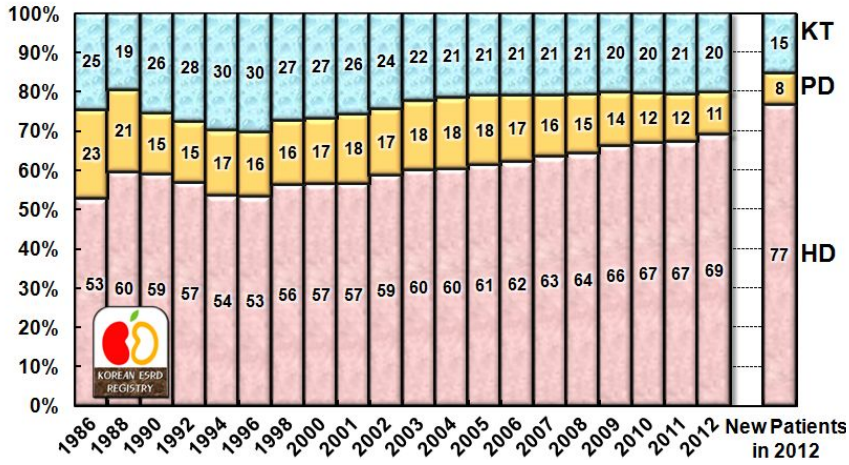


Fig. 2-1. Proportion of renal replacement modalities, annual prevalence and incidence. HD: hemodialysis, PD: peritoneal dialysis, KT: kidney transplantation.

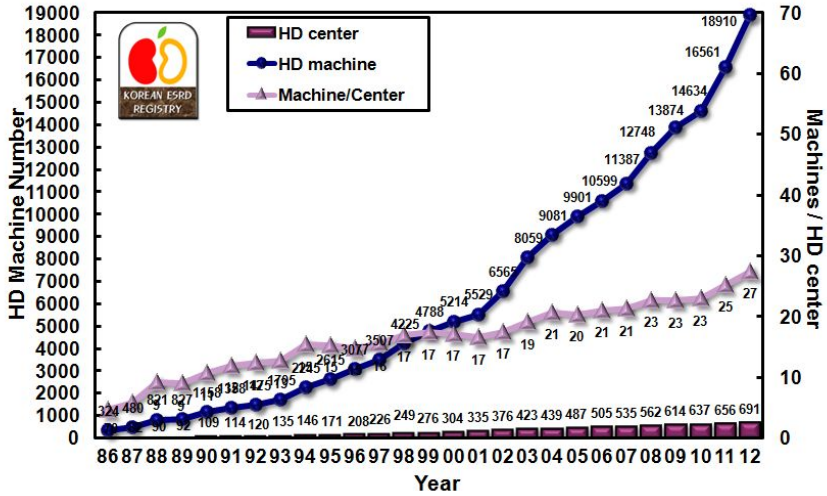


Fig. 2-2. Numbers of dialysis centers, hemodialysis machines and machine per each dialysis center in Korea.

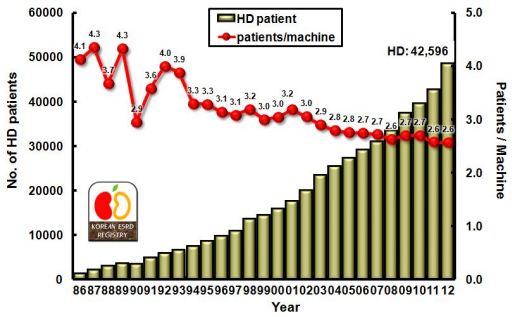


Fig. 2-3. Number of hemodialysis patients and hemodialysis patients per hemodialysis machine.

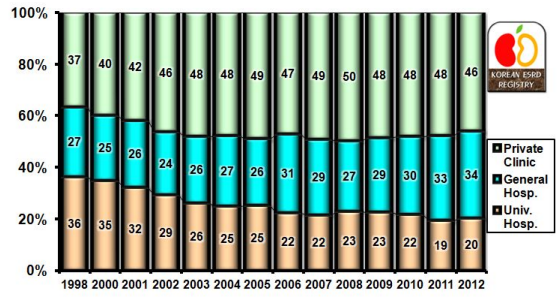


Fig. 2-4. Percentage of hemodialysis patients number according to dialysis center.

Part 3. Regional Distribution of Patients & Facilities

Table 3-1. Administrative regional distribution of dialysis patients & hemodialysis machines.

	HD pts	PD pts	Total Dialysis pts	Dialysis pts. / Million pop.	Dialysis Centers	HD machines	HD pts / HD machine
서울 Seoul	10,555	2,319	12,874	1,233	155	3,939	2.7
부산 Busan	4,125	778	4,903	1,372	46	1,491	2.8
대구 Daegu	3,257	735	3,992	1,579	36	1,053	3.1
인천 Incheon	2,700	334	3,034	1,049	31	1,007	2.7
광주 Gwangju	1,459	231	1,690	1,139	32	683	2.1
대전 Daejeon	1,310	350	1,660	1,079	13	598	2.2
울산 Ulsan	902	66	968	830	15	330	2.7
경기 Gyeonggi	9,821	1,399	11,220	906	142	4,098	2.4
강원 Gangwon	1,421	341	1,762	1,136	25	610	2.3
충북 Chungbuk	1,584	84	1,668	1,049	26	631	2.5
충남 Chungnam	2,080	147	2,227	1,017	32	751	2.8
전북 Jeonbuk	1,808	130	1,938	1,022	22	815	2.2
전남 Jeonnam	1,733	162	1,895	980	31	777	2.2
경북 Gyeongbuk	2,192	148	2,340	855	33	838	2.6
경남 Gyeongnam	2,911	252	3,163	935	43	1,047	2.8
제주 Jeju	673	76	749	1,264	9	242	2.8
Total	48,531	7,552	56,083	1,081	691	18,910	2.6

Table 3-2. Distribution of dialysis patients and machines according to life zone*.

	Population (%)	HD patients	PD patients	Total Dialysis patients	Dialysis pts /Million pop.	Dialysis centers	Dialysis machine	HD pts / HD machine
수도권 Capital area (Seoul, Incheon, Gyeonggi)	25,715,262	23,076	4,052	27,128	1,055	328	9,044	2.6
	49.6%	47.5%	53.7%	48.4%		47.5%	47.8%	
충청권 Chungchung (Daejeon, Chungnam, Chungbuk)	5,320,007	4,974	581	5,555	1,044	71	1,980	2.5
	10.3%	10.2%	7.7%	9.9%		10.3%	10.5%	
호남권 Honam (Gwangju, Jeonnam, Jeonbuk)	5,312,299	5,000	523	5,523	1,040	85	2,275	2.2
	10.2%	10.3%	6.9%	9.8%		12.3%	12.0%	
영남권 Youngnam (Busan, Daegu, Gyeongnam, Gyeongbuk, Ulsan)	13,389,707	13,387	1,979	15,366	1,148	173	4,759	2.8
	25.8%	27.6%	26.2%	27.4%		25.0%	25.2%	
강원권 Gangwon	1,551,531	1,421	341	1,762	1,136	25	610	2.3
	3.0%	2.9%	4.5%	3.1%		3.6%	3.2%	
Total	51,881,255	48,531	7,552	56,083	1,081	691	18,910	2.6

* 제주 표시 제외. Data of Jeju-do is not shown.

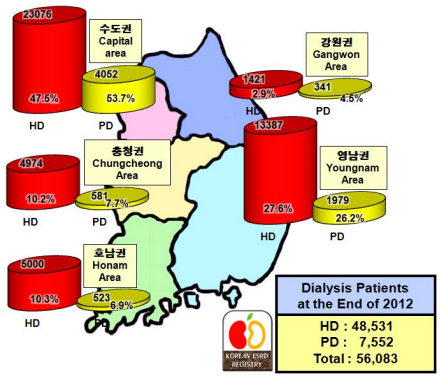


Fig. 3-1. Distribution of dialysis patients and machines according to life zone.

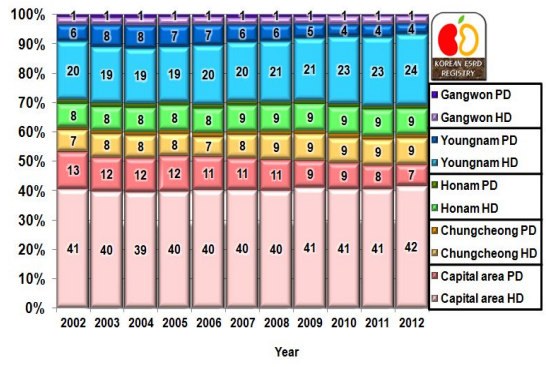


Fig. 3-2. Regional proportion of dialysis patient number in each year.

Part 4. Dialysis Patients Demographics (1)

Table 4-1. Percent of dialysis centers contributing individual patient data.

	Dialysis centers*	Internet Input	Paper data	Total contributed center	Contributing rate (%)
서울 Seoul	155	112	7	119	76.8
부산 Busan	46	30	2	32	69.6
대구 Daegu	36	21	1	22	61.1
인천 Incheon	31	16	5	21	67.7
광주 Gwangju	32	19	2	21	65.6
대전 Daejeon	13	7	0	7	53.8
울산 Ulsan	15	6	2	8	53.3
경기 Gyeonggi	142	84	5	89	62.7
강원 Gangwon	25	17	0	17	68.0
충북 Chungbuk	26	17	2	19	73.1
충남 Chungnam	32	19	2	21	65.6
전북 Jeonbuk	22	12	0	12	54.5
전남 Jeonnam	31	20	2	22	71.0
경북 Gyeongbuk	33	20	3	23	69.7
경남 Gyeongnam	43	29	0	29	67.4
제주 Jeju	9	8	1	9	100.0
Total	691	437	34	471	68.2

* 투석의료기관 수에서 비운리 의료기관(약40개소)은 제외함.

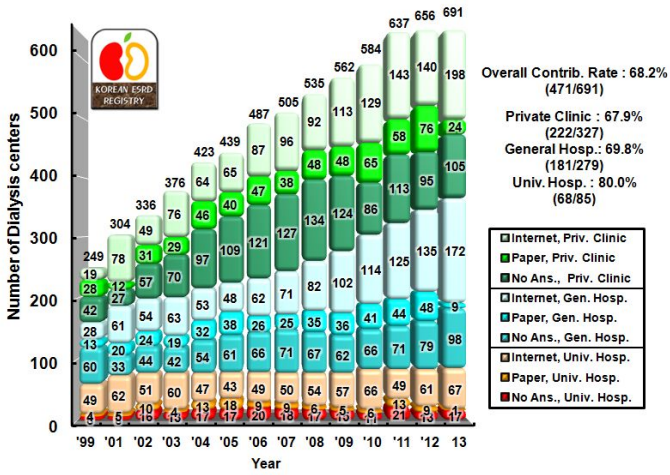


Fig. 4-1. Individual patients data contributing rate of dialysis centers according to hospital classification.

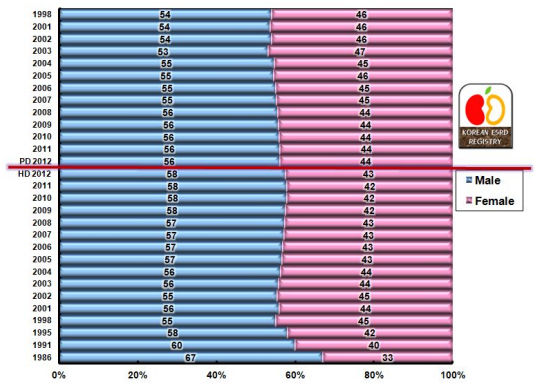


Fig. 4-2. Gender ratio of HD & PD patients according to years.

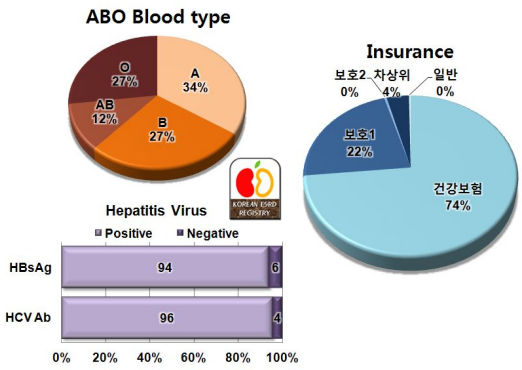


Fig. 4-3. ABO blood type and hepatitis virus, health insurance of HD & PD patients.

Part 4. Dialysis Patients Demographics (2) - Age

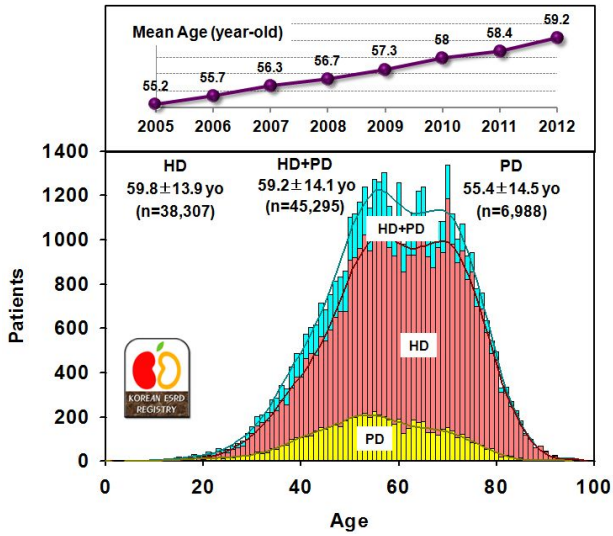


Fig. 4-4. Age distribution of dialysis patients according to dialysis modalities.

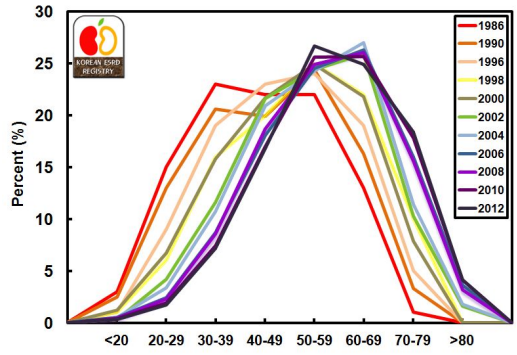


Fig. 4-5. Age distribution of dialysis patients according to years. Note the peak age was shift to old age.

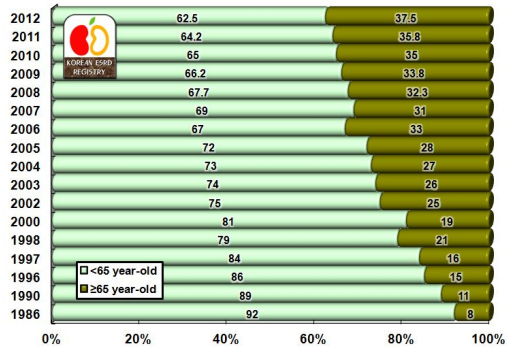


Fig. 4-6. Elderly dialysis patient (over 65 year-old) proportion according to year.

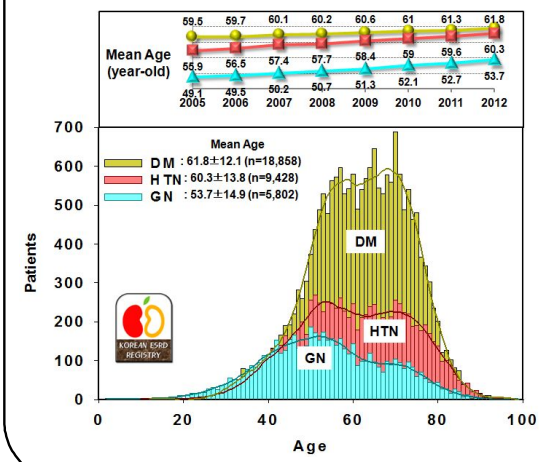


Fig. 4-7. Age distribution of dialysis patients according to underlying diseases, diabetic patients (DM), hypertensive nephrosclerosis (HTN) and glomerulonephritis (GN). Note difference of peak age between GN and DM.

Part 4. Dialysis Patients Demographics (3) - Dialysis Duration

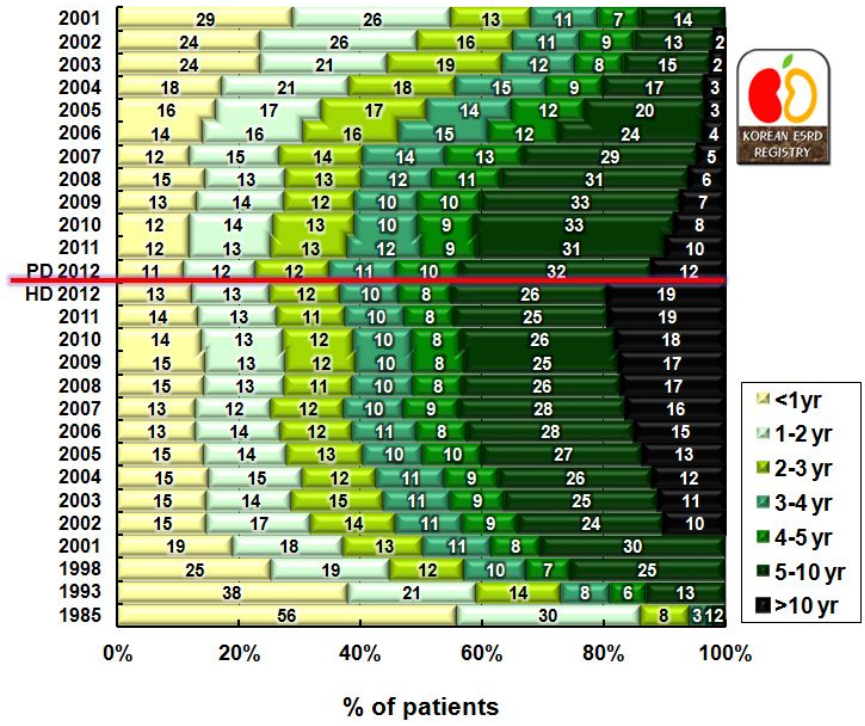


Fig. 4-8. Duration of maintenance hemodialysis and peritoneal dialysis. Percent of estimated patient number according to year.

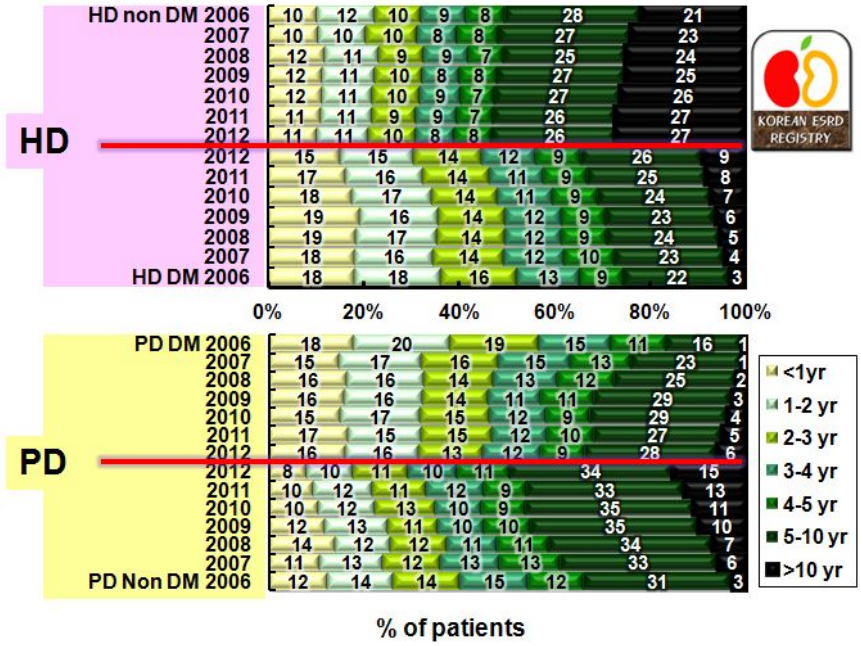


Fig 4-9. Diabetic and non-diabetic patient's duration of dialysis maintenance.

Part 4. Dialysis Patients Demographics (4) - BMI & BP

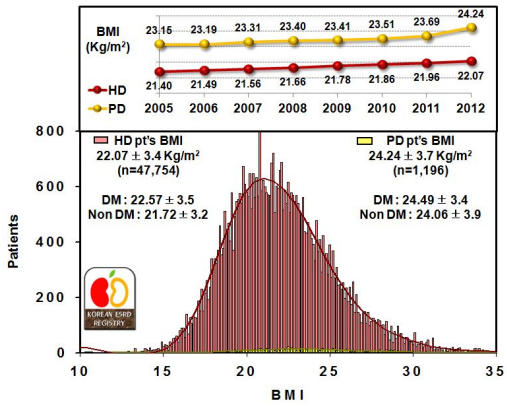


Fig. 4-10. Distribution of body mass index (BMI) in hemodialysis (HD) and peritoneal dialysis (PD) patients

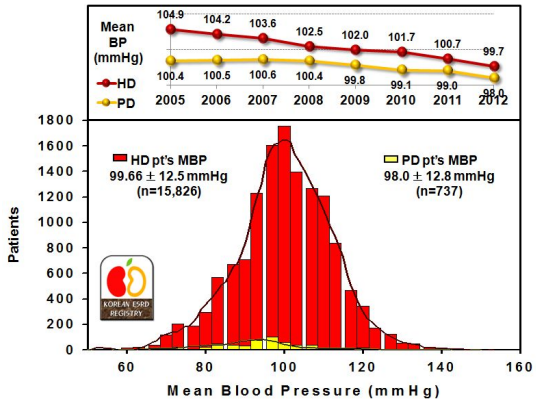


Fig. 4-11. Distribution of mean blood pressure (MBP) in hemodialysis and peritoneal dialysis patients. Blood pressure of HD patients was higher than PD patients BP.

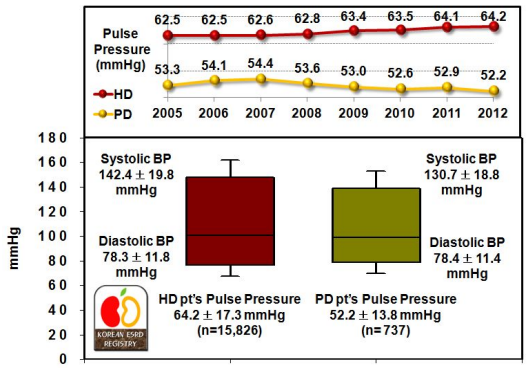


Fig. 4-12. Systolic and diastolic blood pressure with pulse pressure in HD and PD patients. Note difference of pulse pressure between HD and PD patients.

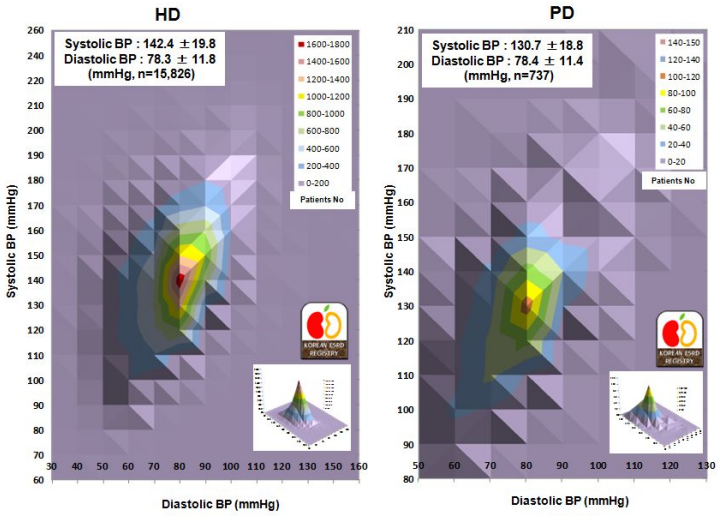


Fig. 4-13. HD and PD patients' number distribution according to systolic and diastolic blood pressure.

Part 5. Dialysis Therapy (1) - HD & Vascular Access

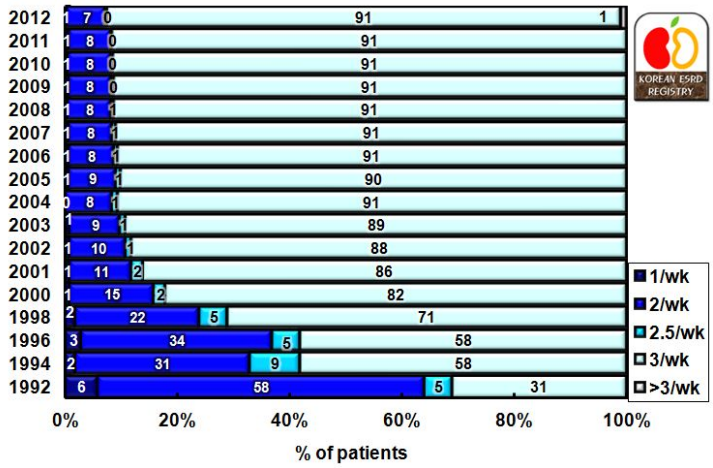
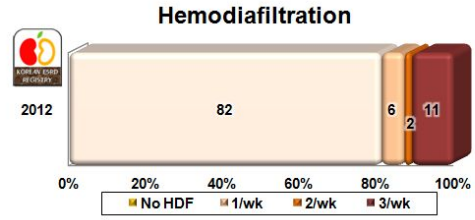


Fig. 5-1. Frequency of HD per week (n=29,289).



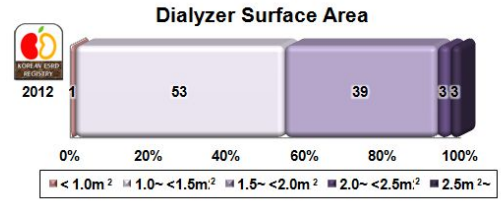
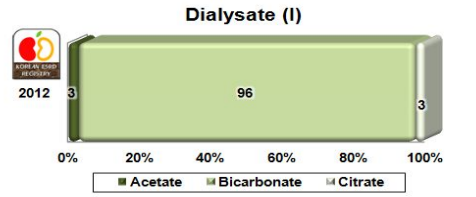


Fig. 5-2. Percent of hemodiafiltration (HDF) applied patients and dialyzer membrane surface area.



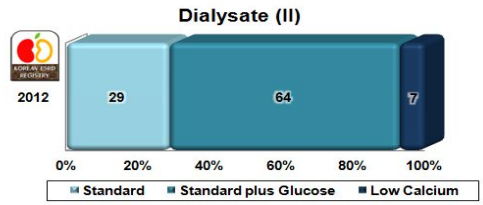


Fig. 5-3. HD dialyste.

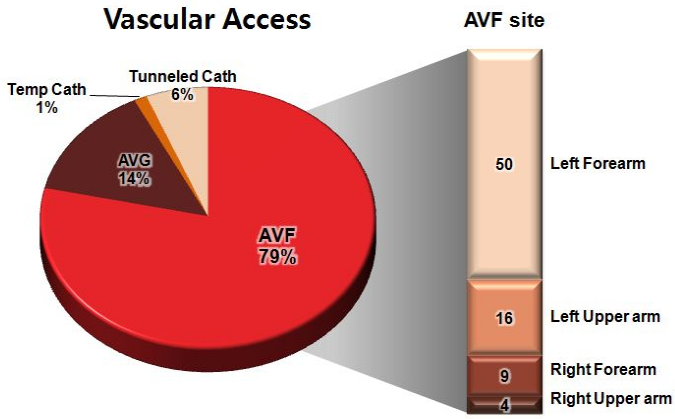


Fig. 5-4. Vascular access for HD in 2012.

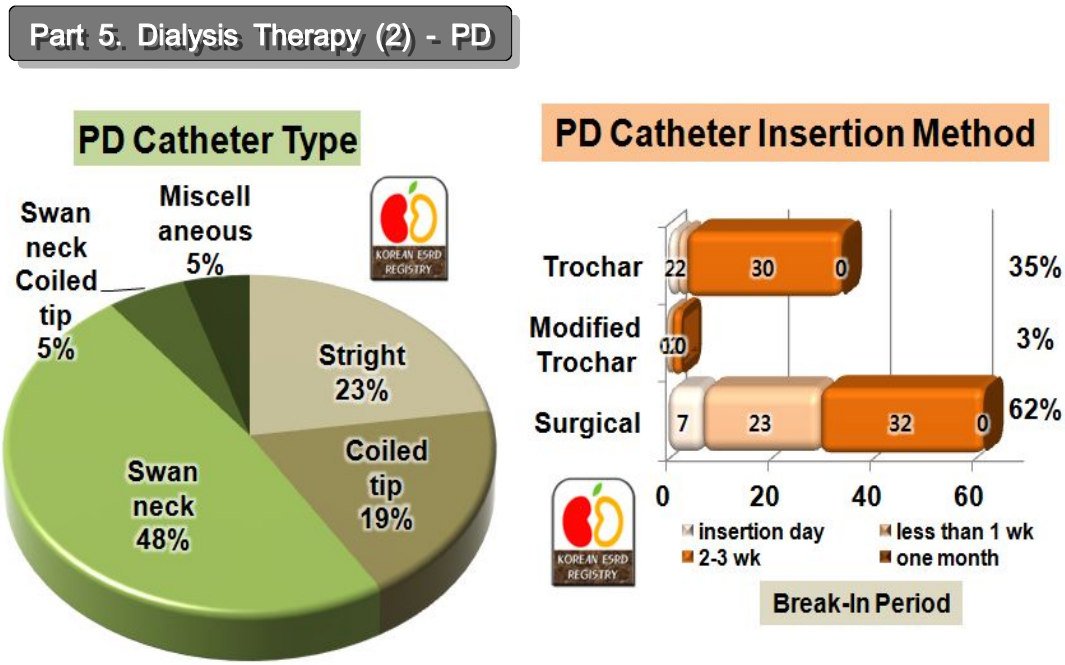


Fig. 5-5. PD catheter type and PD catheter insertion methods in 2012.

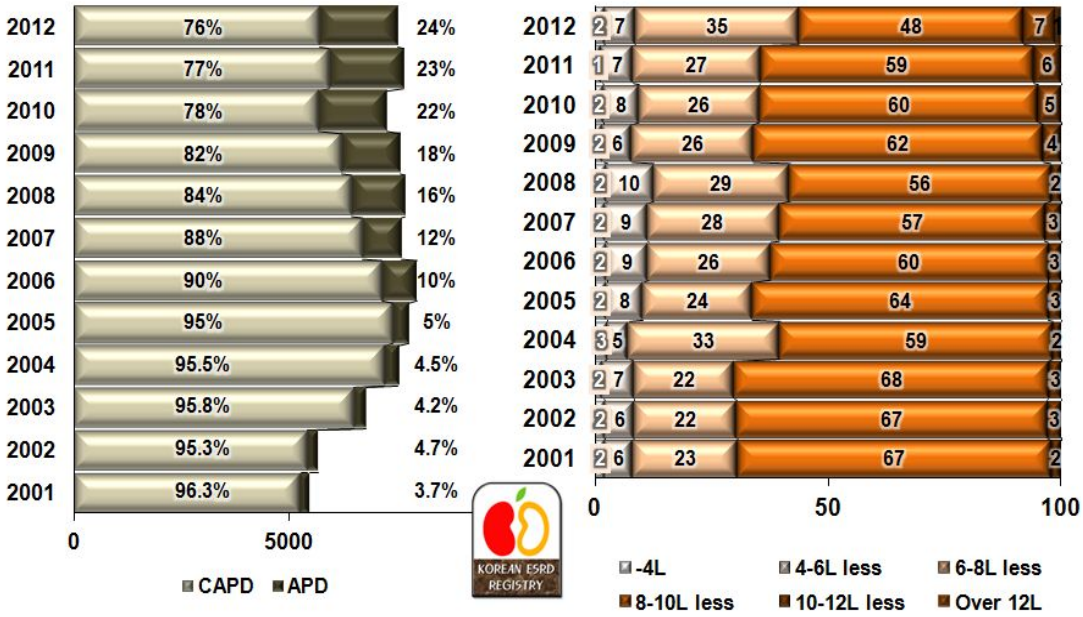


Fig. 5-6. Percent distribution of PD type and dialysate doses according to year.

Part 6. Lab data & Drugs (1)

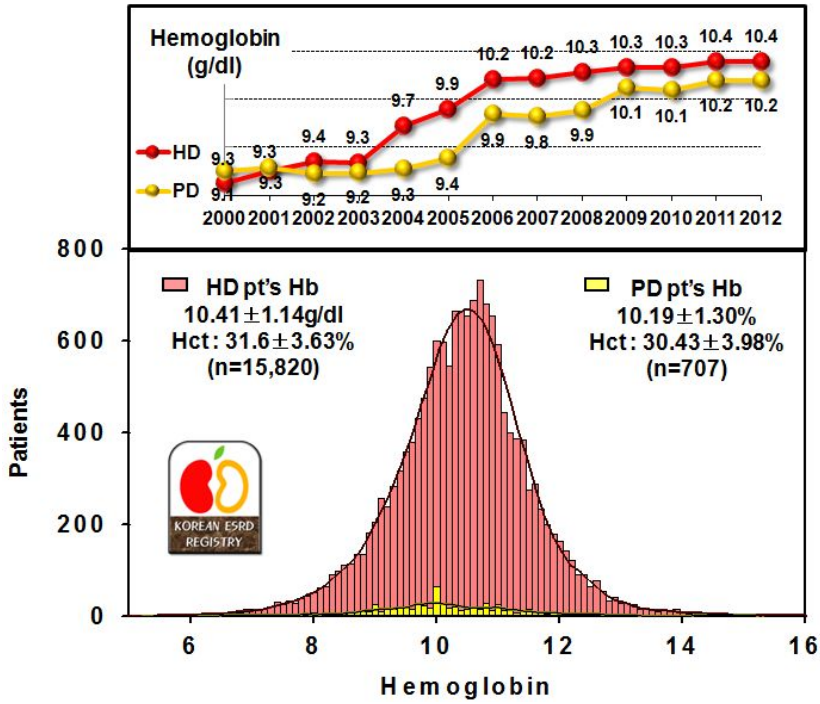


Fig. 6-1. Distribution of hemoglobin levels in HD and PD patients.

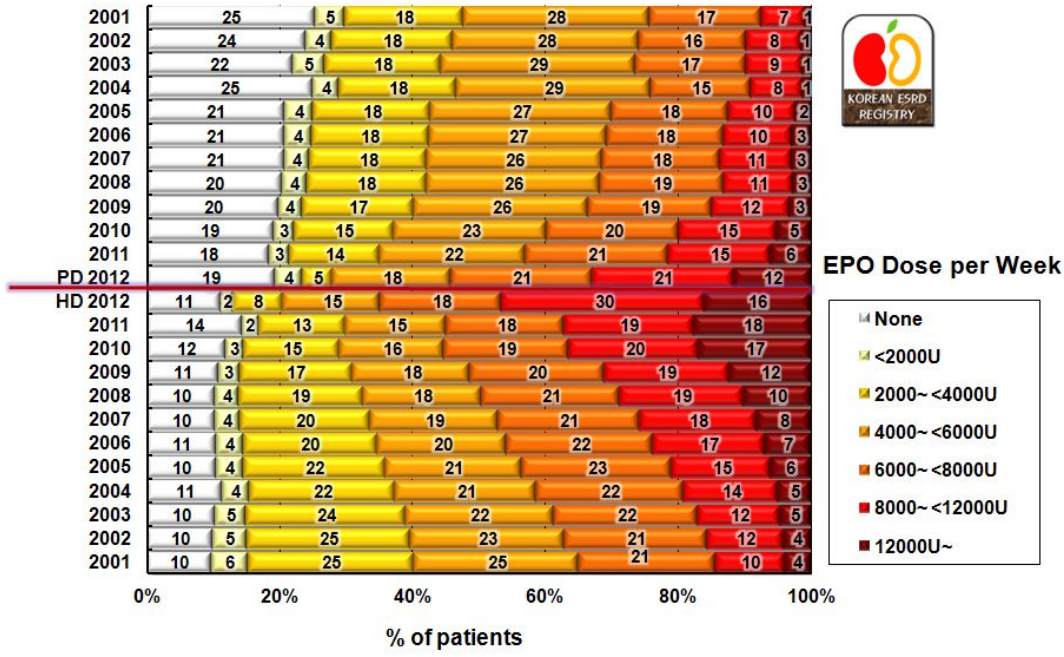


Fig. 6-2. Percent distribution of prescribed erythropoietin doses for hemodialysis and peritoneal dialysis patients.

Part 6. Lab data & Drugs (2)

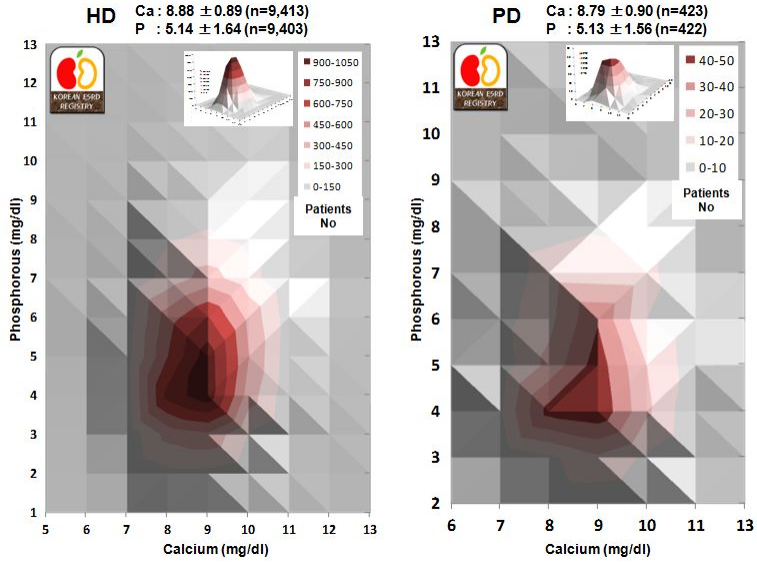


Fig. 6-3. Distribution of patients numbers according to calcium and phosphorous level.

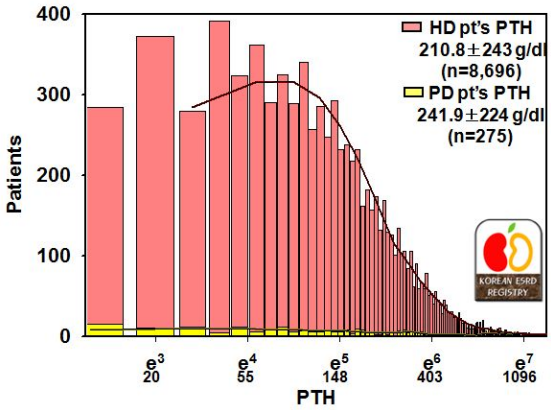


Fig. 6-4. PTH level of HD and PD patients. (x-axis is on nature logarithmic scale.)

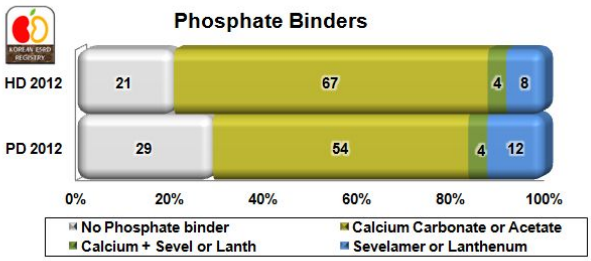


Fig. 6-5. Phosphate binders.

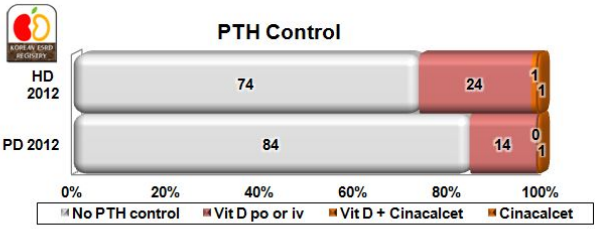


Fig. 6-6. PTH control medications.

Part 6. Lab data & Drugs (3)

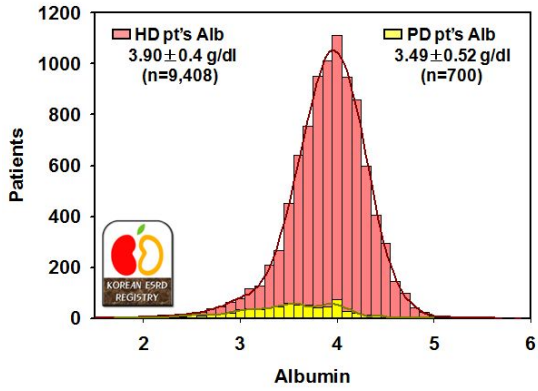


Fig. 6-7. Albumin level of HD and patients.

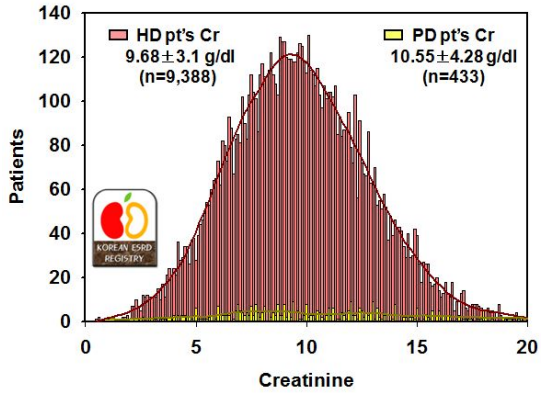


Fig. 6-8. Creatinine level of HD and PD patients.

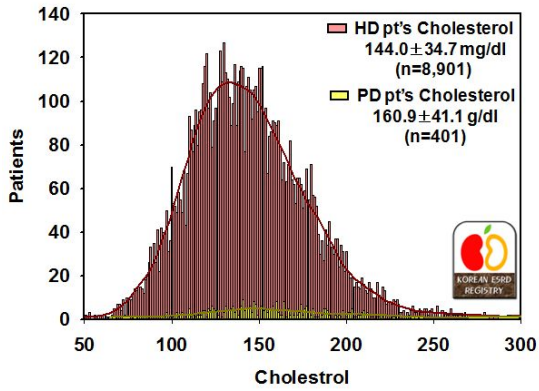


Fig. 6-9. Total cholesterol level of HD and PD patients.

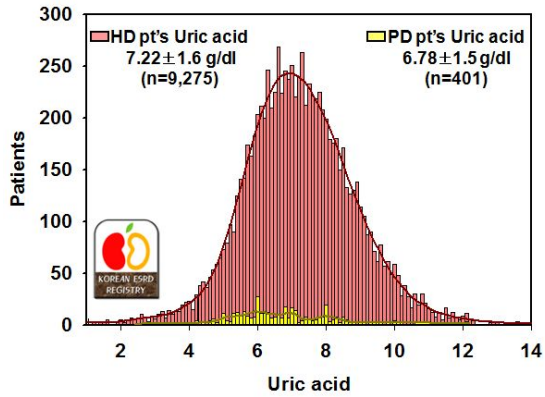


Fig. 6-10. Uric acid level of HD and PD patients.

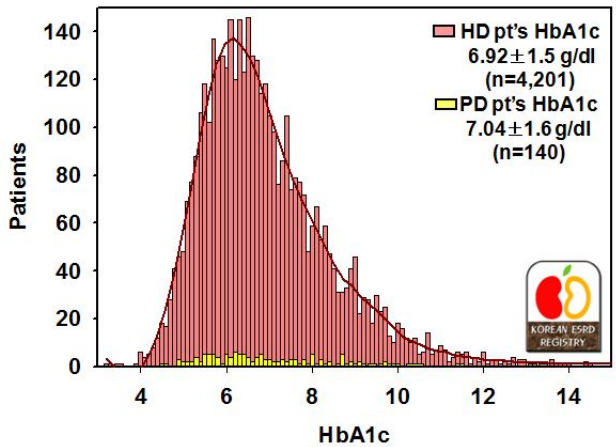


Fig. 6-11. HbA1c level of diabetic HD and PD patients.

Part 7. Dialysis Adequacy (1)

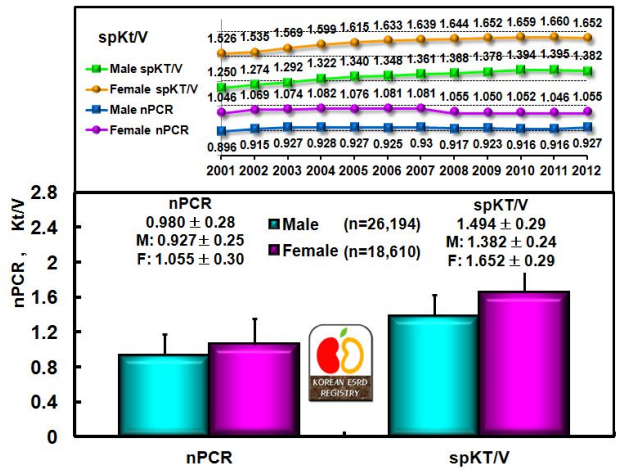


Fig. 7-1. Distribution of urea reduction ratio (URR) of hemodialysis patients. Note the difference between male and female.

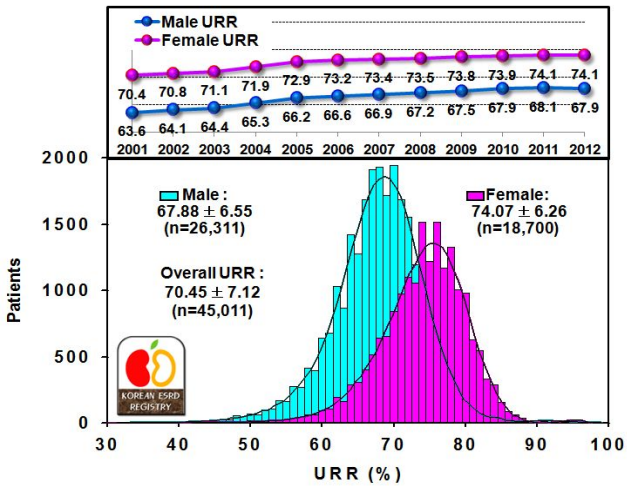


Fig. 7-2. Dialysis adequacy parameters (nPCR & KT/V) of hemodialysis patients.

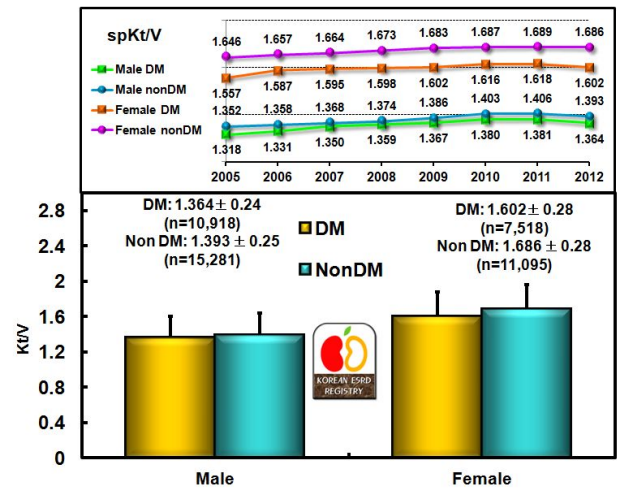


Fig. 7-3. Dialysis adequacy parameters (Kt/V) of diabetic and non-diabetic hemodialysis patients.

Part 7. Dialysis Adequacy (2)

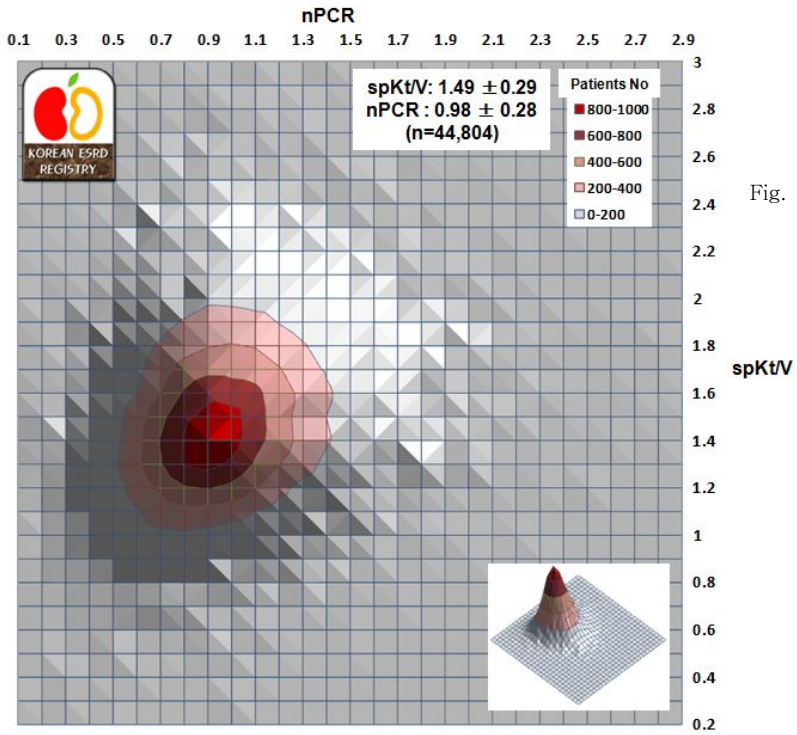


Fig. 7-4. Distribution of patients number according to nPCR and single pool Kt/V in HD patients.

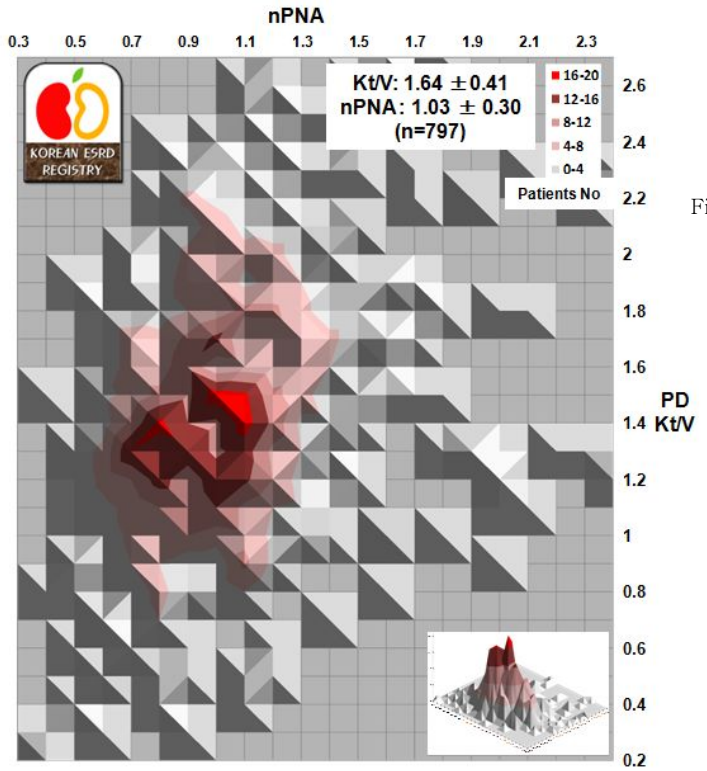


Fig. 7-5. Distribution of patients number according to nPNA and PD Kt/V in PD patients.

Part 8. Rehabilitation Status of Dialysis Patients

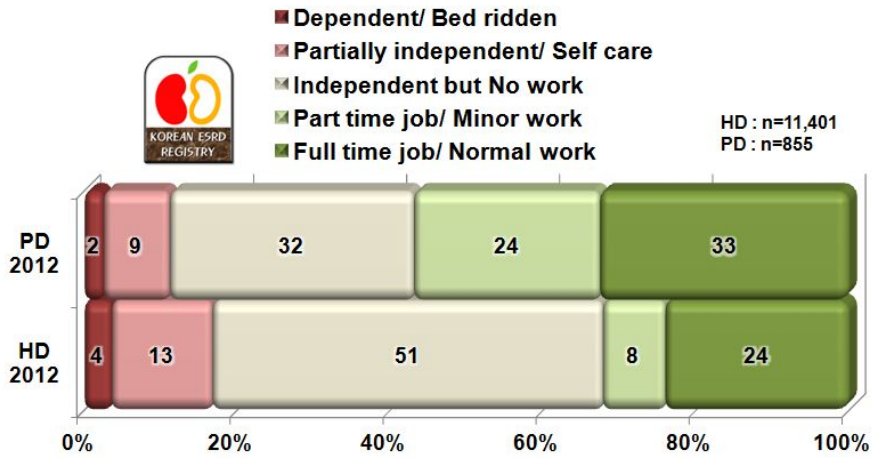


Fig. 8-1. Rehabilitation status of HD and PD patients in 2012.

Part 9. Co-morbidity of Dialysis Patients

Table 9-1. Co-morbidity of dialysis patients in 2012.

	HD Patients (%)	PD Patients (%)
Cardiac	**18.0**	**14.2**
Coronary Artery Disease	9.3	7.6
Congestive Heart Failure	4.3	5.0
Pericardial Effusion	0.5	0.5
Arrythmia	3.8	1.1
Vascular	**51.2**	**60.7**
Cerebrovascular accident	3.7	4.2
Hypertension	45.9	55.3
Other vascular disease	1.6	1.2
Infection	**5.0**	**8.5**
Pneumonia	1.3	1.1
Tuberculosis	0.5	1.1
Peritonitis	0.4	3.1
Herpes zoster	0.3	0.4
Access/ exit site infection	0.3	0.6
Other Infection	2.2	2.2
Liver disease	**7.9**	**4.6**
Hepatitis B	4.6	3.4
Hepatitis C	2.9	0.8
Congestive Liver	0.1	0.0
Hemochromatosis	0.0	0.0
Other liver diseases	0.3	0.4
Gastrointestinal	**10.8**	**6.4**
Gastric Ulcer	2.3	1.0
Duodenal Ulcer	0.4	0.3
Constipation	1.7	0.2
Other Gastrointestinal Diseases	6.3	4.9
Miscellaneous	**7.0**	**5.6**
Malnutrition (Alb<2.5g/dl)	0.2	0.4
Malignancy	1.4	1.3
Hypertensive Retinopathy	0.9	0.6
Uremic Dermatitis	0.8	0.5
Uremic Neuritis	1.2	0.7
Uremic Dementia	0.3	0.2
Uremic Ascites / Pleural Effusion	0.4	0.5
Osteodystrophy	0.6	0.3
COPD & other pulm disease	0.2	0.2
Decubitus ulcer/ DM foot	1.0	0.9

Part 10. Causes of Death in Dialysis Patients

Table 10-1. Causes of death (%) in dialysis patients, 1994-2012.

	1994-96	1998	2001	2003	2005	2006	2007	2008	2009	2010	2011	2012
Cardiac	27.4	27.4	26.9	31.7	30.7	33.7	31.7	35.1	29.5	31.1	32.7	33.9
Myocardial infarction	6.4	6.4	7.7	7.4	8	9.1	7.5	9.7	8.0	8.3	6.6	6.8
Cardiac arrest, uremia associated	13.7	13.7	11.2	11.7	10.4	11.1	10.8	11	8.5	8.7	11.0	11.1
Cardiac arrest, other cause	7.2	7.2	8.1	12.5	12.4	13.5	13.3	14.4	13	14.2	15.0	16.0
Vascular	17.2	17.2	22.7	19.5	17	16.5	17.8	16	15.9	13.3	14.1	13.0
Cerebrovascular accident	14.3	14.3	15.1	14.5	12.3	11.5	13	12.2	11	8.2	8.7	7.9
Pulmonary embolus	0.2	0.2	0.5	0.1	0.6	0.7	0.5	0.1	0.2	0.1	0.2	0.3
Gastrointestinal hemorrhage	1.7	1.7	2.7	3.2	1.7	1.8	2.7	1.9	2.3	2.6	2.2	2.3
Gastrointestinal embolism	0.1	0.1	0.1	0	0.5	0.5	0.1	0.1	0.5	0.4	0.1	0.6
Other vascular disease	0.9	0.9	4.3	1.6	1.9	2	1.6	1.7	1.9	2.2	3.0	1.9
Infection	13.5	13.5	17.8	20.5	20.1	18.8	20.2	19.5	21.9	22.6	23.1	24.5
Pulmonary infection	2.5	2.5	4.5	3.6	4.5	4.2	4.4	4.4	5.9	7.5	8.4	10.8
Septicemia	6.6	6.6	6.9	9.7	9.6	8.9	11.7	9	10.4	10.7	9.7	8.9
Tuberculosis	0.3	0.3	0.8	0.2	0.3	0.1	0.2	0.1	0.3	0.2	0.1	0.7
Peritonitis	2.1	2.1	1.1	2	1.4	1.1	1.1	2	0.8	1.2	1.0	1.0
Other Infection	2	2	4.5	4.9	4.3	4.5	2.9	4	4.5	2.9	4.0	3.0
Liver disease	3.4	3.4	2.6	2.8	2.7	2.6	2.2	1.9	3.1	2.7	2.1	2.8
Liver failure due to hepatitis B	1.8	1.8	1.6	1.8	1.5	1.4	1.3	1	2.2	1.2	1.0	1.4
Liver failure due to other cause	1.6	1.6	1	1	1.2	1.1	0.8	0.8	0.9	1.6	1.1	1.3
Social	6.2	6.2	6.3	4.4	5.4	4.2	3.3	3.3	2.5	2.9	3.3	2.2
Patient refused further treatment	2.9	2.9	2.1	1	1.1	0.6	1.1	0.6	0.5	0.3	0.4	0.6
Suicide	2.5	2.5	3.3	2.3	3.3	3	1.5	1.6	1.3	1.9	1.4	1.4
Therapy ceased for other reason	0.8	0.8	0.9	1	1	0.6	0.7	1	0.8	0.7	1.5	0.3
Miscellaneous	32	32	23.7	21.3	24	24.2	24.8	24.3	27.1	27.3	24.7	23.6
Cachexia	2.9	2.9	8.1	6.6	4	3.9	4.4	3.8	3.3	2.8	2.7	2.1
Malignant disease	2.1	2.1	4.4	3.5	6.4	5.4	5.7	4.6	5.7	5.9	6.0	6.7
Accident	1.2	1.2	0.9	1.1	1.4	1.6	1.2	1	1.3	0.6	1.6	1.4
Uncertain	25.8	25.8	10.3	10.1	12.3	13.2	13.4	14.9	16.8	18	14.5	13.3

*Number of patients :1994-1996=981, 1998=911, 2001=761, 2003=894, 2005=1,256, 2006=1,248, 2007=1,531, 2008=1,563, 2009=1,727, 2010=1,802, 2011=1,828, 2012=1,745.

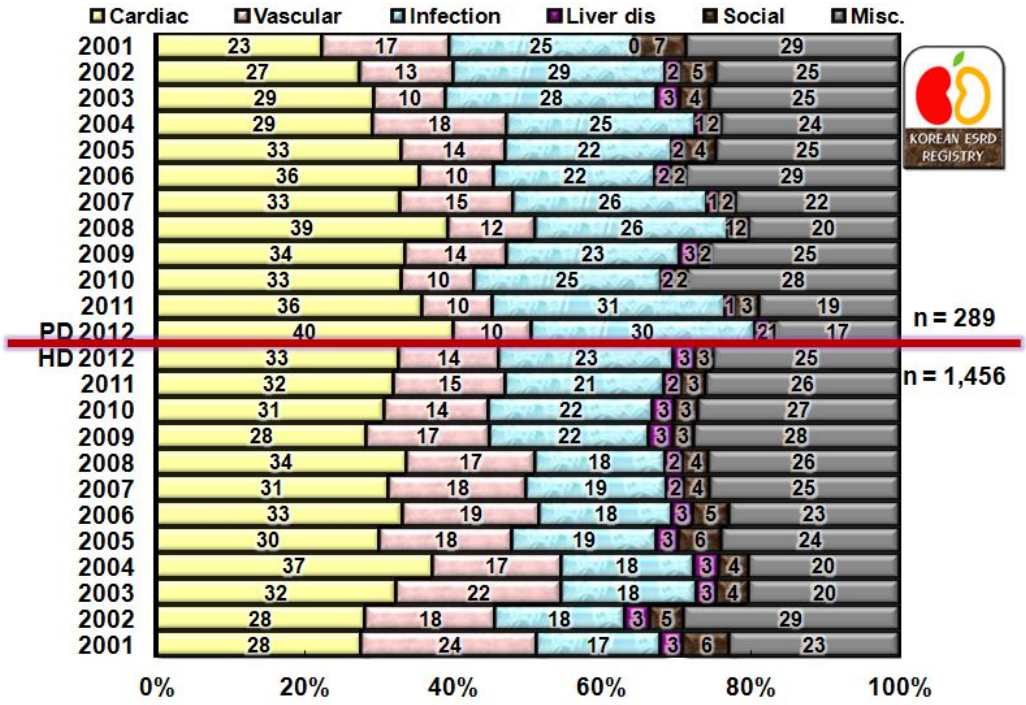


Fig. 10-1. Comparison of death causes, hemodialysis versus peritoneal dialysis patients in 2001-2012.

Part 11. Survival of Dialysis Patients (1) - Overall

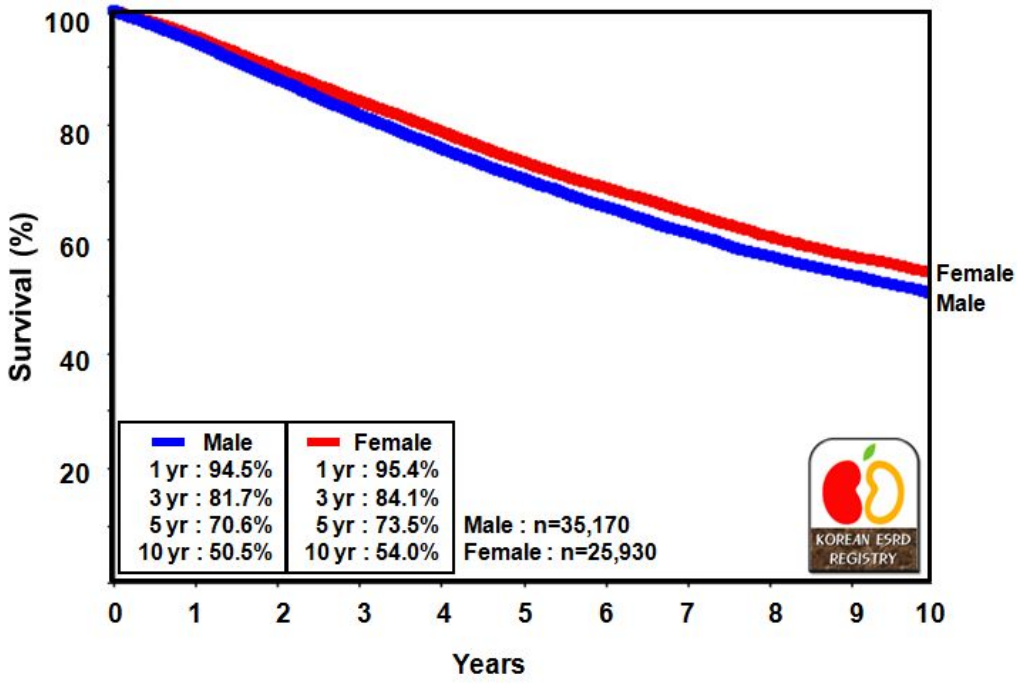


Fig. 11-1. Overall registered dialysis patient survival since 2001.

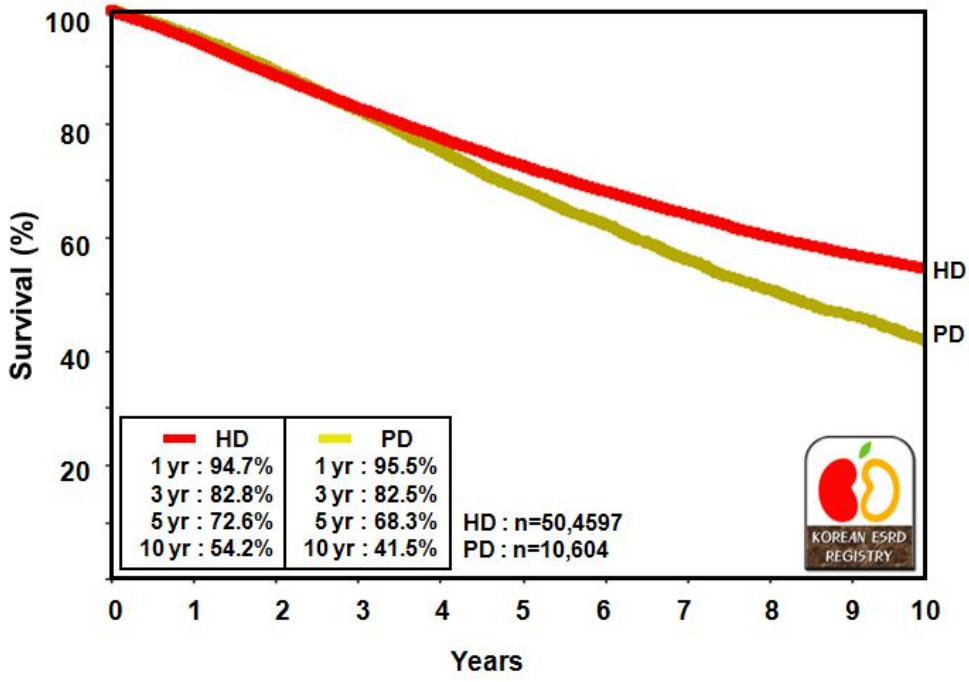


Fig. 11-2. HD and PD patient survival since 2001.

Part 11. Survival of Dialysis Patients (2) - Diseases & Modalities

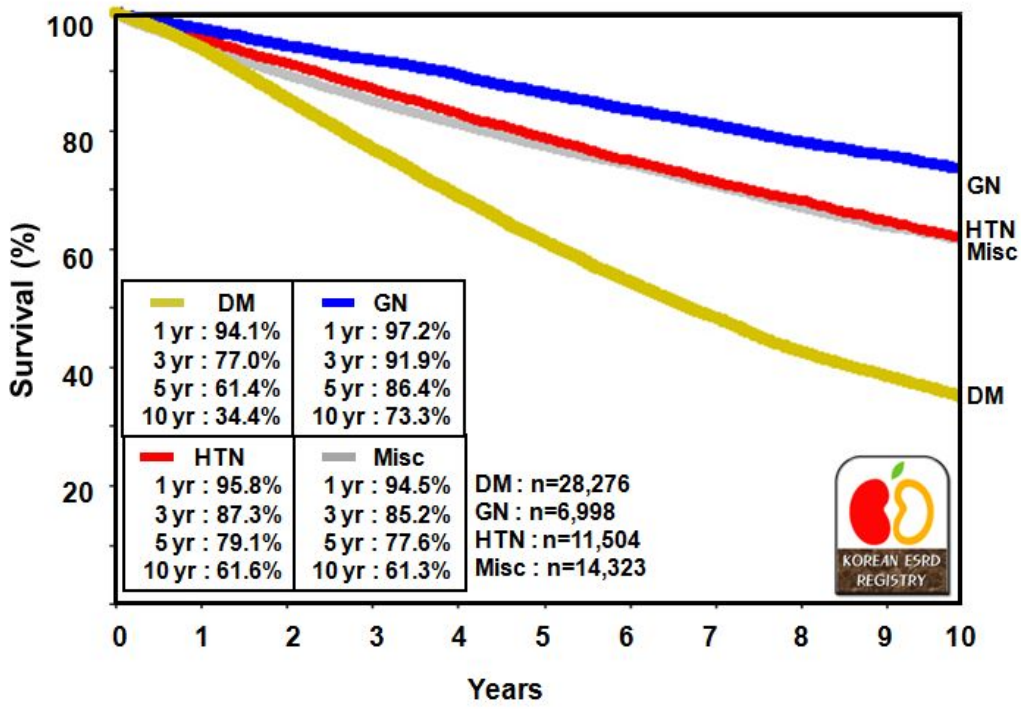


Fig. 11-3. Patient survival according to underlying diseases since 2001 (DM: diabetic nephropathy, GN: chronic glomerulonephritis, HTN: hypertension Misc: miscellaneous).

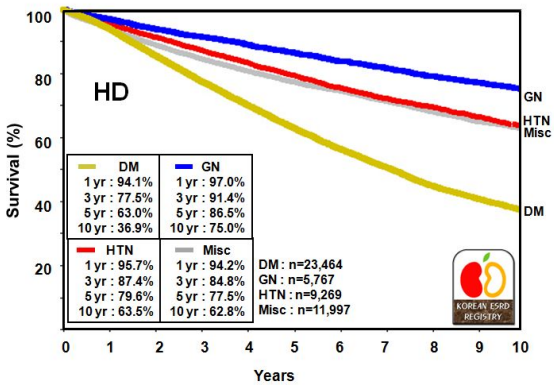


Fig. 11-4. Patient survival according to underlying diseases in hemodialysis patients since 2001.

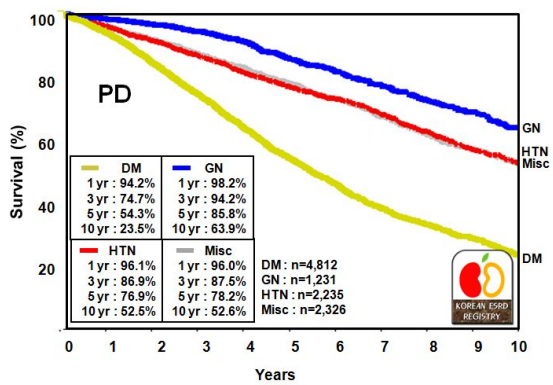


Fig. 11-5. Patient survival according to underlying diseases in peritoneal dialysis patients since 2001.

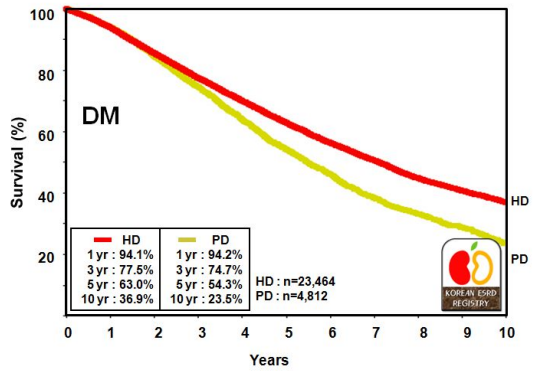


Fig. 11-6. Survival of diabetic dialysis patient according to dialysis modalities since 2001.

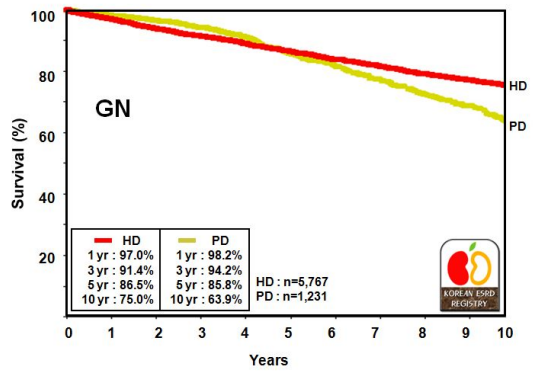


Fig. 11-7. Survival of dialysis patient with underlying glomerulonephritis according to dialysis modalities since 2001.

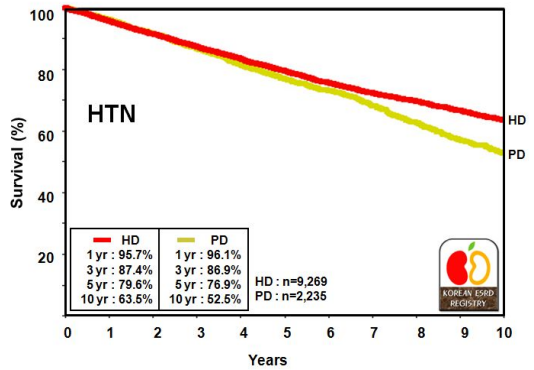


Fig. 11-8. Survival of dialysis patient with underlying hypertensive sclerosis according to dialysis modalities since 2001.

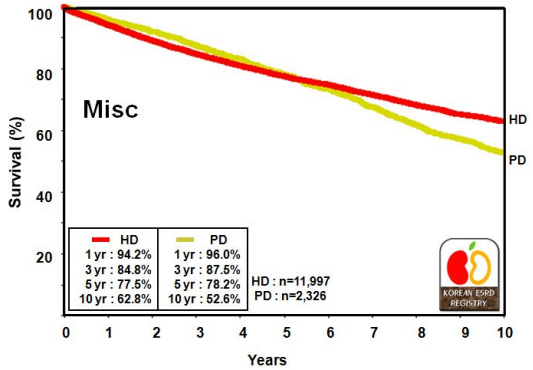


Fig. 11-9. Survival of dialysis patient with miscellaneous underlying diseases according to dialysis modalities since 2001.

Part 12. Kidney Transplantation

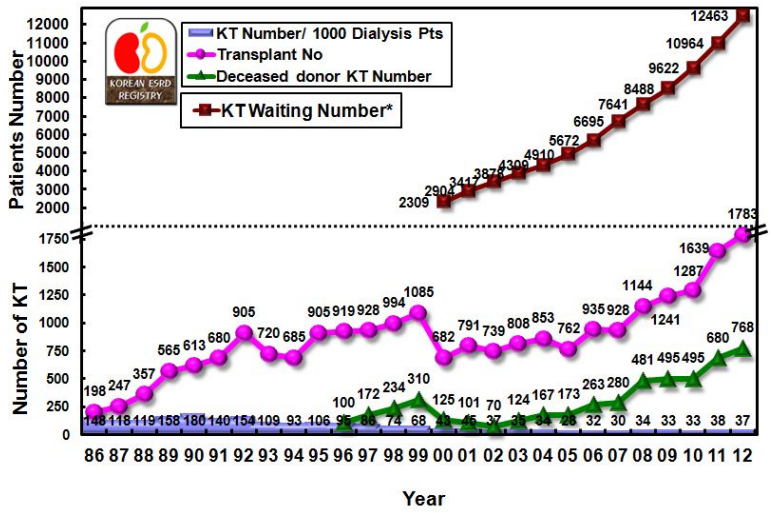
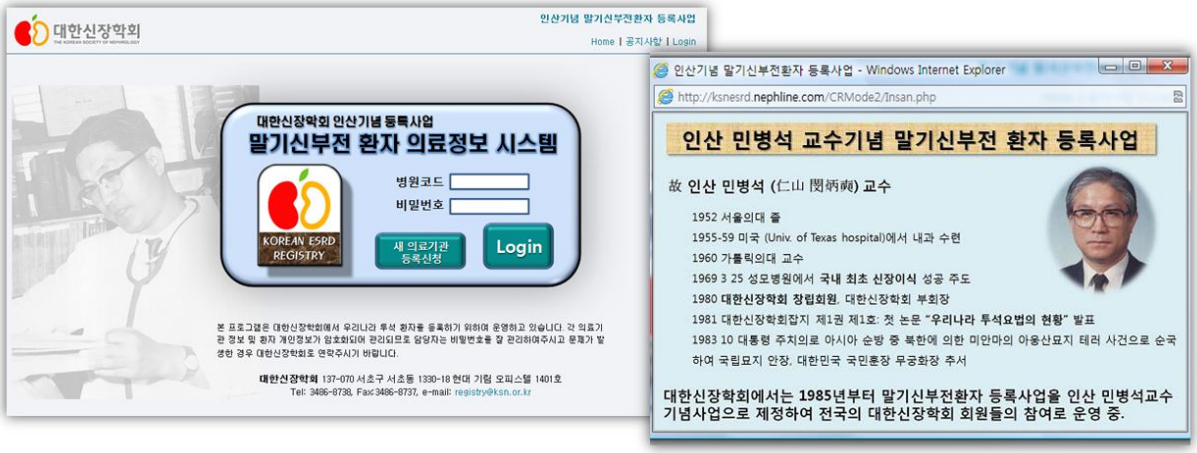


Fig. 12-1. Annual number of kidney transplantation in Korea (including data from KONOS: Korean Network for Organ Sharing). *Survived KT waiting patient number at the end of each year.

◆ Acknowledgements : We, ESRD registry committee of Korean Society of Nephrology, would like deeply thank to every dialysis center medical doctors and nurses in Korea for participation in this survey. Gambro Korea, FMC Korea, Baxter Korea and Boryung Pharm were also share their data for confirmation.

〈별첨: 2013년 7월 새로 개정된 등록사업 화면〉

1. 로그인 화면 및 인산 민병석 교수님 기념 등록사업 소개 화면



2. 새 의료기관 등록신청 화면

3. 환자 목록 화면

4. 새 환자 등록화면

5. 혈액투석 정보 입력 화면

혈액투석 정보

환자 이름 | 성별 / 생년월일 여 / 19 - -

M 본원 혈액투석 시작일 (YYYY-MM-DD)

M 주당 투석 횟수: 1회 이하 / 1.5회 / 2회 / 2.5회 / 3회 / 3.5회 이상

M HDF 적용 여부: 적용안함 / 주1회 / 주2회 / 매혈액투석

M 혈액투석막의 표면적 크기: 1.0m² 미만 / 1.0 ~ 1.5m² 미만 / 1.5 ~ 2.0m² 미만 / 2.0 ~ 2.5m² 미만 / 2.5m² 이상

M 투석액 종류 1: acetate / bicarbonate / citrate

M 투석액 종류 2: standard calcium / standard calcium + glucose / low calcium

M 혈관접근로

중심정맥도관: 임시 도관 (temporary catheter) / 피하터널도관
우내경정맥 / 좌내경정맥 / 대퇴정맥 / 기타

동정맥루 (자가혈관): forearm (radiocephalic) / upper arm (brachiocephalic) / 기타
right / left

동정맥루 (인조혈관): forearm / upper arm
loop / straight
right / left

기타: 대퇴동정맥루 / necklace / 기타

병용약물

M 조혈제 사용: 사용 안함 / erythropoietin / darbepoietin / CERA (Mircera)

M Ca/P 조절 (중복선택 가능): 사용 안함 / calcium carbonate/acetate / sevelomer or lanthenum
Vit D 경구투여 / Vit D 정맥주사 / cinacalcet / 기타약제

혈압 - 수축기	mmHg	혈압 - 이완기	mmHg
hemoglobin	g/dl	hematocrit	%
albumin	g/dl	creatinine	mg/dl
calcium	mg/dl	phosphorus	mg/dl
total cholesterol	mg/ml	uric acid	mg/dl
PTH	pg/ml	HbA1c	%

환자 재활 상태:
완전 의존/와상상태 (식사도 타인의 도움 필요, 의사소통 어려움)
타인의 도움으로 일상생활 (보호자와 투석 내원, 혼자 화장실 정도)
무직이지만 독립생활 가능 (독립적 식사준비, 혼자 투석 내원)
시간제/임시직 (직업유지에 약간 어려움, 집안일 및 가족 돌봄 가능)
정상적 직업 취업 (투석시간 이외에는 정상인과 같은 활동능력)

합병증 (과거 일년동안에 발생 혹은 지속, 투약중인 경우 모두 선택)

심장질환: 관상동맥질환 / 심부전 / 심낭삼출액 / 부정맥

혈관질환: 뇌혈관질환(뇌졸증) / 고혈압 / 기타 혈관질환

감염증: 폐렴 / 결핵 / 복막염 / Herpes zoster / 혈액투석 도관/동정맥루/ 복막투석 도관
기타 감염증

간 질환: B형 간염 / C형 간염 / 술혈성 간부전 / hemochromatosis / 기타 간염

위장관질환: 위궤양 / 십이지장 궤양 / 변비 (계속적 약제 복용) / 기타 위장관질환

기타: 영양실조(Alb 2.5g/dl 이하) / 악성종양 / 고혈압성 망막증
요독성 피부염 / 요독성 신경염 / 요독성 치매 / 요독성 복수/늑막삼출액
신성 골이양증 (골절이 발생한 경우) / COPD 및 호흡기 질환 (입원 경력있는 경우)
말초혈관질환 / DM foot (입원 및 수술 경력 있는 경우)

최근 일년간 입원 여부: 없음 / 있음 | 최근 일년간 입원 횟수 회

입원원인

감염증: 투석연관 - 혈액투석도관 / 투석연관 - 동정맥루감염
투석연관 - 복막투석도관감염 / 투석연관 - 복막염 / 투석무관 감염

심장합병증: 투석연관 - 심부전 / 투석연관 - 폐부종 / 투석무관 - 심근경색
투석무관 - 허혈성 심장병 / 투석무관 - 부정맥

기타: 간염 / 위장관 질환 / 전신쇠약/영양실조 / 악성종양 / 기타 (위의 모든 것 이외의 원인)

M 필수입력사항 F 자동계산 항목지우기

저장 | 환자목록으로 돌아가기 | 투석적절도

6. 혈액투석 적절도 입력과 결과 화면

혈액투석 적절도

환자 이름 | 성별 / 생년월일 | 여 /

검사일 (YYYY-MM-DD)

혈액 검사

serum creatinine	mg/dl	pre-dialysis BUN	mg/dl
post-dialysis BUN	mg/dl	mid-week pre-dialysis BUN	mg/dl

잔여신기능 검사

잔여신기능: 포함 / 무시

duration of urine collection	hours	urine volume	ml
urine creatinine	mg/dl	urine urea	mg/dl

추가 혈액투석정보

ultrafiltration volume (투석간의 체중증가)	L	일회 투석시간	min
inter-HD interval (mid-week BUN까지 시간)	hours	주당 투석횟수	2회 / 3회

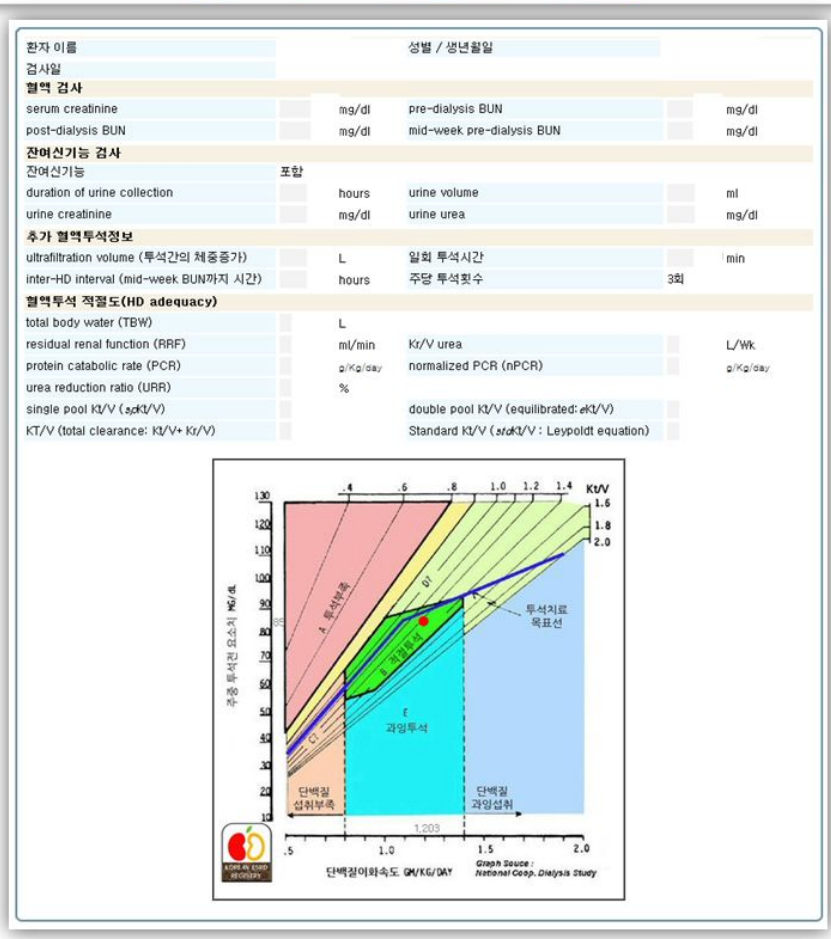
혈액투석 적절도(HD adequacy)

total body water (TBW)	L		
residual renal function (RRF)	ml/min	Kr/V urea	L/Wk
protein catabolic rate (PCR)	g/Kg/day	normalized PCR (nPCR)	g/Kg/day
urea reduction ratio (URR)	%		
single pool Kt/V ($_{sp}$Kt/V)		double pool Kt/V (equilibrated: $_{e}$Kt/V)	
KT/V (total clearance: Kt/V+ Kr/V)		Standard Kt/V ($_{std}$Kt/V : Leypoldt equation)	

* 주의 사항 : 이 투석적절도 계산은 주초에 검사하는 것을 원칙으로 하고 있습니다. 주3회 투석하는 환자의 경우 3일만에 투석을 하는 날에 채취한 검사수치로, 주2회 투석하는 환자의 경우 4일만에 투석을 하는 날에 채취한 검사수치로 입력 하십시오. 또한 mid-week pre dialysis BUN 의 경우는 주3회 투석하는 환자는 2일만에, 주2회 투석하는 환자는 3일만에 투석시작시의 측정치입니다.

필수입력사항 자동계산 항목지우기

이전 | 저장 | 환자목록으로 돌아가기 | 그래프보기



환자 이름 | 성별 / 생년월일

검사일

혈액 검사

serum creatinine	mg/dl	pre-dialysis BUN	mg/dl
post-dialysis BUN	mg/dl	mid-week pre-dialysis BUN	mg/dl

잔여신기능 검사

잔여신기능: 포함

duration of urine collection	hours	urine volume	ml
urine creatinine	mg/dl	urine urea	mg/dl

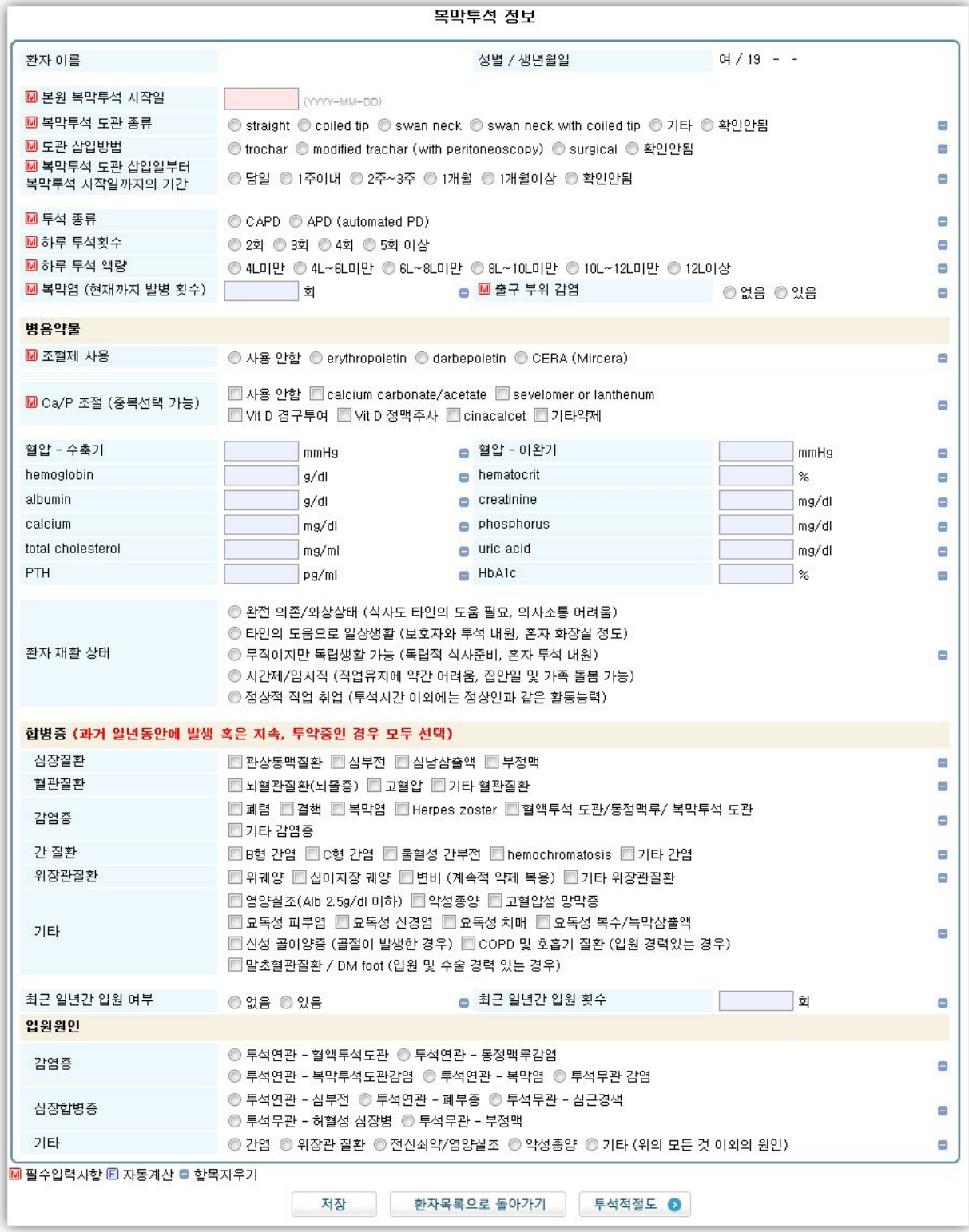
추가 혈액투석정보

ultrafiltration volume (투석간의 체중증가)	L	일회 투석시간	min
inter-HD interval (mid-week BUN까지 시간)	hours	주당 투석횟수	3회

혈액투석 적절도(HD adequacy)

total body water (TBW)	L		
residual renal function (RRF)	ml/min	Kr/V urea	L/Wk
protein catabolic rate (PCR)	g/Kg/day	normalized PCR (nPCR)	g/Kg/day
urea reduction ratio (URR)	%		
single pool Kt/V ($_{sp}$Kt/V)		double pool Kt/V (equilibrated: $_{e}$Kt/V)	
KT/V (total clearance: Kt/V+ Kr/V)		Standard Kt/V ($_{std}$Kt/V : Leypoldt equation)	

7. 복막투석 정보 입력 화면



복막투석 정보

환자 이름		성별 / 생년월일	여 / 19 - -
Ⓜ 본원 복막투석 시작일	(YYYY-MM-DD)		
Ⓜ 복막투석 도관 종류	◎ straight ◎ coiled tip ◎ swan neck ◎ swan neck with coiled tip ◎ 기타 ◎ 확인안됨		
Ⓜ 도관 삽입방법	◎ trochar ◎ modified trachar (with peritoneoscopy) ◎ surgical ◎ 확인안됨		
Ⓜ 복막투석 도관 삽입일부터 복막투석 시작일까지의 기간	◎ 당일 ◎ 1주이내 ◎ 2주~3주 ◎ 1개월 ◎ 1개월이상 ◎ 확인안됨		
Ⓜ 투석 종류	◎ CAPD ◎ APD (automated PD)		
Ⓜ 하루 투석횟수	◎ 2회 ◎ 3회 ◎ 4회 ◎ 5회 이상		
Ⓜ 하루 투석 액량	◎ 4L미만 ◎ 4L~6L미만 ◎ 6L~8L미만 ◎ 8L~10L미만 ◎ 10L~12L미만 ◎ 12L이상		
Ⓜ 복막염 (현재까지 발병 횟수)	회	Ⓜ 출구 부위 감염	◎ 없음 ◎ 있음

병용약물

Ⓜ 조혈제 사용	◎ 사용 안함 ◎ erythropoietin ◎ darbepoietin ◎ CERA (Mircera)
Ⓜ Ca/P 조절 (중복선택 가능)	☐ 사용 안함 ☐ calcium carbonate/acetate ☐ sevelomer or lanthenum ☐ Vit D 경구투여 ☐ Vit D 정맥주사 ☐ cinacalcet ☐ 기타약제

혈압 - 수축기	mmHg	혈압 - 이완기	mmHg
hemoglobin	g/dl	hematocrit	%
albumin	g/dl	creatinine	mg/dl
calcium	mg/dl	phosphorus	mg/dl
total cholesterol	mg/ml	uric acid	mg/dl
PTH	pg/ml	HbA1c	%

환자 재활 상태	◎ 완전 의존/와상상태 (식사도 타인의 도움 필요, 의사소통 어려움) ◎ 타인의 도움으로 일상생활 (보호자와 투석 내원, 혼자 화장실 정도) ◎ 무직이지만 독립생활 가능 (독립적 식사준비, 혼자 투석 내원) ◎ 시간제/임시직 (직업유지에 약간 어려움, 집안일 및 가족 돌봄 가능) ◎ 정상적 직업 취업 (투석시간 이외에는 정상인과 같은 활동능력)

합병증 (과거 일년동안에 발생 혹은 지속, 투약중인 경우 모두 선택)

심장질환	☐ 관상동맥질환 ☐ 심부전 ☐ 심낭삼출액 ☐ 부정맥
혈관질환	☐ 뇌혈관질환(뇌졸증) ☐ 고혈압 ☐ 기타 혈관질환
감염증	☐ 폐렴 ☐ 결핵 ☐ 복막염 ☐ Herpes zoster ☐ 혈액투석 도관/동정맥루/ 복막투석 도관 ☐ 기타 감염증
간 질환	☐ B형 간염 ☐ C형 간염 ☐ 출혈성 간부전 ☐ hemochromatosis ☐ 기타 간염
위장관질환	☐ 위궤양 ☐ 십이지장 궤양 ☐ 변비 (계속적 약제 복용) ☐ 기타 위장관질환
기타	☐ 영양실조(Alb 2.5g/dl 이하) ☐ 악성종양 ☐ 고혈압성 망막증 ☐ 요독성 피부염 ☐ 요독성 신경염 ☐ 요독성 치매 ☐ 요독성 복수/늑막삼출액 ☐ 신성 골이양증 (골절이 발생한 경우) ☐ COPD 및 호흡기 질환 (입원 경력있는 경우) ☐ 말초혈관질환 / DM foot (입원 및 수술 경력 있는 경우)

최근 일년간 입원 여부	◎ 없음 ◎ 있음	최근 일년간 입원 횟수	회

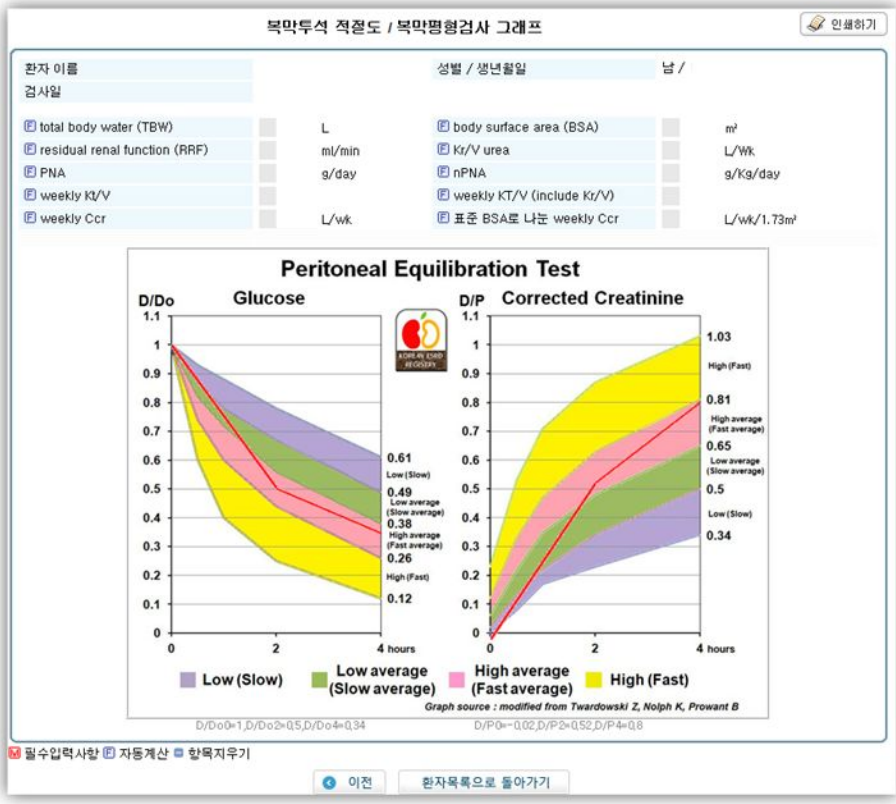
입원원인

감염증	◎ 투석연관 - 혈액투석도관 ◎ 투석연관 - 동정맥루감염 ◎ 투석연관 - 복막투석도관감염 ◎ 투석연관 - 복막염 ◎ 투석무관 감염
심장합병증	◎ 투석연관 - 심부전 ◎ 투석연관 - 폐부종 ◎ 투석무관 - 심근경색 ◎ 투석무관 - 허혈성 심장병 ◎ 투석무관 - 부정맥
기타	◎ 간염 ◎ 위장관 질환 ◎ 전신쇠약/영양실조 ◎ 악성종양 ◎ 기타 (위의 모든 것 이외의 원인)

Ⓜ 필수입력사항 Ⓕ 자동계산 ⊖ 항목지우기

저장 | 환자목록으로 돌아가기 | 투석적절도

8. 복막투석 적절도, 평형검사 입력 및 결과 화면



9. 신장이식, 전원, 사망 등록 화면