등록사업보고

우리나라 신대체요법의 현황

-인산 민병석교수 기념 말기신부전 환자 등록사업 2016-

대한신장학회 등록위원회

Current Renal Replacement Therapy in Korea

- Insan Memorial Dialysis Registry, 2016 -

ESRD Registry Committee, Korean Society of Nephrology*

=Abstracts=

The 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 2016 was as follows:

1) The total number of patients with renal replacement therapy (RRT) was 93,884 (hemodialysis: HD 68,853 peritoneal dialysis: PD 6,842, functioning kidney transplant: KT 18,189). Prevalence of RRT was 1,816 patients per million population (pmp). The proportion of RRT was HD 73%, PD 7%, and renal transplant 19%. New RRT patients in 2016 were 16,068 (HD 13,049, PD 786, KT 2,233). Incidence rate was 311 pmp in 2016.

2) The most common primary cause of end stage renal diseases was diabetic nephropathy (50.2%), hypertensive nephrosclerosis (20.3%) and chronic glomerulonephritis (8.4%), in order.

3) The number of RRT centers was 896 and total number of HD machines was 24,115. Dialysis patients' individual data were collected from 53.9% of overall RRT centers.

4) Mean age of HD patient was 62.3 years old, of PD was 53.8 years old. Proportion of patients on HD more than 5 years' maintenance was 45%. Mean blood pressure was 99.3mmHg in HD and 98.0mmHg in PD patients. Pulse pressure was 66.7 mmHg in HD and 53.5 mmHg in PD patients. Mean hemoglobin of HD patient was 10.4 g/dL (hematocrit 31.8%), PD was 10.3 g/dL. Mean urea reduction ratio was 69.4% in male HD patients and 75.5% in female HD patients. Mean single pool Kt/V was 1.44 in male patient, 1.72 in female patients.

5) Common causes of death were unknown cause or not uremia associated cardiac arrest (19.3%), uremia associated cardiac arrest (13.3%), sepsis (10.2%), pulmonary infection (9.3%) and cerebrovascular accident (6.2%) in 2016. Overall patient survival of male dialysis patient in 5 years was 60.7%, female patients was 63.8%. HD patient's 5 year survival was 62.2% and PD was 60.3%. Five year survival of diabetic dialysis patients was 53.9%, chronic glomerulonephritis patients 78.2%, hypertensive nephrosclerosis patients 69.7%, respectively.

6) Survey on rehabilitation status of dialysis patients showed that 23% of HD patients have full time job and 10% have part time job. 35% of PD patients have full time job, and 16% have part time job.

7) The number of kidney transplantation was 2,233 (deceased donor 901) in 2016.

8) Survey on diabetic dialysis patients showed that followings: More male patients in diabetics (DM) dialysis patient (60%) than in non-DM dialysis patients (56%). About 51% of non-DM patients, but 38% of DM patients have been under more than 5 years. Body mass index of DM patient was 23.0 and non-DM patients 21.9. The pulse pressure of DM patients was higher than non-DM patients (71.5 versus 62.6mmHg). For the vascular access, lower proportion of DM patients had native vessel arteriovenous fistula than non-DM HD patients (73% vs 78%). The mean of serum creatinine level of DM HD patients was 8.4mg/dl but that of non-DM HD patients was 9.5mg/dl, also phosphorus level was lower in elderly HD patient, 4.7 and 5.0mg/dl, respectively. The dialysis adequacy (Kt/V) was lower in DM patients than that of non-DM patients. Prevalence of coronary artery disease and cerebrovascular diseases in DM patients were higher than in non-DM dialysis patients. About 28% of non-DM dialysis patients but only 17% of DM dialysis patient had full time job.

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

---

* ESRD registry committee, Korean Society of Nephrology:
- Director: Dong-Chan Jin (Catholic Univ. of Korea; jindongc@catholic.ac.kr)
- Members: Sung Ro Yoon (Kyunyang Univ.), Seoung Woo Lee (Inha Univ.), Sang Woong Han (Hanyang Univ.), Won Kim (Jeonbuk Univ.), Jongha Park (Ulsan Univ.), Yong Kyun Kim (Catholic Univ.)

Part 1. Prevalence and Incidence of ESRD (1)

Table 1-1. Prevalence of renal replacement therapy.

	HD		PD		Transplant		Total	
1980	198	(4.9)	30	(0.7)	-	-	228	(6.0)
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)
2002	20,010	(412.4)	5,712	(117.7)	8,271	(170.5)	33,993	(700.6)
2004	25,335	(516.5)	7,569	(154.3)	8,987	(183.2)	41,891	(854.0)
2006	29,031	(585.0)	7,990	(161.0)	9,709	(195.7)	46,730	(941.7)
2008	33,427	(663.3)	7,840	(155.6)	10,722	(212.8)	51,989	(1031.6)
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)
2013	52,378	(1006.1)	7,540	(144.8)	15,124	(290.5)	75,042	(1441.5)
2014	57,256	(1115.3)	7,423	(144.6)	15,995	(311.6)	80,674	(1571.5)
2015	62,634	(1215.5)	7,352	(142.7)	17,028	(330.5)	87,014	(1688.6)
2016	68,853	(1331.9)	6,842	(132.4)	18,189	(351.8)	93,884	(1816.1)

( ): Number of patients per million population. Rep. of Korea's population at the end of 2016: 51,696,216.

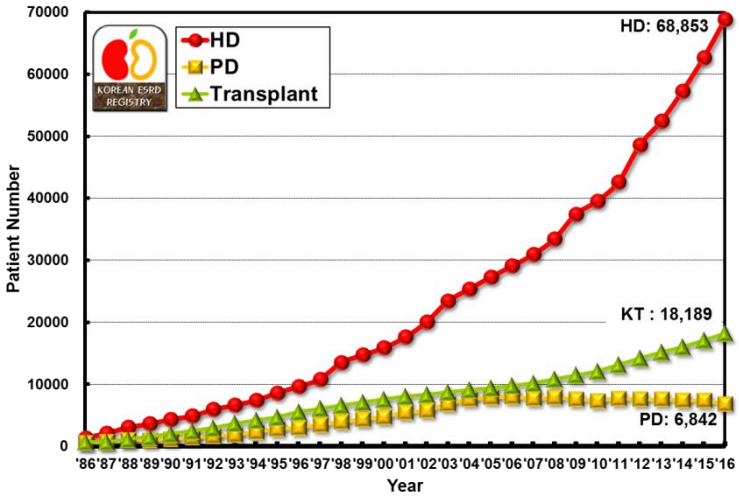


Fig.1-1. Patient numbers of renal replacement therapy at the end of each year.

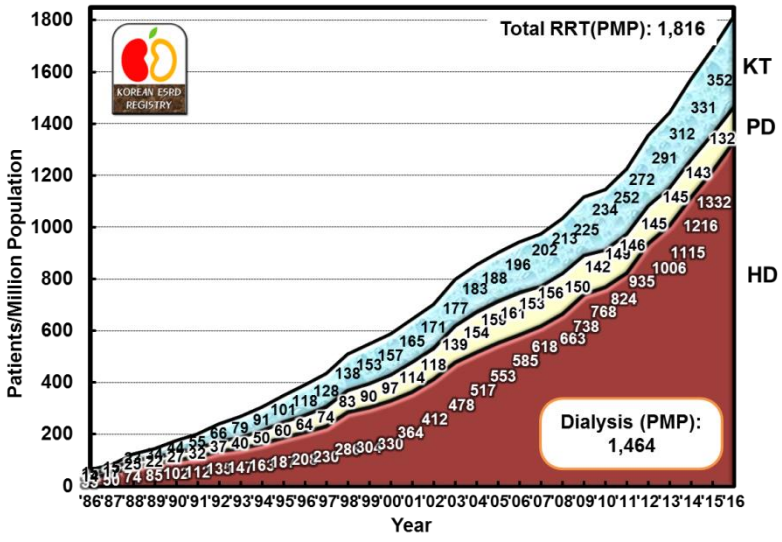


Fig.1-2. Point prevalence of renal replacement therapy (Patients numbers per million population, HD; hemodialysis, PD; peritoneal dialysis, KT; kidney transplantation).

Part 1. Prevalence and 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)
2002	3,878	(79.9)	1,666	(34.3)	739	(15.2)	6,283	(129.5)
2004	5,279	(107.6)	2,246	(45.8)	853	(17.4)	8,378	(170.8)
2006	5,694	(114.7)	2,568	(51.7)	935	(18.8)	9,197	(185.3)
2008	6,415	(127.3)	1,619	(32.1)	1,145	(22.7)	9,179	(182.1)
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)
2013	9,543	(183.3)	884	(17.0)	1,756	(33.7)	12,183	(234.0)
2014	10,594	(206.4)	867	(16.9)	1,680	(32.7)	13,141	(256.0)
2015	12,011	(233.1)	854	(16.6)	1,891	(36.7)	14,756	(286.4)
2016	13,049	(252.4)	786	(15.2)	2,233	(43.2)	16,068	(310.8)

( ): Number of patients per million population. Rep. of Korea's population at the end of 2016: 51,696,216.

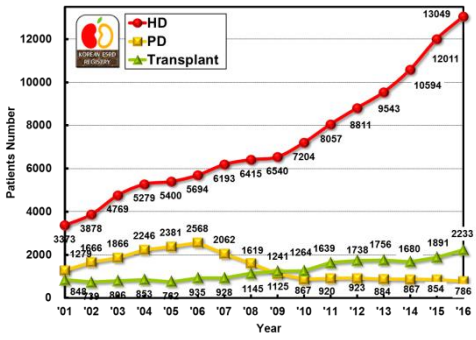


Fig.1-3. New renal replacement therapy patients number in each year.

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

Causes	Percent (%)													
	1992	1994	1996	1998	2000	2002	2004	2006	2008	2010	2012	2014	2015	2016
Chronic Glomerulonephritis	25.3	25.5	21.6	17.9	14	13.9	12.5	13.0	12.1	11.3	8.1	8.2	8.5	8.4
Not Histologically confirmed	19.7	20.4	16.7	13.6	10.6	10.0	8.6	9.0	8.2	7.7	4.5	4.4	4.2	3.8
Histologically confirmed	5.6	5.0	4.9	4.3	3.4	3.9	3.9	3.9	3.8	3.6	3.6	3.8	4.3	4.5
Diabetic nephropathy	19.5	26.1	30.8	38.9	40.7	40.7	43.4	42.3	41.9	45.2	50.6	48.0	48.4	50.2
Hypertensive nephrosclerosis	15.4	20.8	18.3	17.8	16.6	16	16.2	16.9	18.7	19.2	18.5	21.2	20.2	20.3
Cystic kidney disease	2.1	2.2	1.8	1.7	2.2	1.6	1.4	1.7	1.7	1.7	1.8	1.8	1.9	1.5
Renal tuberculosis	1.1	1.5	1.2	0.5	0.4	0.5	0.3	0.3	0.2	0.2	0.0	0.1	0.1	0.1
Pyelo/interstitial nephritis	1.3	1.1	0.7	1.0	0.8	0.6	0.6	0.6	0.5	0.4	0.5	0.8	0.3	0.4
Drugs or nephrotoxic agents	1.3	0.1	0.6	0.3	0.3	0.4	0.2	0.3	0.3	0.3	0.4	0.2	0.6	0.3
Lupus nephritis	0.8	0.7	1.0	0.5	0.9	0.8	0.6	0.6	0.6	0.5	0.6	0.5	0.3	0.5
Gouty nephropathy	0.7	0.7	0.6	0.5	0.7	0.4	0.5	0.3	0.3	0.4	0.3	0.3	0.4	0.3
Hereditary nephropathy	0.3	0.7	0.4	0.2	0.1	0.2	0.3	0.3	0.3	0.2	0.5	0.5	0.4	0.5
Kidney tumor	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.3
Other	4.1	2.7	2.8	3.9	3.0	5.6	5.9	6.0	5.8	5.1	6.8	6.1	6.3	5.5
Uncertain	28.6	17.8	15.9	16.6	20.2	19	17.8	17.5	17.6	15.3	11.4	12.1	12.3	11.7

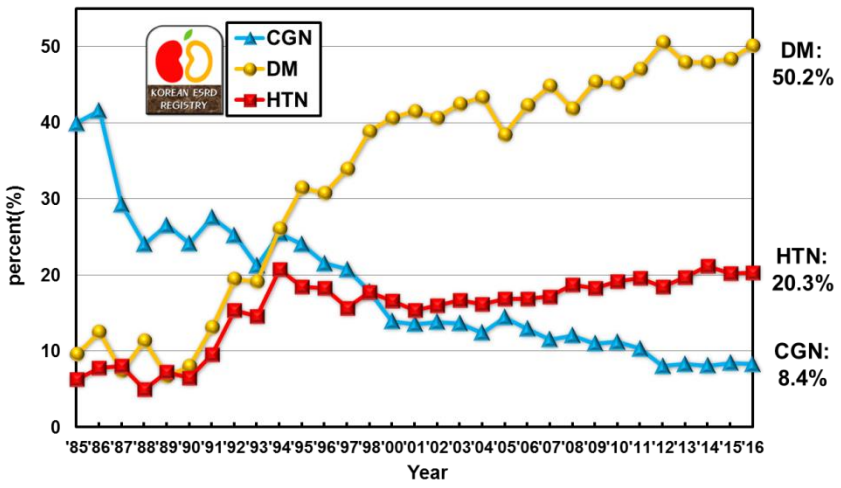


Fig.1-4. Three major causes of end stage renal disease patients who were initiated renal replacement therapy in each year. (DM: diabetic nephropathy, CGN: chronic glomerulonephritis, HTN: hypertensive nephrosclerosis). Note increase of DM and decrease of CGN.

Part 2. Renal Replacement Therapy Modalities

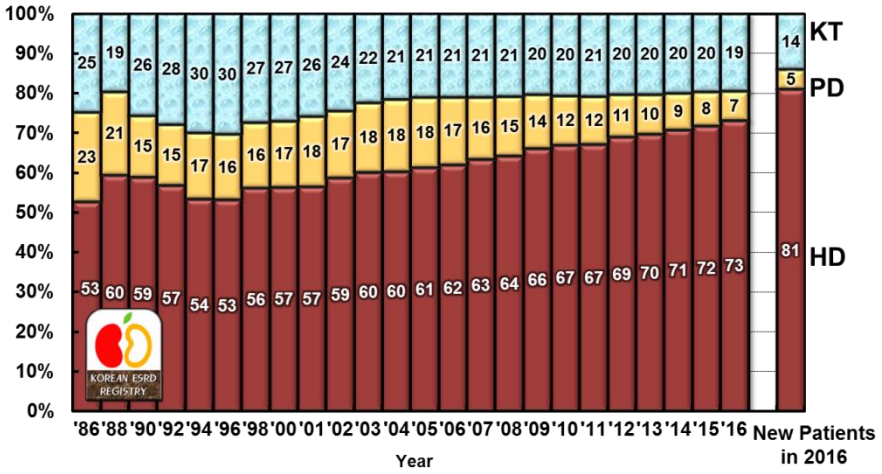


Fig. 2-1. Proportion of renal replacement modalities, annual prevalence and incidence. HD: hemodialysis, PD: peritoneal dialysis, KT: kidney transplantation.

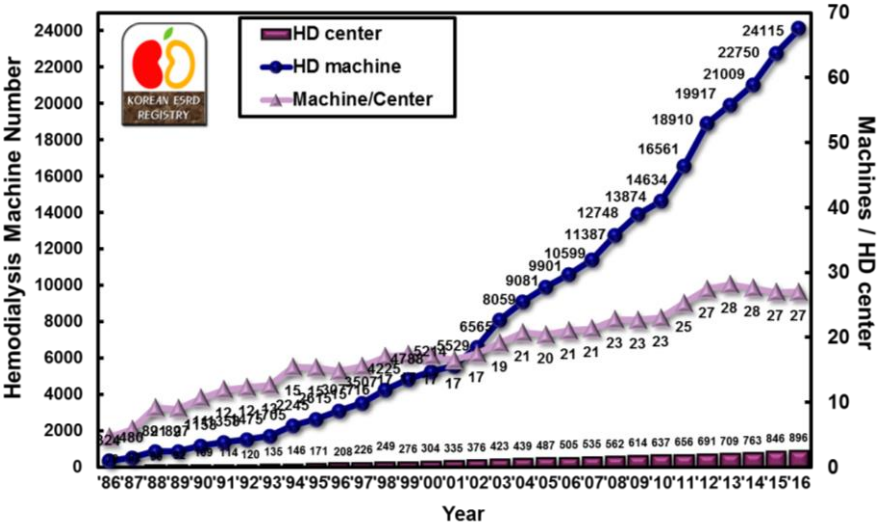


Fig. 2-2. Numbers of dialysis centers, hemodialysis (HD) machines and machine per each dialysis center in Korea.

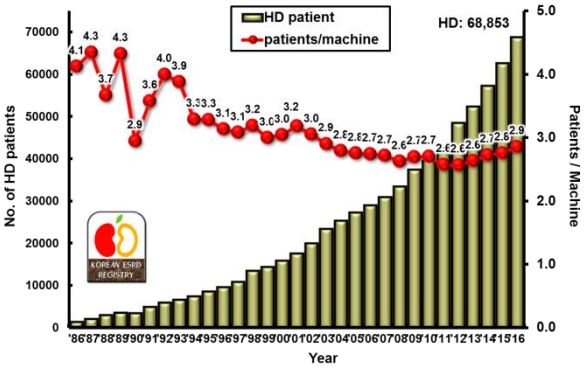


Fig. 2-3. Number of hemodialaysis (HD) patients and hemodialysis patients per hemodialysis machine.

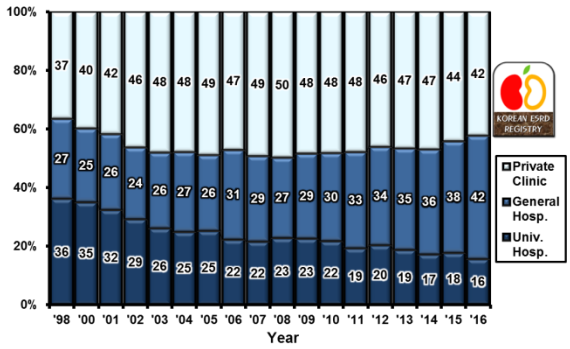


Fig. 2-4. Percentage of hemodialysis patients number according to dialysis center.

Part 3. Regional Distribution of Patients & Facilities

Table 3-1. 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	15,187	2,003	17,190	1,731	187	4,949	3.1
부산 Busan	5,325	853	6,178	1,766	63	1,767	3.0
대구 Daegu	3,924	577	4,501	1,812	41	1,185	3.3
인천 Incheon	3,653	305	3,958	1,345	42	1,304	2.8
광주 Gwangju	2,348	220	2,568	1,748	40	958	2.5
대전 Daejeon	1,589	276	1,865	1,232	21	616	2.6
울산 Ulsan	1,539	81	1,620	1,382	21	522	2.9
경기 Gyeonggi	14,528	1,322	15,850	1,246	187	5,132	2.8
강원 Gangwon	2,157	352	2,509	1,618	30	750	2.9
충북 Chungbuk	2,295	84	2,379	1,495	31	806	2.8
충남 Chungnam	2,721	127	2,848	1,217	44	1,104	2.5
전북 Jeonbuk	2,248	97	2,345	1,258	30	1,001	2.2
전남 Jeonnam	2,433	140	2,573	1,351	41	1,019	2.4
경북 Gyeongbuk	3,532	111	3,643	1,349	49	1,152	3.1
경남 Gyeongnam	4,277	192	4,469	1,325	55	1,485	2.9
제주 Jeju	1,097	102	1,199	1,869	14	365	3.0
Total	68,853	6,842	75,695	1,464	896	24,115	2.9

Table 3-2. 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)	25,590,465	33,368	3,630	36,998	1,446	416	11,385	2.9
	49.5%	48.5%	53.1%	48.9%		46.4%	47.2%	
충청권 Chungchung (Daejeon, Chungnam, Chungbuk)	5,445,770	6,605	487	7,092	1,302	96	2,526	2.6
	10.5%	9.6%	7.1%	9.4%		10.7%	10.5%	
호남권 Honam (Gwangju, Jeonnam, Jeonbuk)	5,237,919	7,029	457	7,486	1,429	111	2,978	2.4
	10.1%	10.2%	6.7%	9.9%		12.4%	12.3%	
영남권 Youngnam (Busan, Daegu, Gyeongnam, Gyeongbuk, Ulsan)	13,229,659	18,597	1,814	20,411	1,543	229	6,111	3.0
	25.6%	27.0%	26.5%	27.0%		25.6%	25.3%	
강원권 Gangwon	1,550,806	2,157	352	2,509	1,618	30	750	2.9
	3.0%	3.1%	5.1%	3.3%		3.3%	3.1%	
Total	51,696,216	68,853	6,842	75,695	1,464	896	24,115	2.9

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

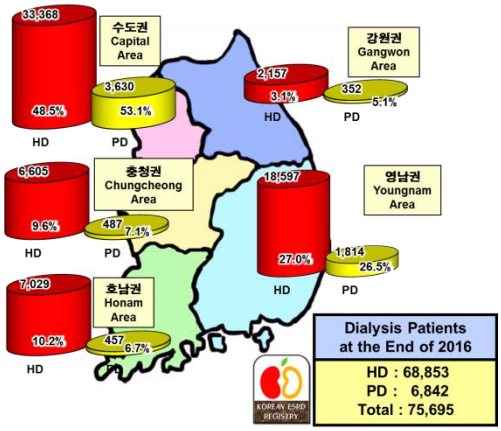


Fig. 3-1. Distribution of dialysis patients and machines according to life zone.

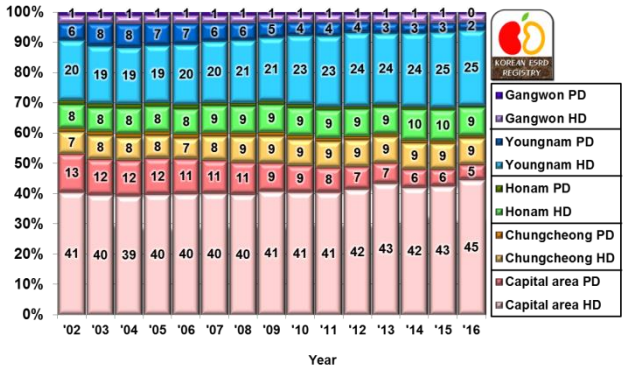


Fig. 3-2. Regional proportion of dialysis patient number in each year.

Part 4. Dialysis Patients Demographics (1)

Table 4-1. Dialysis centers contributing individual patient data.

	Dialysis Centers*	Internet Input	Paper Data	Total Contributed Centers	Contributing Rate (%)
서울 Seoul	164	100	0	100	61.0
부산 Busan	55	29	1	30	54.5
대구 Daegu	36	19	0	19	52.8
인천 Incheon	37	22	0	22	59.5
광주 Gwangju	35	14	1	15	42.9
대전 Daejeon	18	7	0	7	38.9
울산 Ulsan	18	9	0	9	50.0
경기 Gyeonggi	166	79	3	82	49.4
강원 Gangwon	26	12	1	13	50.0
충북 Chungbuk	27	13	1	14	51.9
충남 Chungnam	39	19	1	20	51.3
전북 Jeonbuk	26	10	0	10	38.5
전남 Jeonnam	36	19	0	19	52.8
경북 Gyeongbuk	42	25	0	25	59.5
경남 Gyeongnam	49	33	0	33	67.3
제주 Jeju	13	6	0	6	46.2
Total	787	416	8	424	53.9

* 투석의료기관 수에서 비윤리 의료기관 및 소수 환자 의료기관(약 90개소)은 제외함.

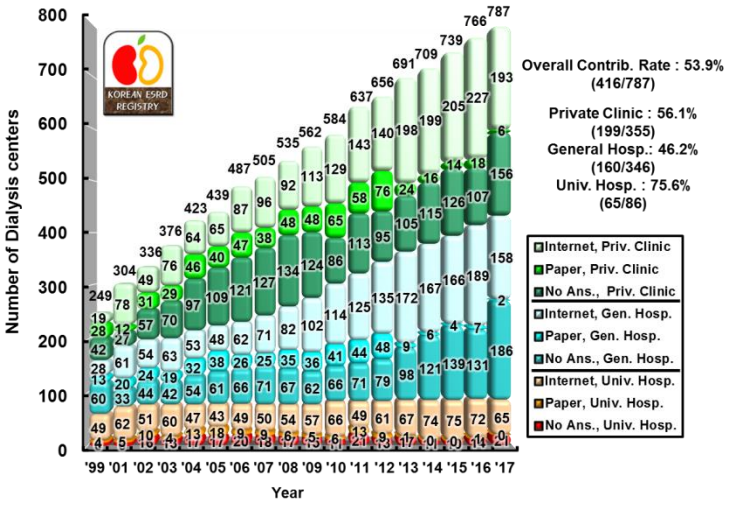


Fig.4-1. Individual patients data contributing rate of dialysis centers according to hospital classification in each year.

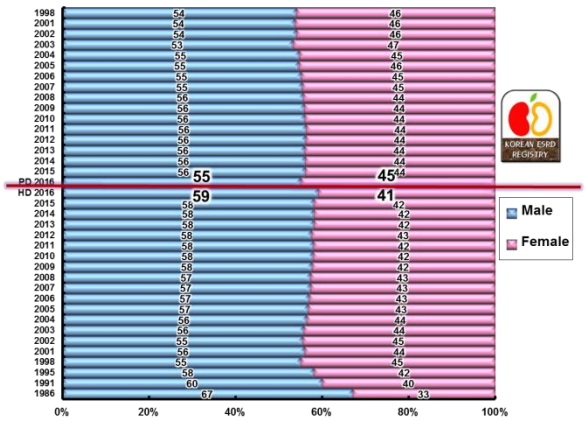


Fig.4-2. Gender ratio of HD & PD patients according to years.

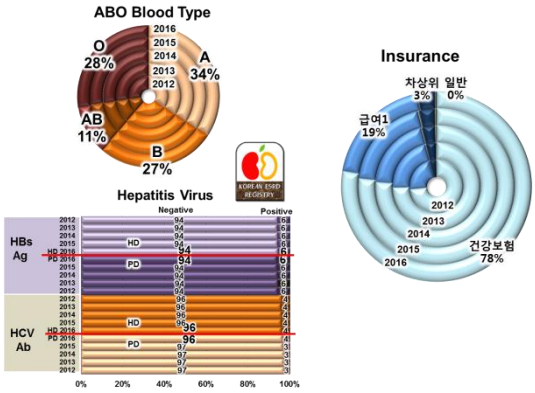


Fig.4-3. ABO blood type and hepatitis virus, medical insurance of HD & PD patients.

Part 4. Dialysis Patients Demographics (2) - Age

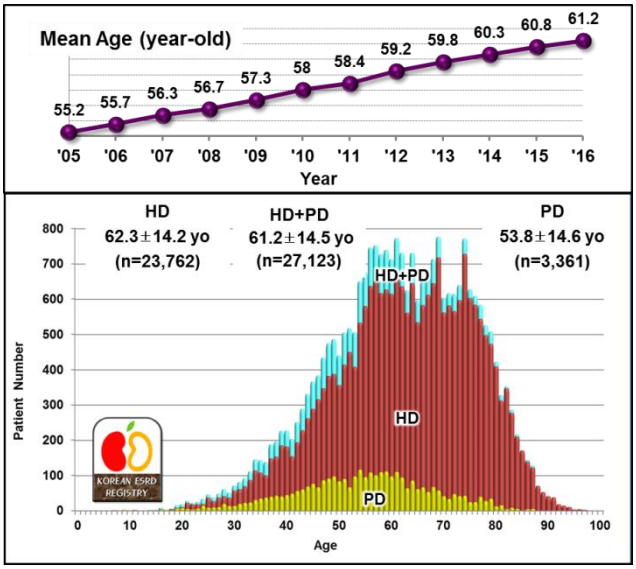


Fig.4-4. Age distribution of dialysis patients according to dialysis modalities.

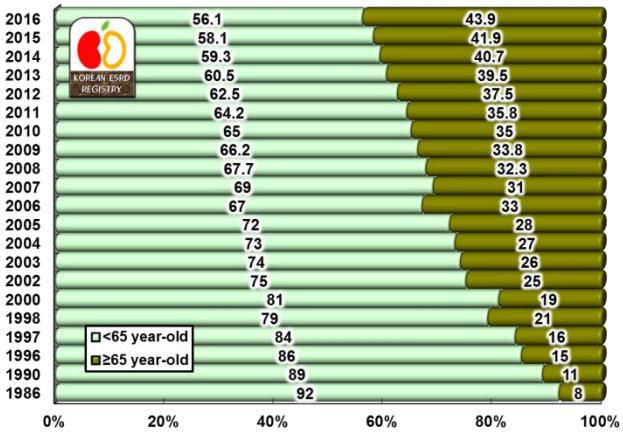


Fig.4-5. Elderly dialysis patient (over 65 year-old) proportion according to year.

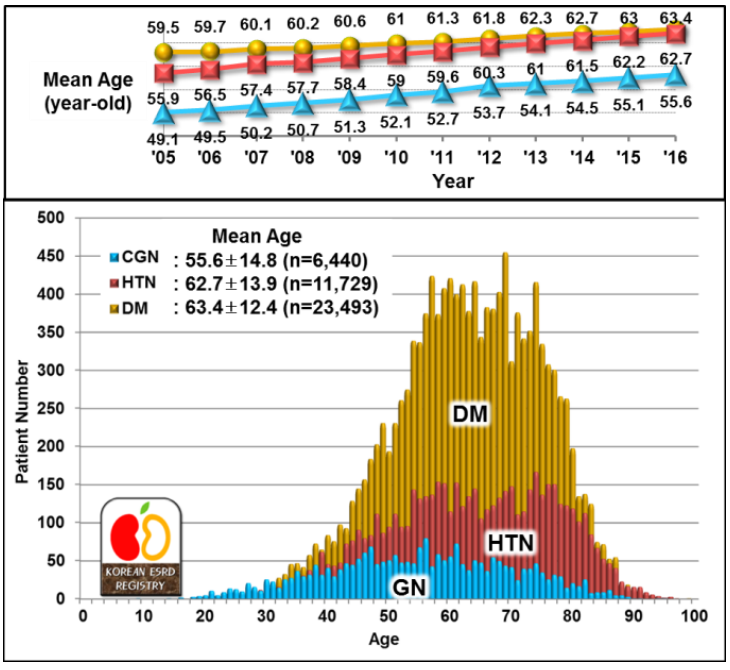


Fig.4-6. Age distribution of dialysis patients according to underlying diseases, diabetic patients (DM), hypertensive nephrosclerosis (HTN) and glomerulonephritis (GN). Note the difference of peak age between GN

Part 4. Dialysis Patients Demographics (3) – Dialysis Duration & BMI

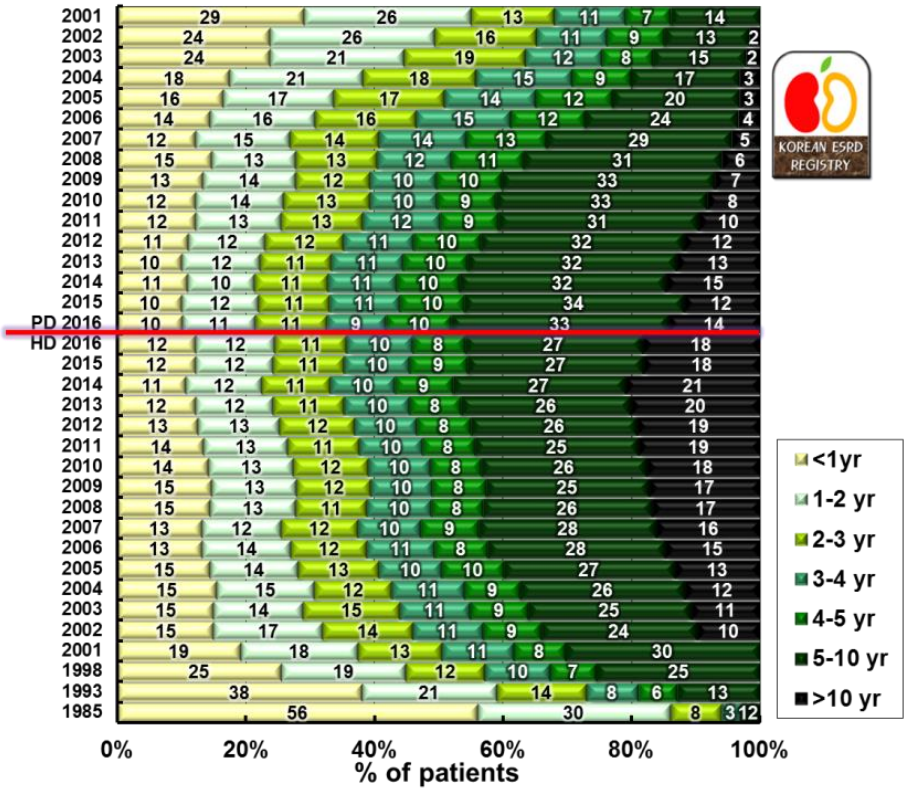


Fig.4-7. Duration of maintenance hemodialysis and peritoneal dialysis. Percent of estimated patient number according to year.

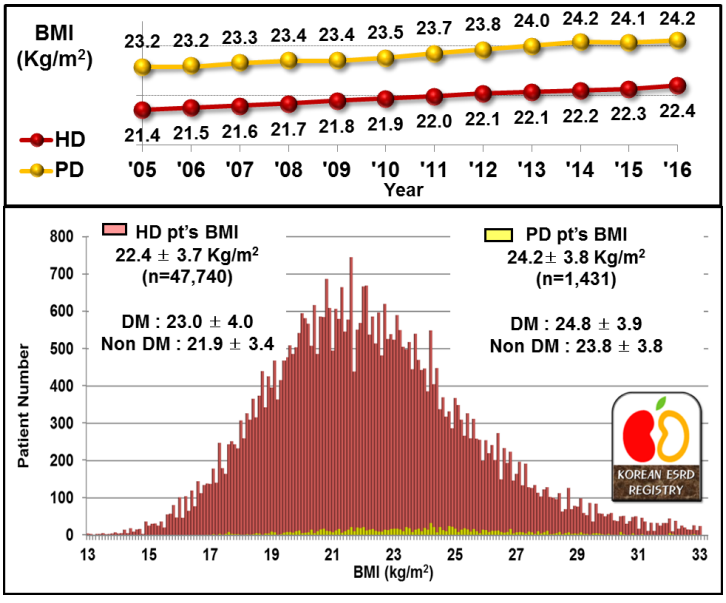


Fig.4-8. Distribution of body mass index (BMI) in hemodialysis (HD) and peritoneal dialysis (PD) patients.

Part 4. Dialysis Patients Demographics (4) – BP

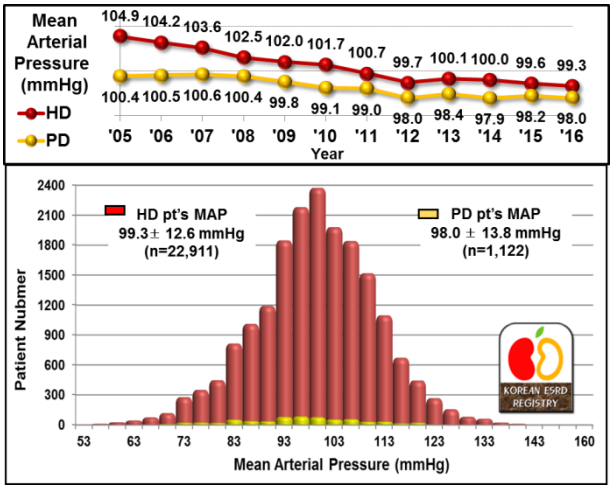


Fig.4-9. Distribution of mean blood pressure (MBP) in hemodialysis and peritoneal dialysis patients. Blood pressure was higher in HD patients than in PD patients.

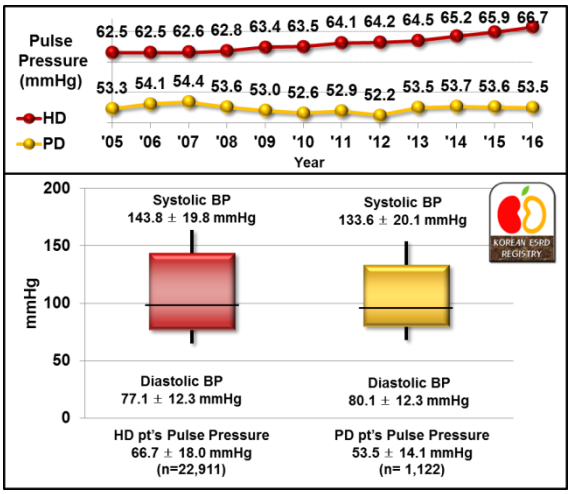


Fig.4-10. Systolic and diastolic blood pressure with pulse pressure in HD and PD patients. Note the difference of pulse pressure between HD and PD patients.

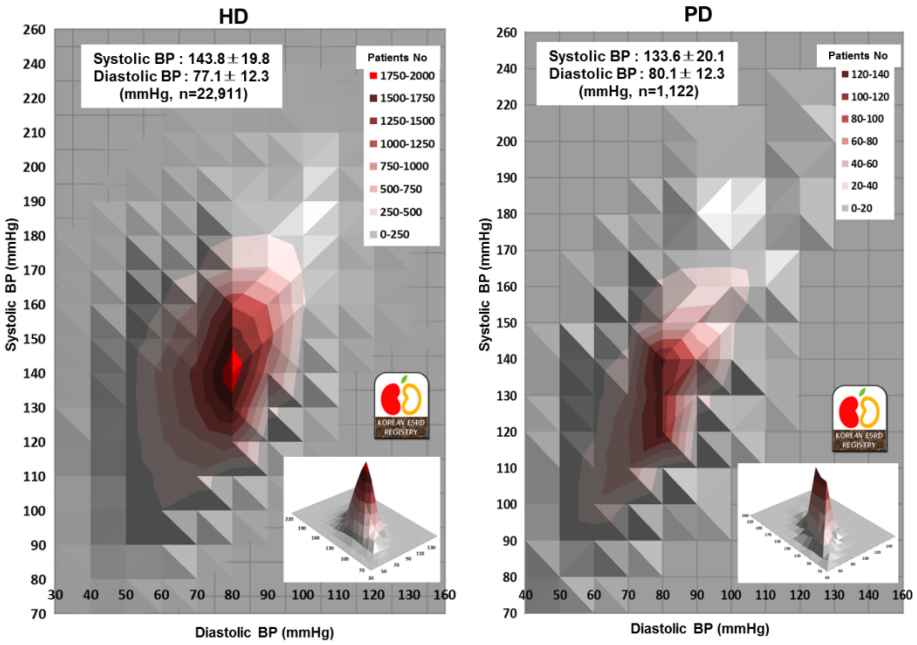


Fig.4-11. HD and PD patients' number distribution according to systolic and diastolic blood pressure.

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

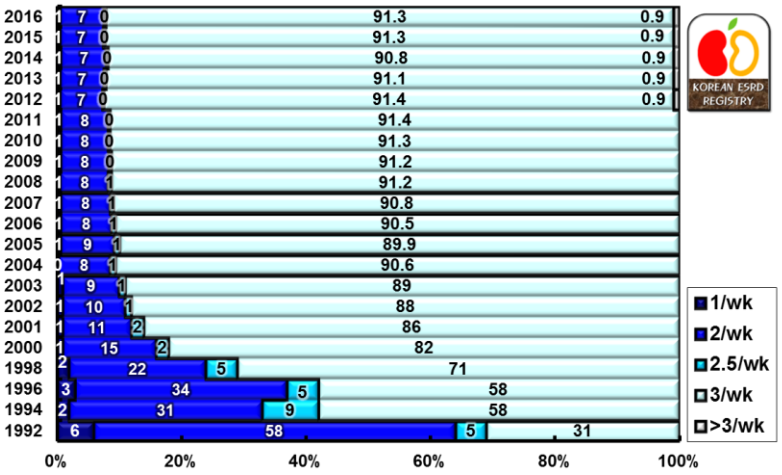


Fig.5-1. Frequency of HD per week.

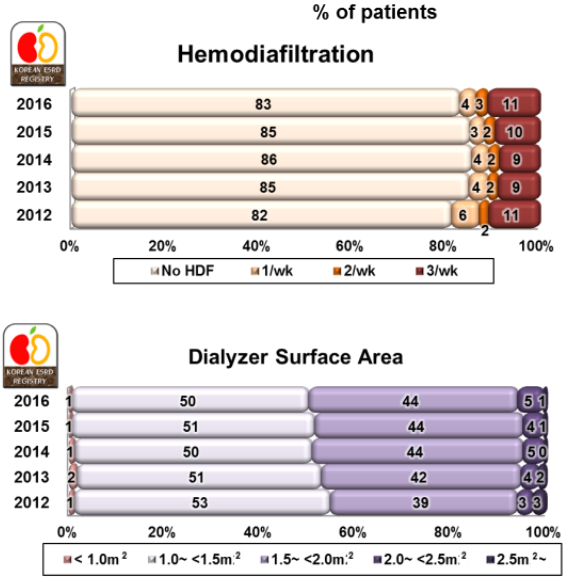
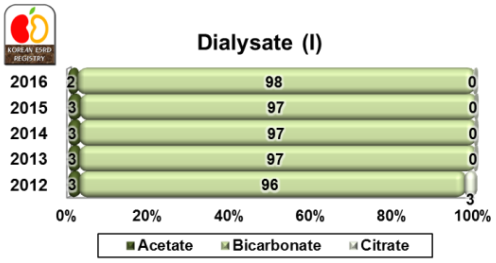


Fig. 5-2. Percent of hemodiafiltration (HDF) applied patients and dialyzer membrane surface area.



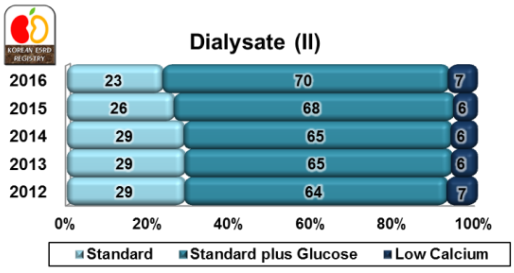


Fig.5-3. HD dialysate.

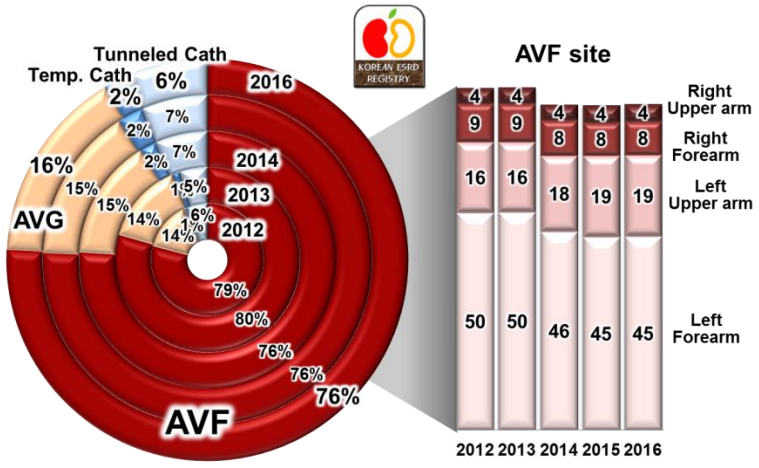


Fig.5-4. Vascular access for hemodialysis.

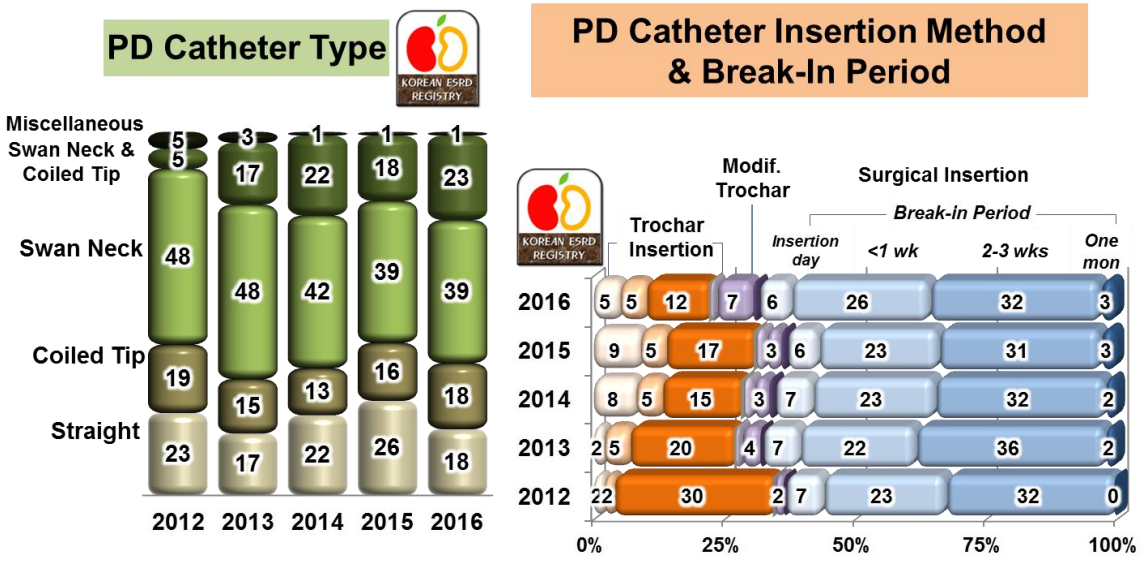


Fig.5-5. PD catheter type and PD catheter insertion methods.

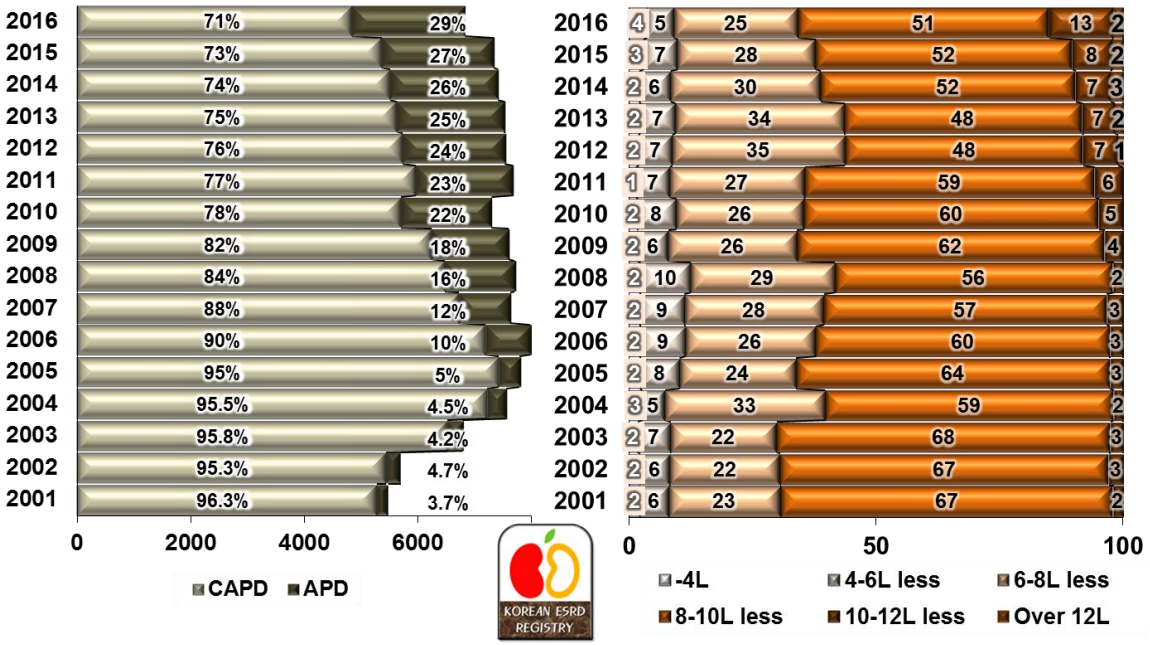
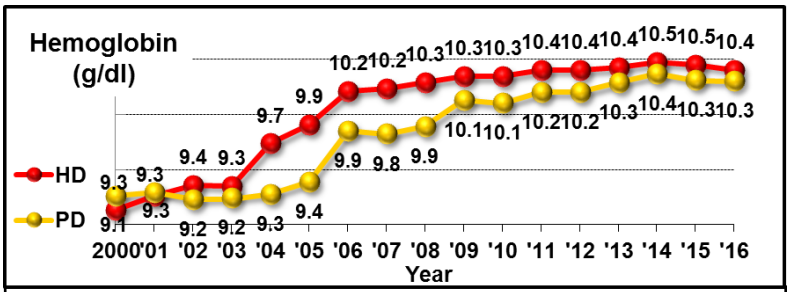


Fig.5-6. Percent distribution of PD type and dialysate doses according to year.

Part 6. Laboratory Data & Drugs (1) – Anemia & Erythropoietin



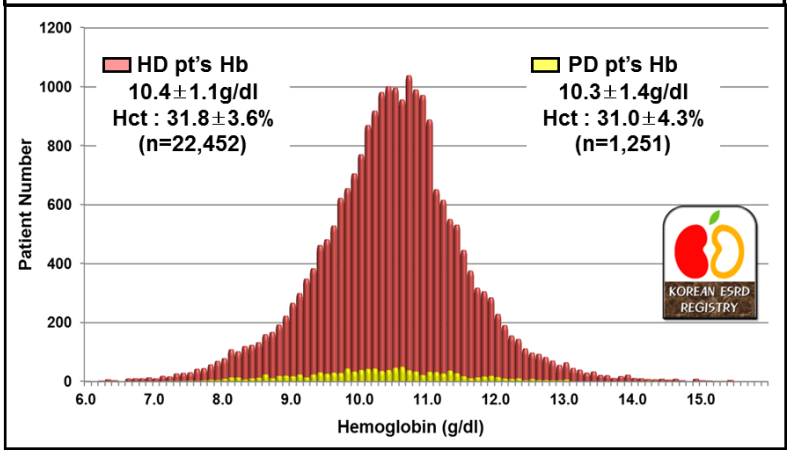


Fig.6-1. Distribution of hemoglobin levels in HD and PD patients.

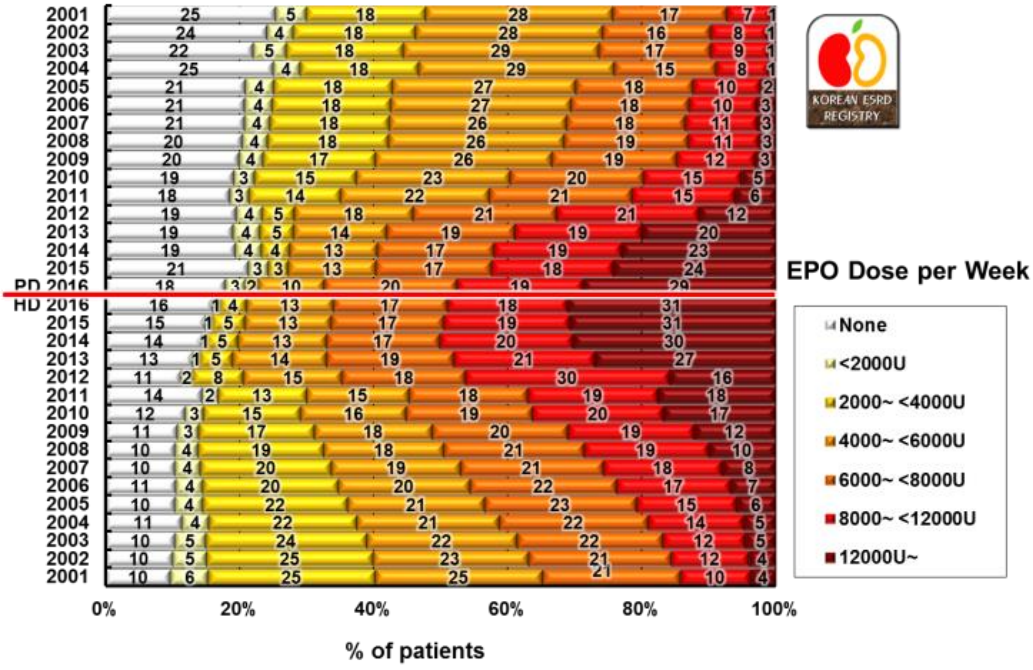


Fig.6-2. Percent distribution of erythropoietin doses prescribed for hemodialysis and peritoneal dialysis patients.

Part 6. Laboratory Data & Drugs (2) – Calcium & Phosphorus

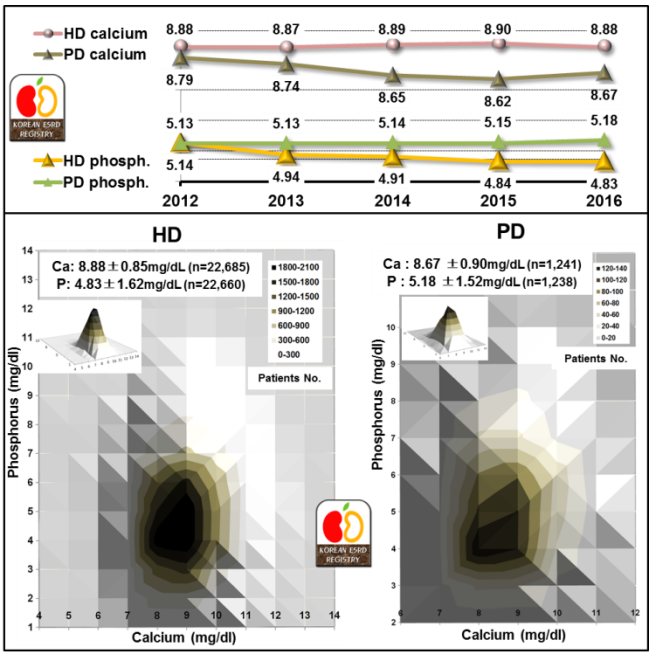


Fig.6-3. Distribution of patients numbers according to calcium and phosphorus level.

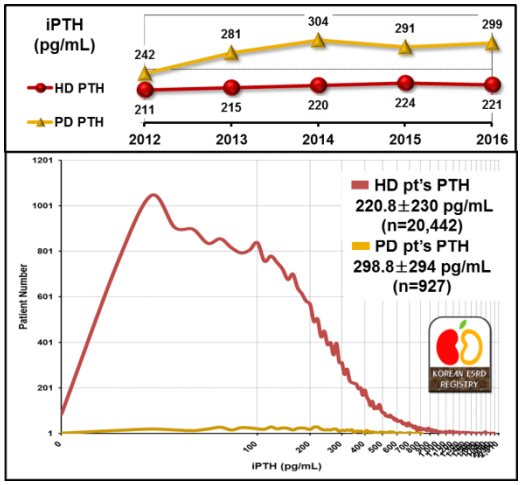


Fig.6-4. PTH level of HD and PD patients. (x-axis is on logarithmic scale.)

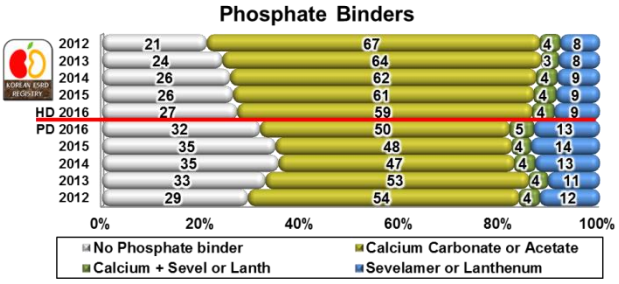


Fig.6-5. Phosphate binders.

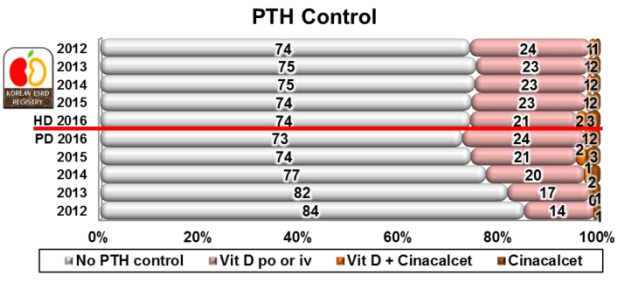


Fig.6-6. Medications for PTH control.

Part 6. Laboratory Data & Drugs (3) – Miscellaneous Lab Data

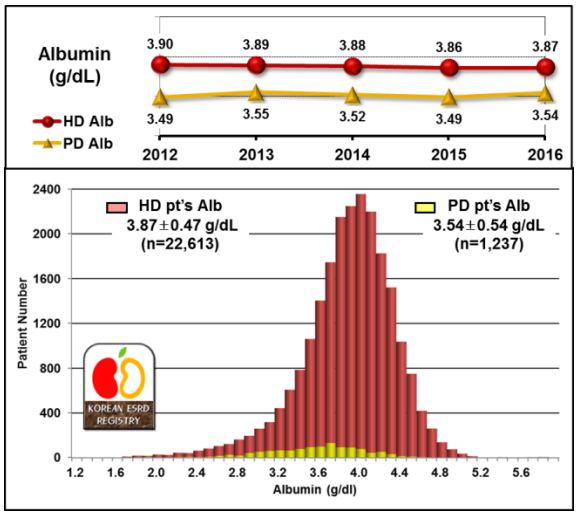


Fig. 6-7. Albumin level of HD and PD patients.

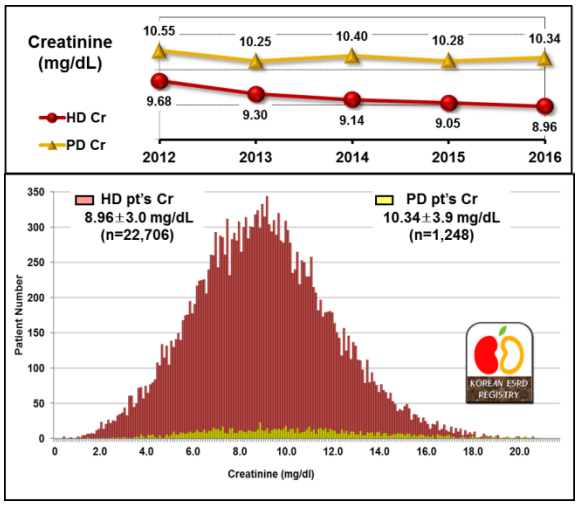


Fig. 6-8. Creatinine level of HD and PD patients.

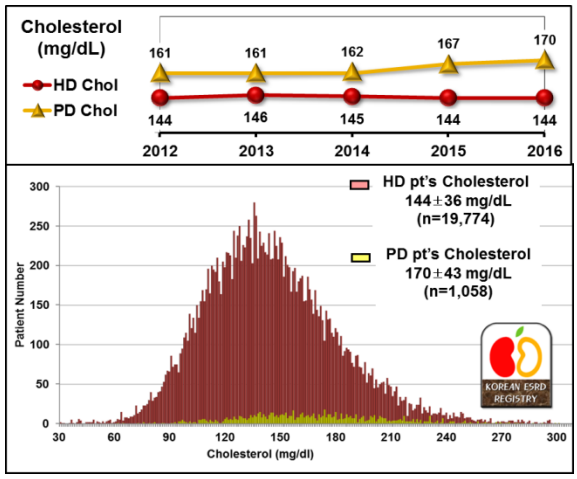


Fig. 6-9. Total cholesterol level of HD and PD

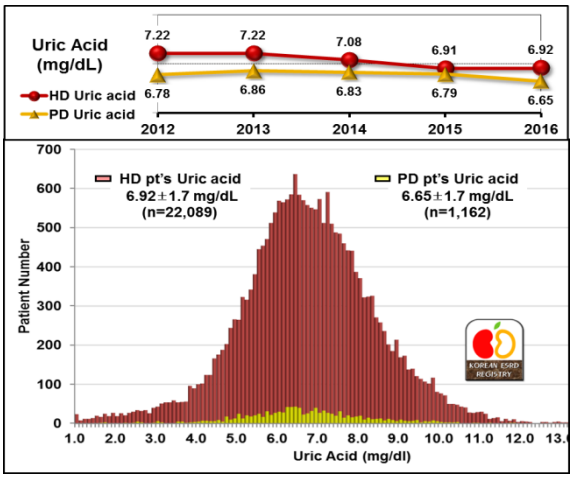


Fig. 6-10. Uric acid level of HD and PD patients.

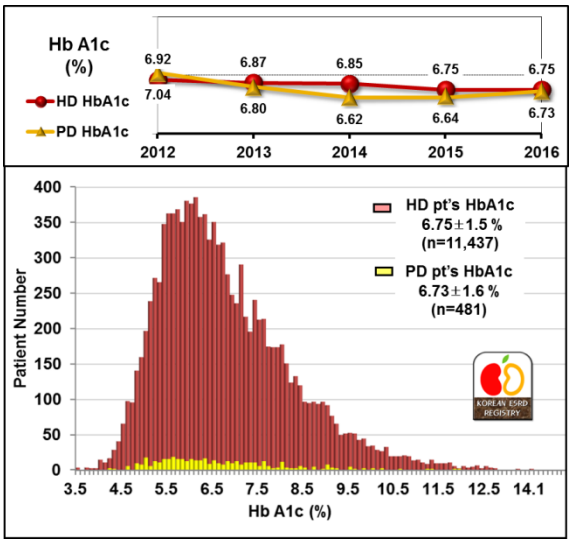


Fig. 6-11. HbA1c level of diabetic HD and PD patients.patients.

Part 7. Dialysis Adequacy

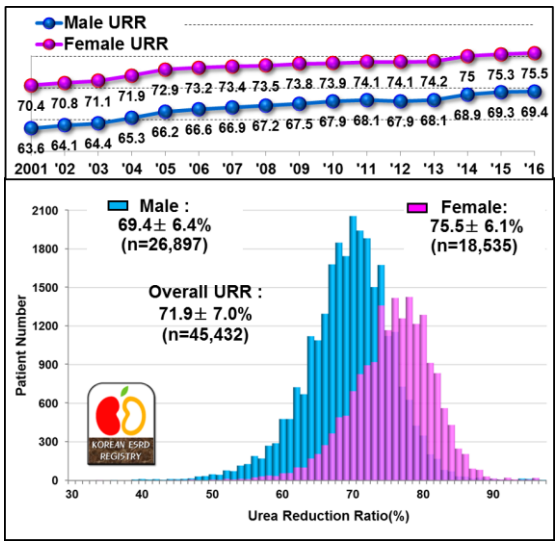


Fig.7-1. Distribution of urea reduction ratio (URR) of hemodialysis patients. Note the difference between male and female.

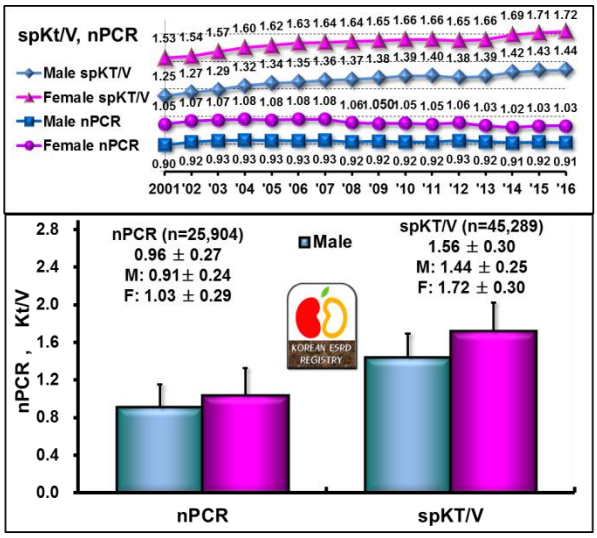


Fig.7-2. Dialysis adequacy parameters (nPCR & KT/V) of hemodialysis patients.

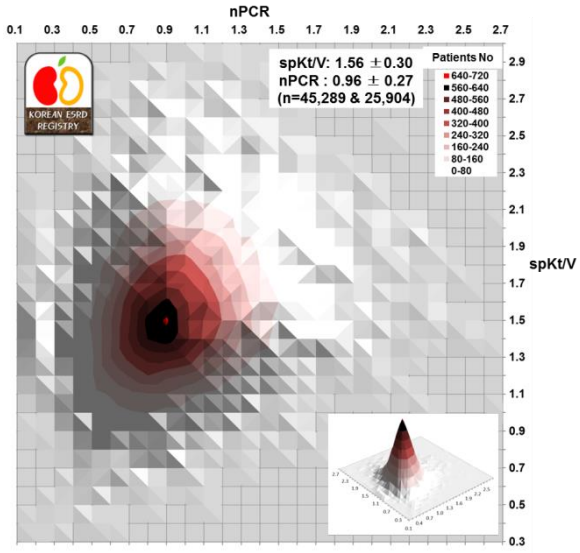


Fig.7-3.Distribution of patients number according to nPCR and single pool Kt/V in hemodialysis patients.

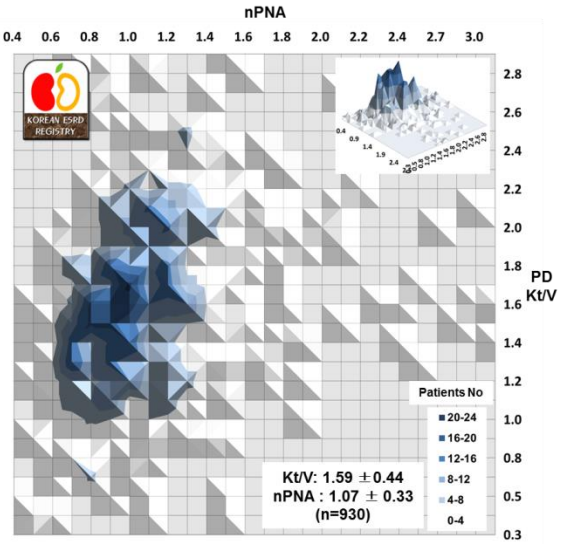


Fig.7-4. Distribution of patients number according to nPNA and PD Kt/V in peritoneal dialysis

Part 8. Rehabilitation Status of Dialysis Patients

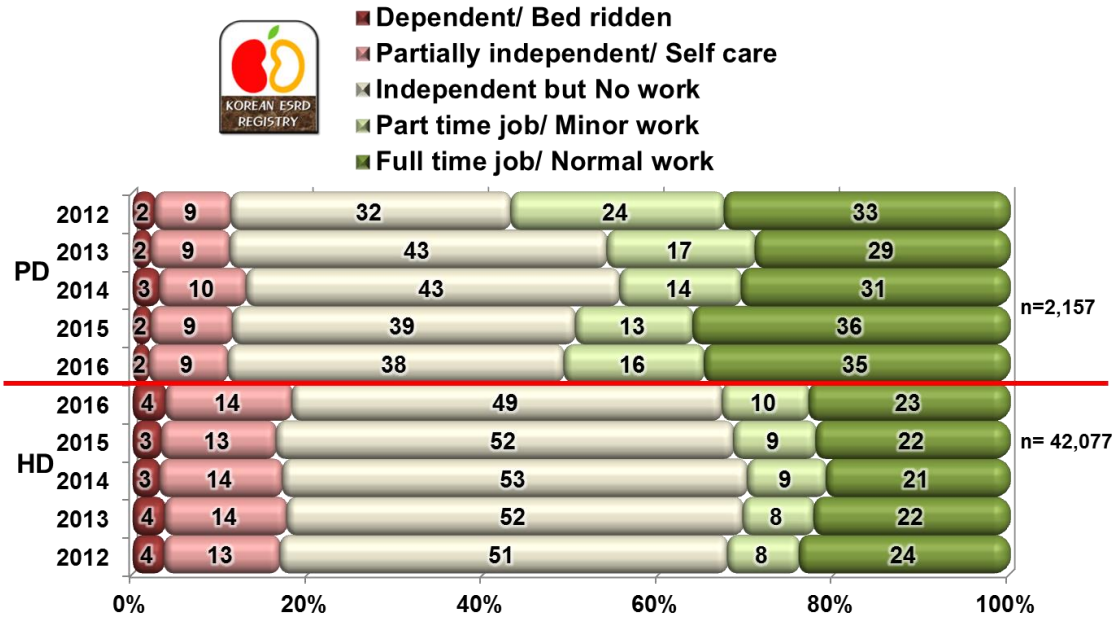


Fig.8-1. Rehabilitation status of HD and PD patients.

Part 9. Co-morbidity of Dialysis Patients

Table 9-1. Co-morbidity of dialysis patients in 2016. Relative percent of reported comorbidity.

	HD (%, n=38,252)		PD (%, n=1,624)	
Cardiac	**16.0**		**18.6**	
Coronary Artery Disease		8.2		7.7
Congestive Heart Failure		4.2		8.7
Pericardial Effusion		0.3		0.5
Arrythmia		3.3		1.7
Vascular	**50.4**		**52.8**	
Cerebrovascular accident		3.3		3.2
Hypertension		45.0		48.5
Other vascular disease		2.1		1.0
Infection	**5.4**		**12.7**	
Pneumonia		1.6		1.1
Tuberculosis		0.4		0.7
Peritonitis		0.2		7.0
Herpes zoster		0.3		0.2
Access/ exit site infection		0.7		1.5
Other Infection		2.2		2.2
Liver disease	**5.3**		**5.0**	
Hepatitis B		3.2		3.3
Hepatitis C		1.8		1.1
Congestive Liver		0.1		0.1
Hemochromatosis		0.0		0.0
Other liver diseases		0.3		0.4
Gastrointestinal	**15.3**		**6.8**	
Gastric Ulcer		1.9		0.6
Duodenal Ulcer		0.3		0.1
Constipation		5.3		2.5
Other Gastrointestinal Diseases		7.9		3.7
Miscellaneous	**7.5**		**4.1**	
Malnutrition (Alb<2.5g/dl)		0.2		0.7
Malignancy		1.2		0.6
Hypertensive Retinopathy		0.4		0.1
Uremic Dermatitis		1.9		0.6
Uremic Neuritis		0.7		0.0
Uremic Dementia		0.2		0.2
Uremic Ascites / Pleural Effusion		0.2		0.1
Osteodystrophy		0.5		0.2
COPD & other pulm disease		0.5		0.4
Decubitus ulcer/ DM foot		1.9		1.1

Part 10. Causes of Death in Dialysis Patients

Table 10-1. Causes of death (%) in dialysis patients, 1994-2016*

	1994-96	1998	2001	2003	2005	2007	2009	2011	2012	2013	2014	2015	2016
Cardiac	**27.4**	**27.4**	**26.9**	**31.7**	**30.7**	**31.7**	**29.5**	**32.7**	**33.9**	**35.8**	**32.5**	**36.1**	**38.1**
Myocardial infarction	6.4	6.4	7.7	7.4	8	7.5	8.0	6.6	6.8	7.5	5.7	8.0	5.5
Cardiac arrest, uremia associated	13.7	13.7	11.2	11.7	10.4	10.8	8.5	11.0	11.1	14.2	14.1	13.1	13.3
Cardiac arrest, other cause	7.2	7.2	8.1	12.5	12.4	13.3	13	15.0	16.0	14.2	12.6	15.0	19.3
Vascular	**17.2**	**17.2**	**22.7**	**19.5**	**17**	**17.8**	**15.9**	**14.1**	**13.0**	**13.3**	**13.2**	**11.8**	**10.8**
Cerebrovascular accident	14.3	14.3	15.1	14.5	12.3	13	11	8.7	7.9	8.7	8.5	6.5	6.2
Pulmonary embolus	0.2	0.2	0.5	0.1	0.6	0.5	0.2	0.2	0.3	0.2	0.2	0.9	0.4
Gastrointestinal hemorrhage	1.7	1.7	2.7	3.2	1.7	2.7	2.3	2.2	2.3	1.2	1.7	1.4	2.0
Gastrointestinal embolism	0.1	0.1	0.1	0	0.5	0.1	0.5	0.1	0.6	0.2	0.2	0.7	0.3
Other vascular disease	0.9	0.9	4.3	1.6	1.9	1.6	1.9	3.0	1.9	3.0	2.6	2.4	1.9
Infection	**13.5**	**13.5**	**17.8**	**20.5**	**20.1**	**20.2**	**21.9**	**23.1**	**24.5**	**23.5**	**26.8**	**24.6**	**24.5**
Pulmonary infection	2.5	2.5	4.5	3.6	4.5	4.4	5.9	8.4	10.8	8.4	9.0	8.9	9.3
Septicemia	6.6	6.6	6.9	9.7	9.6	11.7	10.4	9.7	8.9	11.9	13.6	11.0	10.2
Tuberculosis	0.3	0.3	0.8	0.2	0.3	0.2	0.3	0.1	0.7	0.1	0.1	1.1	0.1
Peritonitis	2.1	2.1	1.1	2	1.4	1.1	0.8	1.0	1.0	0.5	0.7	1.1	1.2
Other Infection	2	2	4.5	4.9	4.3	2.9	4.5	4.0	3.0	2.7	3.4	2.4	3.6
Liver disease	**3.4**	**3.4**	**2.6**	**2.8**	**2.7**	**2.2**	**3.1**	**2.1**	**2.8**	**2.4**	**2.2**	**2.6**	**2.3**
Liver failure due to hepatitis B	1.8	1.8	1.6	1.8	1.5	1.3	2.2	1.0	1.4	1.3	1.0	1.1	0.9
Liver failure due to other cause	1.6	1.6	1	1	1.2	0.8	0.9	1.1	1.3	1.1	1.2	1.5	1.5
Social	**6.2**	**6.2**	**6.3**	**4.4**	**5.4**	**3.3**	**2.5**	**3.3**	**2.2**	**2.8**	**2.5**	**2.0**	**2.5**
Patient refused further treatment	2.9	2.9	2.1	1	1.1	1.1	0.5	0.4	0.6	0.3	0.3	0.3	0.5
Suicide	2.5	2.5	3.3	2.3	3.3	1.5	1.3	1.4	1.4	1.3	1.6	1.0	1.5
Therapy ceased for other reason	0.8	0.8	0.9	1	1	0.7	0.8	1.5	0.3	1.2	0.7	0.8	0.5
Miscellaneous	**32**	**32**	**23.7**	**21.3**	**24**	**24.8**	**27.1**	**24.7**	**23.6**	**22.2**	**22.9**	**23.0**	**21.8**
Cachexia	2.9	2.9	8.1	6.6	4	4.4	3.3	2.7	2.1	1.6	1.5	1.4	0.9
Malignant disease	2.1	2.1	4.4	3.5	6.4	5.7	5.7	6.0	6.7	5.7	6.0	5.8	6.5
Accident	1.2	1.2	0.9	1.1	1.4	1.2	1.3	1.6	1.4	1.4	2.0	1.0	1.0
Uncertain	25.8	25.8	10.3	10.1	12.3	13.4	16.8	14.5	13.3	13.4	13.4	14.8	13.4

*Number of patients :1994-1996=981, 1998=911, 2001=761, 2003=894, 2005=1,256, 2007=1,531, 2009=1,727, 2011=1,828, 2012=1,745, 2013=1,604, 2014=1,534, 2015=891, 2016=1,849

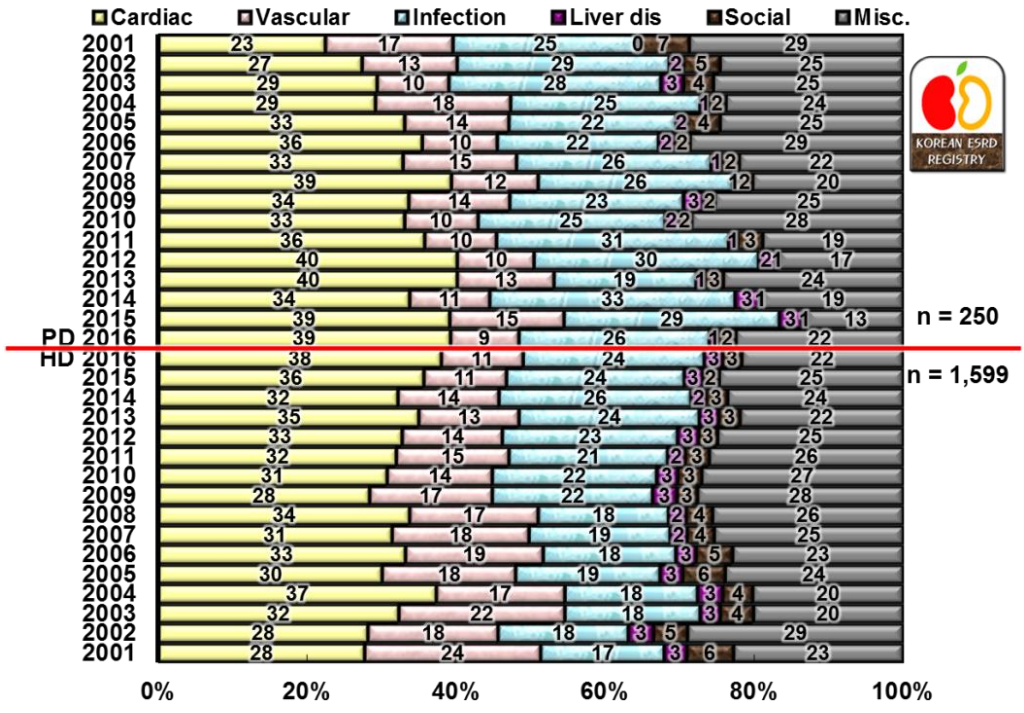


Fig.10-1. Comparison of death causes, hemodialysis versus peritoneal dialysis patients

Part 11. Survival Rate of Dialysis Patients

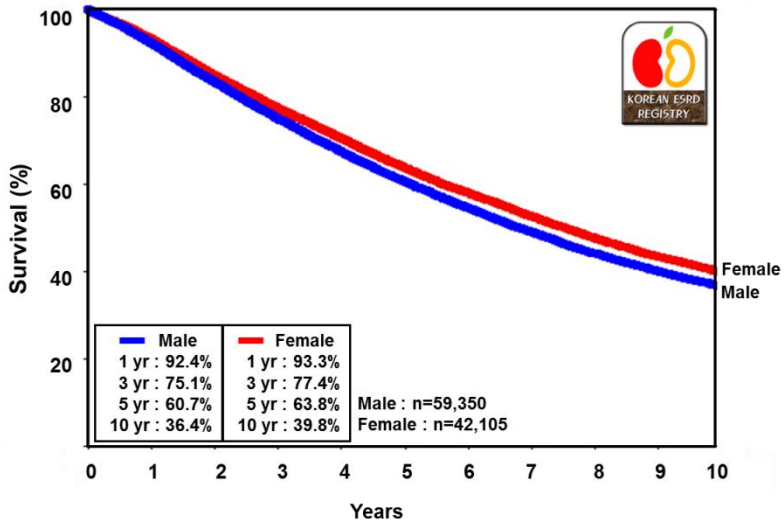


Fig.11-1. Survival rates of male and female dialysis patients. (Registered dialysis patients to Korean Society of Nephrology registry since 2001.).

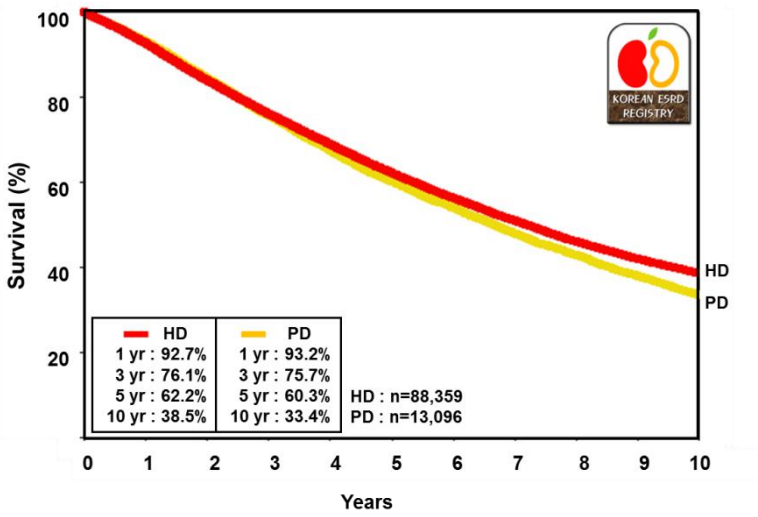


Fig.11-2. Survival rates of hemodialysis and peritoneal dialysis patients. (Registered dialysis patients to Korean Society of Nephrology registry since 2001.).

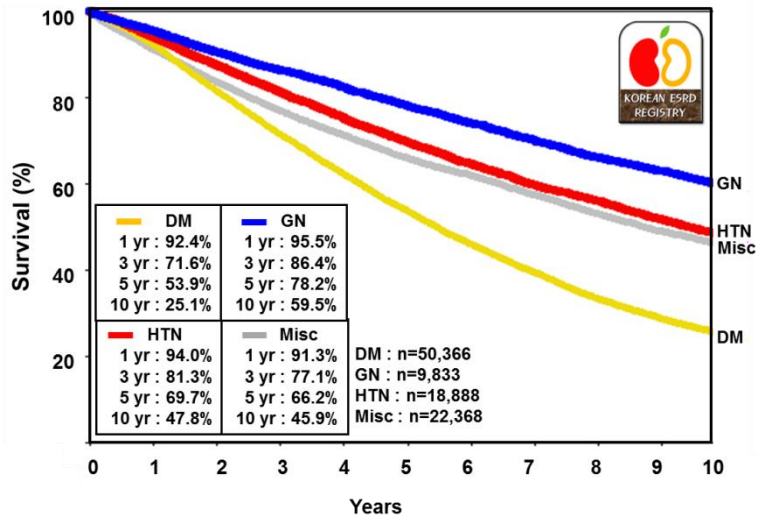


Fig.11-3. Patient survival rates according to underlying diseases (DM: diabetic nephropathy, GN: chronic glomerulonephritis, HTN: hypertension Misc: miscellaneous, Registered dialysis patients to Korean Society of Nephrology registry since 2001.)

Part 12. Kidney Transplantation

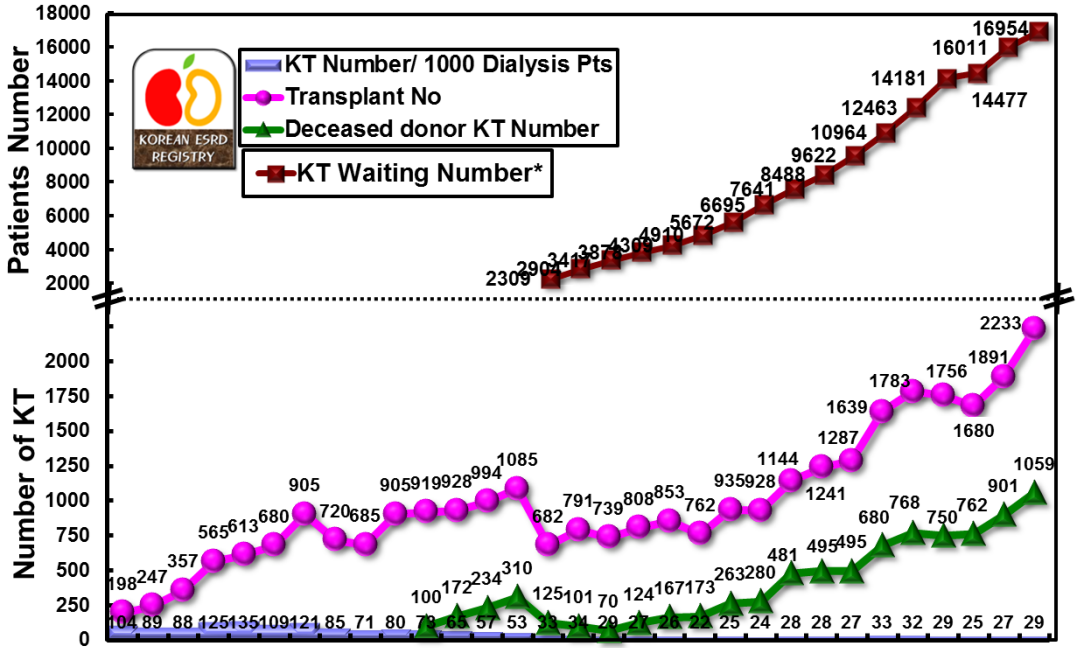


Fig.12-1. Annual number of kidney transplantation in Korea (including data from KONOS: Korean Network for Organ Sharing). *Survived kidney transplantation waiting patient number at the end of each year.

Special Report: Diabetic Dialysis Patients

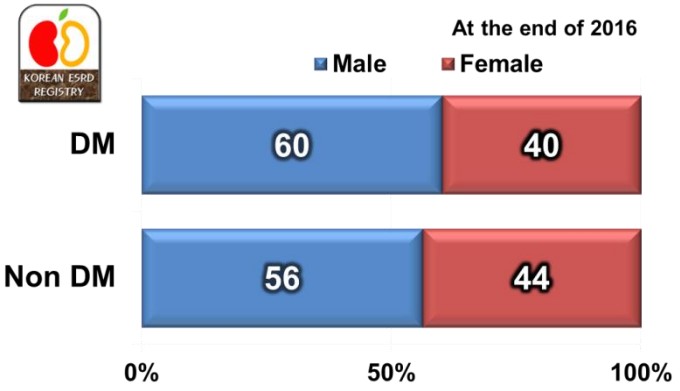


Fig.S-1.Gender ratio of diabetic (DM) dialysis patients, compared to non-DM patients.

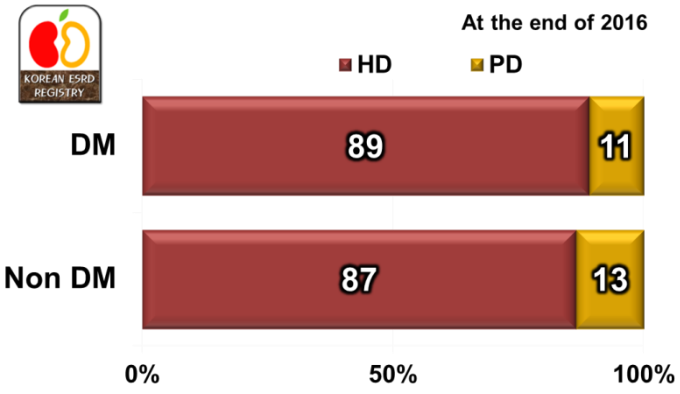


Fig.S-2. Dialysis modalities of diabetic (DM) dialysis patients, compared to non-DM patients.

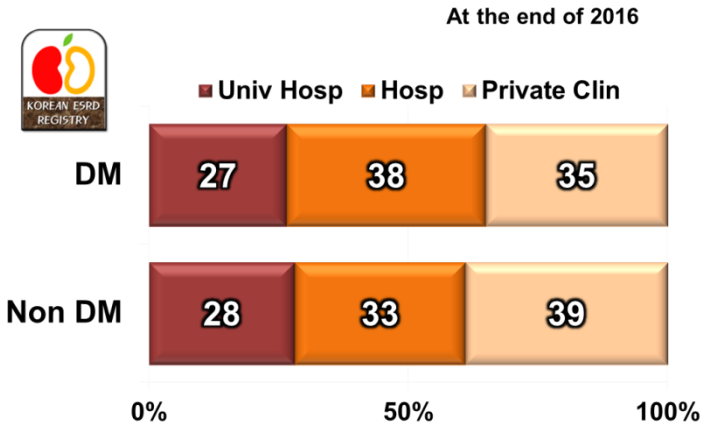


Fig.S-3. Ratio of patient number of diabetic hemodialysis patients according to the dialysis center type (university hospital, general hospital, private clinics).

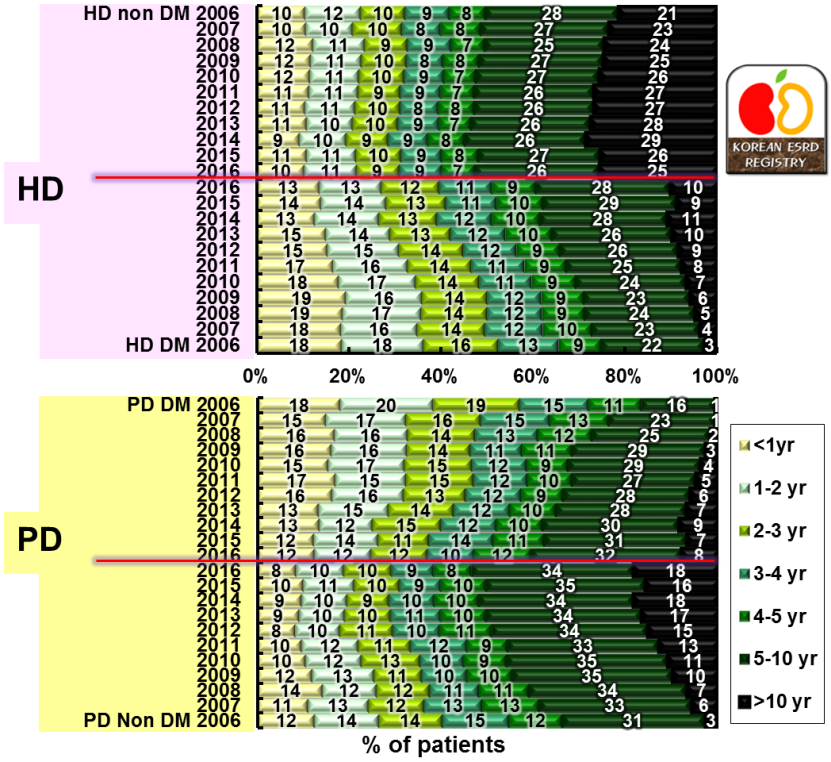


Fig.S-4. Duration of dialysis maintenance in diabetic and non-diabetic patients. HD non DM; hemodialysis non-diabetic patients, HD DM; diabetics hemodialysis patients, PD DM; diabetic peritoneal dialysis patients, PD non DM; non-diabetic peritoneal dialysis patients.

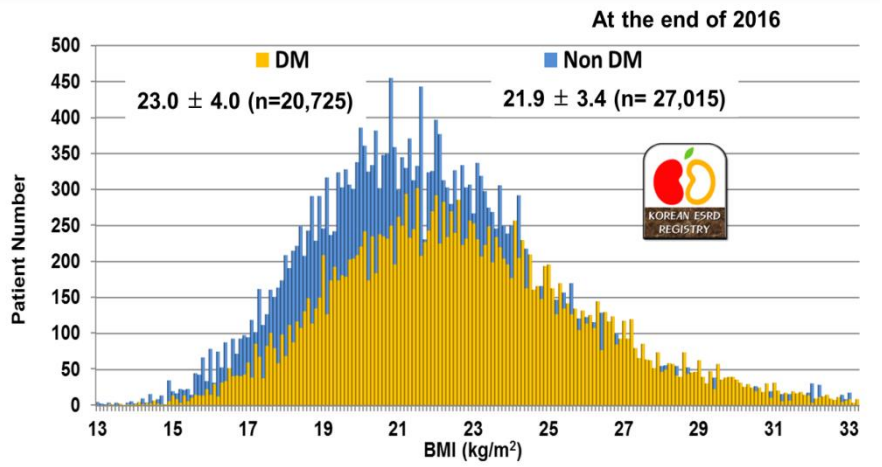


Fig.S-5.Body mass index distribution of diabetic dialysis patients, compared to non-diabetic patients.

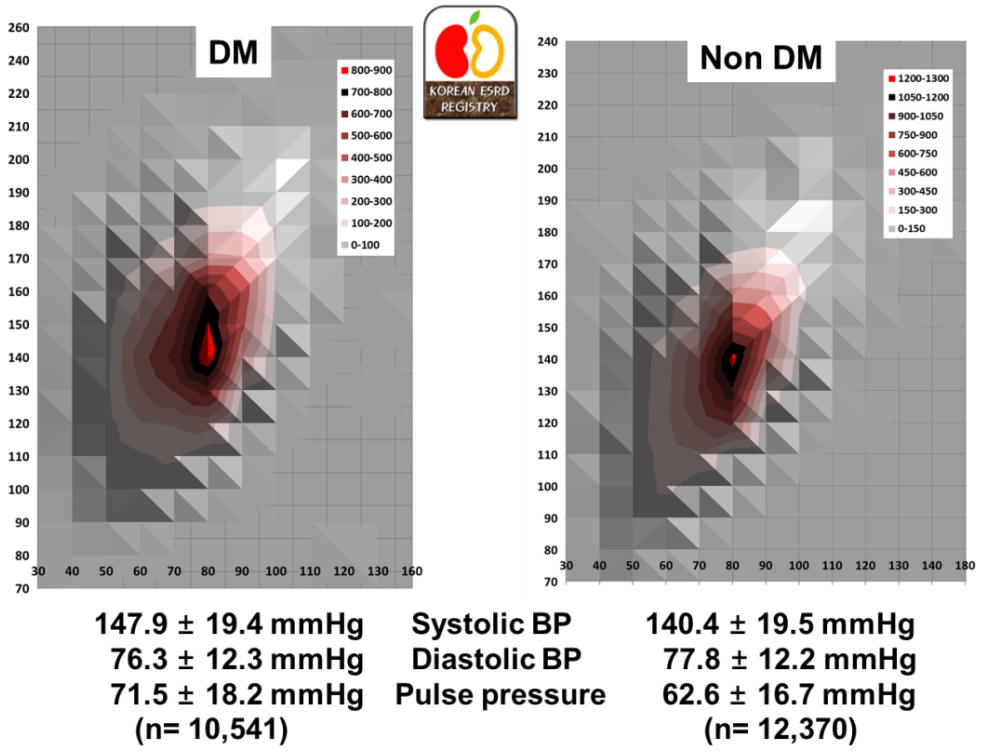


Fig.S-6. Blood pressure comparison of diabetic and non-diabetic dialysis patients.
Note the wide pulse pressure of diabetic dialysis patients.

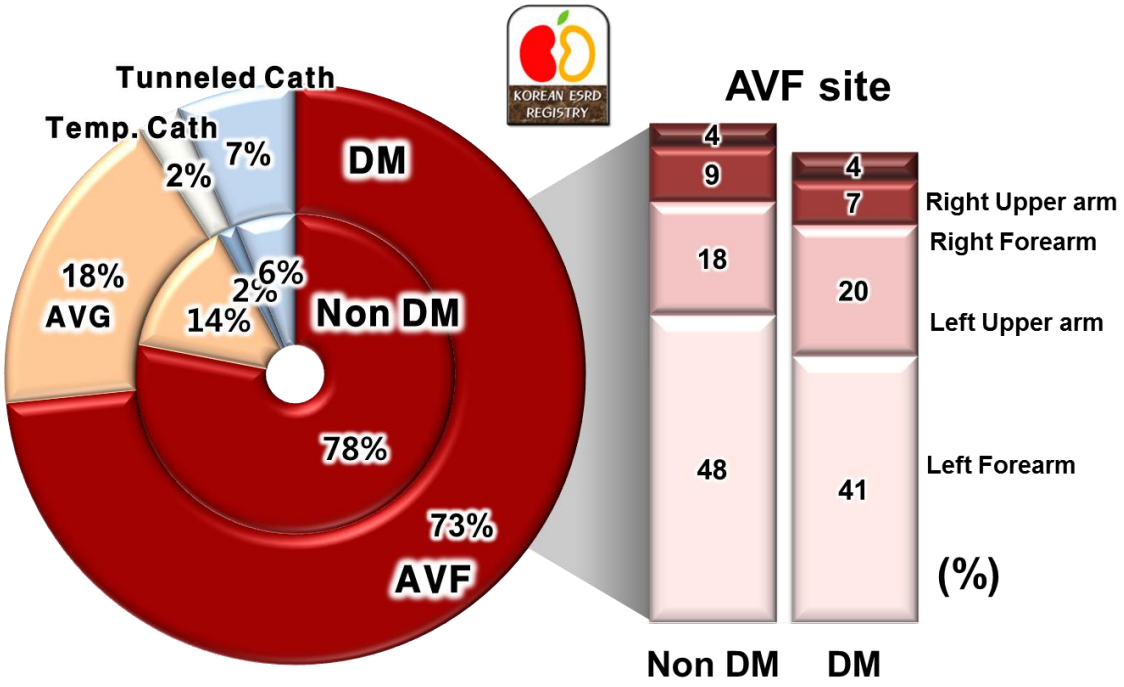


Fig.S-7. Vascular access of diabetic hemodialysis patients, compared to non-diabetic patients.

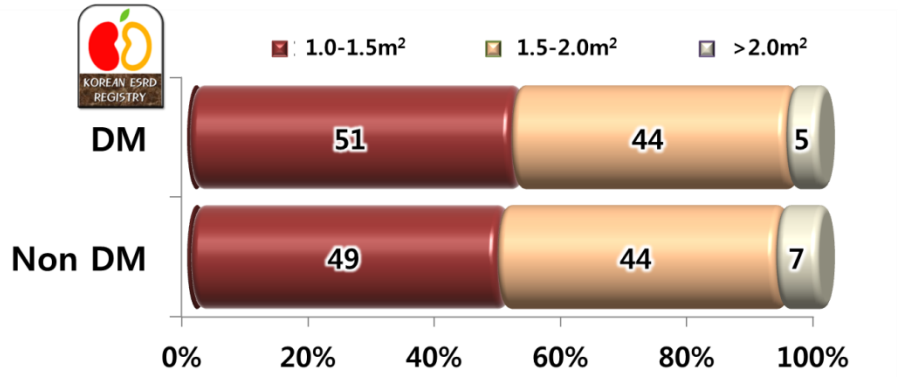


Fig.S-8. Dialyzer surface area of diabetic and non-diabetic hemodialysis patients.

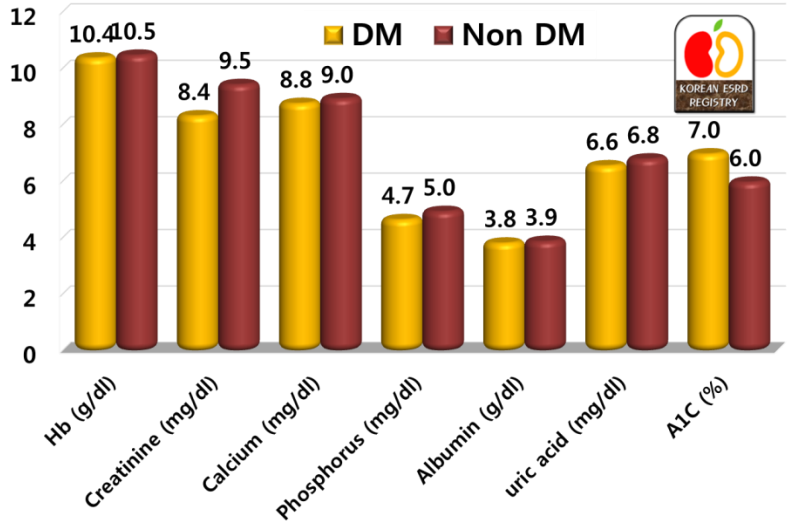


Fig.S-9. Various laboratory data comparison of diabetic and non-diabetic dialysis patients.

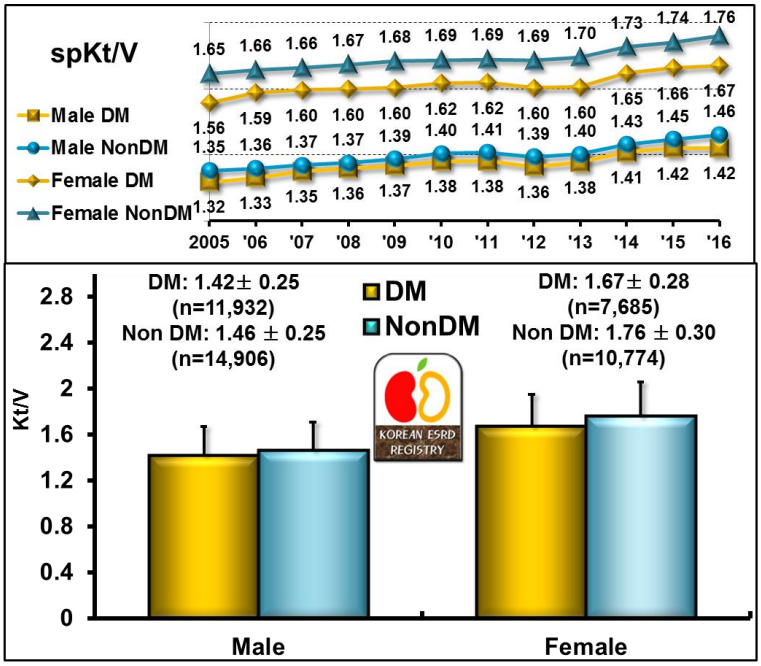


Fig.S-10. Hemodialysis adequacy comparison of diabetic and non-diabetic hemodialysis patients according to years.spKt/V; single pool Kt/V.

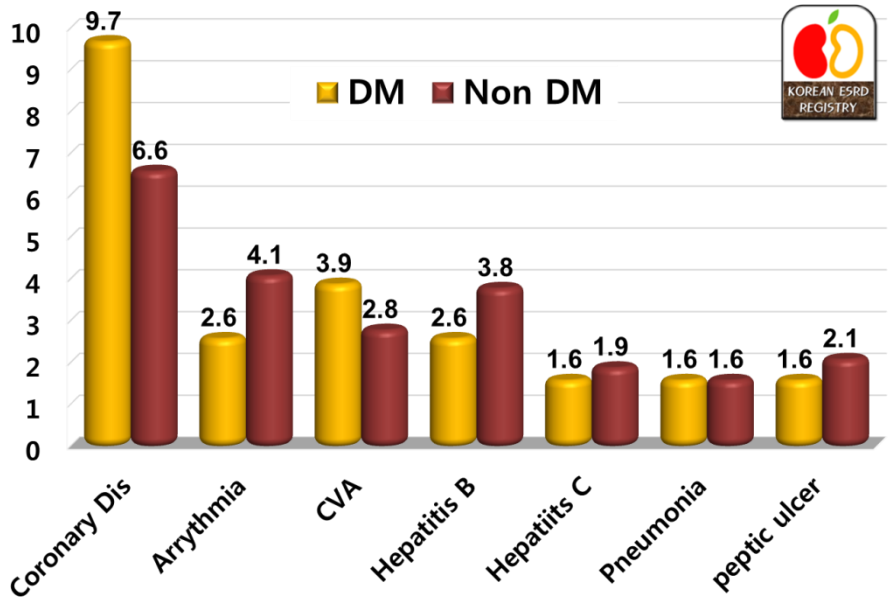


Fig.S-11. Co-morbid conditions comparison of diabetic and non-diabetic dialysis patients.

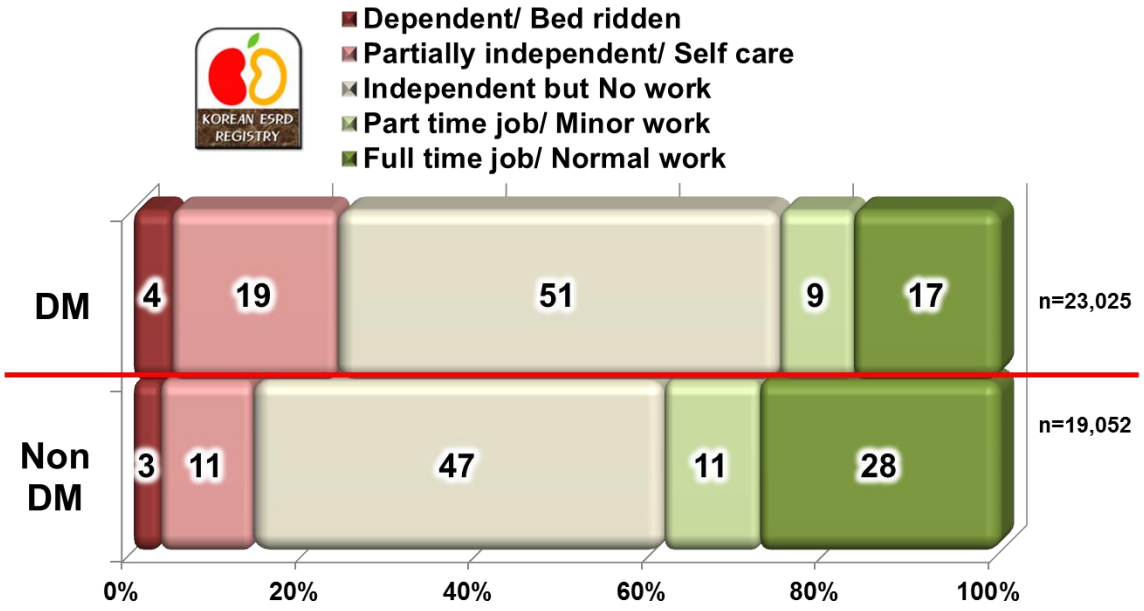


Fig.S-12. Rehabilitation status of diabetic dialysis patients compared to non-diabetic patients..

◆ Acknowledgements: We, ESRD registry committee of Korean Society of Nephrology, would like deeply thank to every dialysis centers' medical doctors and nurses for participation in this survey. The dialysis facility sales department of Baxter Korea and Fresenius Medical Care Korea were also shared their data.