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Renal Replacement Therapy

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Annual Dialysis Data Report 2014, JSDT Renal Data Registry (JRDR)

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Abstract

Background: The Japanese Society for Dialysis Therapy (JSDT) has performed a nationwide renal data registry since 1966. The data from the survey have been used for promoting dialysis facilities to improve dialysis quality and developing JSDT guidelines. Here, we summarized the current status of chronic dialysis in Japan as of 31 December 2014.

Methods: The annual survey was conducted targeting for 4367 dialysis facilities by electrically and partially paper-based; among which, 4330 (99.2%) responded. The results shown in this report are all descriptive, and no statistical analyses were conducted.

Results: The number of the incident dialysis patients was 38,327 and that of the prevalent dialysis patients was 320,448 in 2014. The count of prevalent dialysis patients per million population was 2517. The count of dialysis patients who died in 2014 was 30,707, and the crude mortality rate was 9.6%. The mean age of incident dialysis patients was 69.04 years, and the mean age of the prevalent dialysis patients was 67.54 years. The most common primary cause on the incident and prevalent dialysis patients was diabetic nephropathy. The patient count on hemodiafiltration (HDF) at the end of 2014 was 43,283; in particular, the number of online HDF patients increased more than 2.5 times over the last 3 years. The facility survey showed that 9255 patients were on peritoneal dialysis (PD) in 2014. Among them, 1913 patients were treated by the combination of PD and hemodialysis (HD) or HDF. The number of patients treated by home HD at the end of 2014 was 529, a continued increase from that at the end of 2013 as 461.

Conclusions: The chronic dialysis population in Japan has been still increasing and becoming older year by year. The rapidly increasing number of online hemodiafiltration is an emerging trend but the penetration rate of home therapies by peritoneal dialysis and home hemodialysis was still the lowest in the world.

Trial registration: UMIN000018641

Keywords: Dialysis patient population, Survival rate, Dialysis fluid quality, Hemodiafiltration, Peritoneal dialysis

Outline of JSDT Renal Data Registry

Introduction

The Japanese Society for Dialysis Therapy (JSDT) has been annually surveyed the status of chronic dialysis since 1968, and it was named the JSDT renal data registry (JRDR). In the early surveys, only the counts of patients and dialysis-beds in dialysis facilities were recorded annually. Since 1983, clinical data of all dialysis patients treated in the facilities that participated in the surveys have been collected. The results from these surveys were summarized as the annual renal data report and also used for making JSDT guidelines and standards. JRDR is respected worldwide as an unbiased complete patient census.

Before 2014, the results from JRDR had been reported in following three types of report. First, quick analyses of the data obtained by April in the following year were reported at the annual meeting of the JSDT held in June and compiled in "The Atlas, Overview of Regular

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Table 1 Summary of chronic dialysis therapy in 2014

Number of facilities		4330 facilities	(increase of 62 facilities, 1.5% increase)		
Equipment	Number of bedside consoles	131,555 units	(increase of 3405 units, 2.7% increase)		
Capacity	Capacity for simultaneous HD treatments	129,860 treatments	(increase of 3600 patients, 2.9% increase)		
	Maximum capacity	432,433 patients	(increase of 10,272 patientns, 2.4% increase)		
Prevalent dialysis patients	Daytime	269,393 patients	(84.1%)		
	Nighttime	41,271 patients	(12.9%)		
	Home HD	529 patients	(0.2%)		
	PD	9255 patients	(2.9%)		
Total prevalent dialysis patients		320,448 patients	(100.0%)	(increase of 6010 patients)	
Adjusted prevalent patient count (pmp)		2517.3 patients	(increase of 47.2 patients)		
Number of PD + HD patients[a]		1913 patients			
Number of non-PD + catheter patients[b]		278 patients			
Number of PD dropout patients[c]		193 patients			
Incident dialysis patients		38,327 patients	(increase of 232 patients, 0.6% increase)		
Deceased patients in 2014		30,707 patients	(increase of 44 patients, 0.1% decrease)		
The above data were obtained from the facility survey.					
Dialysis vintage (years)	Male	Female	Unspecified	Total	(%)
0≦, <5	98,411	47,674	0	146,085	(47.1)
5≦, <10	49,893	27,969	0	77,862	(25.1)
10≦, <15	24,330	15,702	0	40,032	(12.9)
15≦, <20	12,178	9035	0	21,213	(6.8)
20≦, <25	6368	5434	0	11,802	(3.8)
25≦, <30	3450	3101	0	6551	(2.1)
30≦, <35	2091	1869	0	3960	(1.3)
35≦	1359	1158	0	2517	(0.8)
Subtotal	198,080	111,942	0	310,022	(100.0)
Unknown/no information available	61	25		86	
Total	198,141	111,967	0	310,108	
Longest dialysis vintage		46 years and 6 months			
The above data were obtained from the patient survey.					

[a]PD + HD patients: Patients treated by the combination of PD and HD, HDF, hemoadsorption, or hemofiltration (excluding those who underwent only peritoneal lavage)
[b]Non-PD + catheter patients: Patients who did not undergo PD despite having a peritoneal catheter but underwent HD, HDF, hemoadsorption, or hemofiltration (including those who underwent only peritoneal lavage)
[c]PD dropout patients: Incident PD patients who changed a dialysis modality during 2014
pmp per million population

Dialysis Treatment in Japan". Second, the responses to the survey had been continuously collected until September, and the obtained data were screened to determine the definite survey results, which were published in the "An Overview of Regular Dialysis Treatment in Japan, the CD-ROM Report". Third, the tabulated results based on the definite values in the CD-ROM report were published as an annual dialysis data report in the *Journal of Japanese Society for Dialysis Therapy*. Therefore, the values in the atlas were different from the definite values in the CD-ROM. The quick estimations were prepared only for the atlas in the annual meeting of JSDT. However, the values in the atlas had been occasionally cited as if

Table 2 Prevalent, incident, and deceased dialysis patient counts and adjusted rate

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Prevalent dialysis patients	154,413	167,192	175,988	185,322	197,213	206,134	219,183	229,538	237,710	248,166
Incident dialysis patients	26,398	28,409	28,870	29,641	31,483	32,018	33,243	33,710	33,966	35,084
Deceased dialysis patients	14,406	15,174	16,102	16,687	18,524	18,938	19,850	20,614	21,672	22,715
Adjusted prevalent dialysis patients (pmp)	1229.7	1328.4	1394.9	1465.2	1556.7	1624.1	1721.9	1801.2	1862.7	1943.5
Recovery rate for facility survey (%)	99.8	99.8	99.7	99.7	99.7	99.9	99.0	99.6	99.1	98.7
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Prevalent dialysis patients	257,765	264,473	275,242	283,421	290,661	298,252	304,856	310,007	314,438	320,448
Incident dialysis patients	36,063	36,373	36,934	38,180	37,566	37,512	38,613	38,055	38,095	38,327
Deceased dialysis patients	23,983	24,034	25,253	27,266	27,646	28,882	30,743	30,710	30,751	30,707
Adjusted prevalent dialysis patients (pmp)	2017.6	2069.9	2154.2	2219.6	2279.5	2329.1	2385.4	2431.2	2470.1	2517.3
Recovery rate for facility survey (%)	98.9	98.4	98.9	99.0	98.5	98.6	99.0	99.0	98.7	99.2

The above counts were from the facility surveys

they were officially approved values because they were expressed by attractive graphs. To avoid these malcitations, we decided to publish all the official reports from the 2014 survey based on the definite database.

All the figures and tables included in the CD-ROM report have been made available on the members-only pages of the JSDT website since 2012 to widely provide the survey findings among JSDT members. These pages contain all the findings from the first survey conducted in 1968 to the latest survey. All figures and tables in the website in JRDR have been updating if any errors had been found so these updated data should be used for any academic and social analyses. On the other hand, the summaries of survey results in the illustrated report are available for the general public on the JSDT website (http://www.jsdt.or.jp/overview_confirm.html). A review report should be referred for the historical background of the annual survey and the survey items in the previous surveys [1].

The current manuscript is the second publication of *An overview of regular dialysis treatment in Japan (as of December 31, 2014)* J Jpn Soc Dial Ther 49(7):1–34, 2016, written in Japanese.

Subjects and methods

Survey method

The JSDT survey is conducted annually by sending questionnaires to all dialysis facilities in Japan at the end of

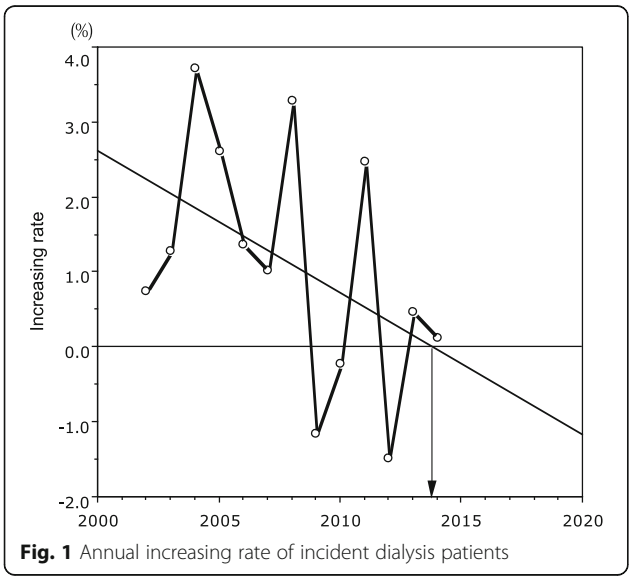

Fig. 1 Annual increasing rate of incident dialysis patients

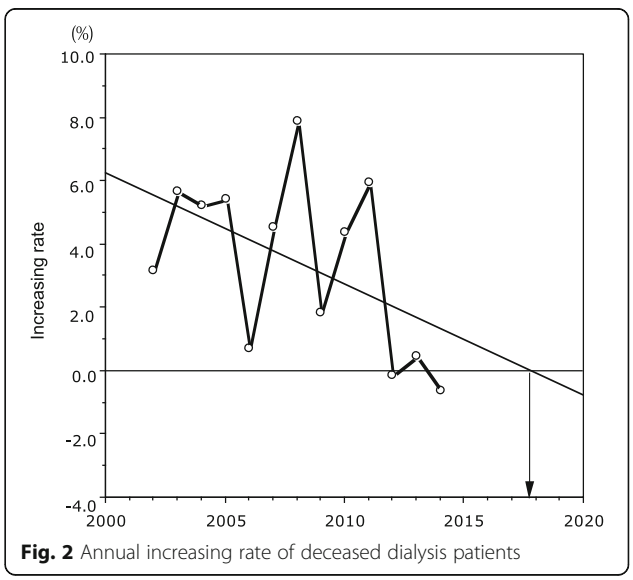

Fig. 2 Annual increasing rate of deceased dialysis patients

Table 3 Modalities in prevalent dialysis patients

		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Facility survey[a]	Prevalent dialysis patient	248,166	257,765	264,473	275,242	283,421	290,661	298,252	304,856	310,007	314,438	320,448
	(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
	Daytime dialysis patient	196,337	206,340	213,454	223,953	231,517	238,848	246,146	253,916	258,131	263,184	269,393
	(%)	(79.1)	(80.0)	(80.7)	(81.4)	(81.7)	(82.2)	(82.5)	(83.3)	(83.3)	(83.7)	(84.1)
	Nighttime dialysis patient	42,600	41,871	41,641	41,742	42,405	41,719	42,052	40,971	41,969	41,401	41,271
	(%)	(17.2)	(16.2)	(15.7)	(15.2)	(15.0)	(14.4)	(14.1)	(13.4)	(13.5)	(13.2)	(12.9)
	Home HD patient	114	127	147	187	193	236	277	327	393	461	529
	(%)	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.2)
	PD patient[c]	8774	9243	9003	9362	9300	9858	9773	9642	9514	9392	9255
	(%)	(3.5)	(3.6)	(3.4)	(3.4)	(3,3)	(3.4)	(3.3)	(3.2)	(3.1)	(3.0)	(2.9)
	PD + HD patient[d]						1720	1983	1902	1932	1920	1913
	non-PD + catheter patient[e]						437	406	369	347	292	278
Patient survey[b]	Prevalent dialysis patient	236,606	240,513	249,957	264,356	273,237	281,996	289,449	295,735	301,545	306,925	310,108
	(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
	HD	213,474	216,880	223,737	235,960	245,090	253,807	262,973	270,072	268,275	264,211	255,641
	(%)	(90.2)	(90.2)	(89.5)	(89.3)	(89.7)	(90.0)	(90.9)	(91.3)	(89.0)	(86.1)	(82.4)
	HDF	14,183	14,083	16,163	17,759	17,380	16,853	14,867	14,115	21,725	31,371	43,283
	(%)	(6.0)	(5.9)	(6.5)	(6.7)	(6.4)	(6.0)	(5.1)	(4.8)	(7.2)	(10.2)	(14.0)
	PD[c]	8004	8103	7971	8630	8636	9164	9298	9094	8996	9037	8941
	(%)	(3.4)	(3.4)	(3.2)	(3.3)	(3.2)	(3.2)	(3.2)	(3.1)	(3.0)	(2.9)	(2.9)

[a]Data obtained from the facility survey
[b]Data obtained from the patient survey
[c]The figures mean "number of CAPD patients" from 2002 to 2008 (CAPD: continuous ambulatory peritoneal dialysis)
[d]PD + HD patients: patients treated by the combination of PD and HD or HDF
[e]Non-PD + catheter patients: HD or HDF patients with PD catheter

each year. A total of 4367 facilities surveyed were either member facilities of JSDT, nonmember facilities offering regular maintenance hemodialysis (HD), or nonmember facilities offering peritoneal dialysis (PD) but not HD as of 31 December 2014. The number of facilities participating in this survey increased by 42 (1.0%) from 2013 as 4325 facilities [2].

The questionnaires were mainly sent and collected by postal mail; the rest of them were also faxed. Universal serial bus (USB) memory devices with stored electronic spreadsheets in Microsoft Excel format were also sent with the printed questionnaires to the facilities. The facilities were requested to use these devices for the completion of the questionnaires as much as possible.

In this survey, two sets of questionnaires were used. One was for the facility survey, which included questions about dialysis facilities, such as the number of patients and the number of staff members. The other was for the patient survey, which included items on the epidemiological background, treatment conditions, and the outcome of the treatment of individual dialysis patients.

The deadline for the acceptance of responses was the end of January in 2015. The acceptance of responses submitted after this deadline, including those of the additional surveys, ended on 7 August 2015.

As previously addressed, we decided to publish the annual report based on the definite database from 2014, so all values in this report are officially approved and the same as those in the CD-ROM. Based on the defined database, the count of facilities that responded to the facility survey was 4330 (99.2%), and the count of facilities that responded to both the facility and patient surveys was 4191 (96.0%). Moreover, the facilities that completed the questionnaires using the electronic medium (3764 facilities, 86.9%) further increased from the 2013 survey (3698 facilities, 86.6%). This increase contributed to the accurate and simplified analysis of survey data [3].

Survey items

The collected data in the 2014 survey were classified to the following two categories as facility data and patient data. The items in the previous surveys are

Table 4 Prevalent dialysis patient counts by modality and prefecture

Prefecture	Daytime		Nighttime		Home HD		PD		Total
	Outpatients	Inpatients	Outpatients	Inpatients	Outpatients	Inpatients	Outpatients	Inpatients	
Hokkaido	11,733	1793	1277	32	10	0	384	10	15,239
Aomori	2885	226	231	2	0	0	85	3	3432
Iwate	2390	219	332	3	0	0	95	5	3044
Miyagi	4030	346	813	36	0	0	86	6	5317
Akita	1597	258	134	0	2	0	54	5	2050
Yamagata	1953	252	310	0	10	0	66	4	2595
Fukushima	3852	368	400	1	1	0	169	12	4803
Ibaraki	6098	600	885	0	5	0	112	15	7715
Tochigi	4736	431	704	0	2	0	86	2	5961
Gunma	4200	563	906	17	7	0	95	2	5790
Saitama	13,574	1080	1837	31	80	0	266	6	16,874
Chiba	10,972	1105	1630	10	6	0	270	4	13,997
Tokyo	22,033	2484	4919	112	65	1	1017	20	30,651
Kanagawa	14,710	1524	3082	41	32	0	530	74	19,993
Niigata	3607	291	971	12	1	0	155	3	5040
Toyama	1794	342	270	1	2	0	97	4	2510
Ishikawa	2019	237	316	0	2	0	68	1	2643
Fukui	1325	153	212	7	3	0	82	4	1786
Yamanashi	1800	117	246	0	1	0	58	0	2222
Nagano	3823	354	732	2	4	0	127	5	5047
Gifu	3672	439	610	7	22	0	81	3	4834
Shizuoka	8119	831	1289	4	12	0	174	9	10,438
Aichi	12,379	1397	3027	41	48	0	672	17	17,581
Mie	3333	387	498	18	5	0	78	1	4320
Shiga	2147	299	439	4	31	0	135	7	3062
Kyoto	4534	510	913	100	11	0	202	4	6274
Osaka	17,336	2087	2696	76	36	0	523	20	22,774
Hyogo	10,353	1081	1601	22	55	0	232	32	13,376
Nara	2699	234	265	2	6	0	152	3	3361
Wakayama	2357	279	264	23	16	0	38	1	2978
Tottori	1147	111	138	0	0	0	57	10	1463
Shimane	1203	104	142	0	1	0	57	8	1515
Okayama	3511	547	555	24	1	4	179	18	4839
Hiroshima	5603	844	636	2	22	1	350	27	7485
Yamaguchi	2561	477	315	5	0	0	132	5	3495
Tokushima	2106	260	241	1	4	0	160	13	2785
Kagawa	1932	273	210	3	8	0	184	5	2615
Ehime	2809	471	379	6	0	0	140	3	3808
Kochi	1694	303	260	31	0	0	20	4	2312
Fukuoka	10,276	1222	2171	62	3	0	641	20	14,395
Saga	1763	260	295	9	1	0	14	2	2344
Nagasaki	2924	386	482	9	3	0	129	3	3936
Kumamoto	4667	640	900	3	1	0	149	2	6362

Table 4 Prevalent dialysis patient counts by modality and prefecture *(Continued)*

Oita	2916	487	325	5	3	0	146	2	3884
Miyazaki	2954	292	506	12	0	0	53	2	3819
Kagoshima	3928	669	531	24	1	0	127	24	5304
Okinawa	3297	409	576	0	0	0	96	2	4380
Total	241,351	28,042	40,471	800	523	6	8823	432	320,448

All figures were from the facility survey. They do not necessarily meet the total number of patients counted in accordance with dialysis modality

found on the members-only pages of the JSDT website (http://www.jsdt.or.jp/).

Facility survey

The following are the items surveyed in the 2014 survey and are the same as those in the 2013 survey [2].

- Name and contact numbers (TEL, FAX) of facility
- Year and month when the facility started providing dialysis treatment
- Capacity for simultaneous hemodialysis treatments
- Maximum capacity for hemodialysis treatments
- Number of bedside consoles
- Number of workers involved in dialysis treatment (e.g., doctors, nurses, clinical engineers, nutritionists, case workers)
- Number of dialysis specialists
- Number of prevalent dialysis patients at the end of 2014 (daytime dialysis, nighttime dialysis, home HD, PD)
- Number of HD/HDF patients with PD catheter (non-PD + catheter patients)
- Number of patients treated by the combination of PD and HD/HDF (PD + HD patients)
- Number of inpatients on dialysis at the end of 2014
- Number of incident dialysis patients
- Number of the incident PD patients who changed a dialysis modality during 2014 (PD dropout patients)
- Number of deceased patients during 2014
- Number of bedside consoles equipped with an endotoxin retentive filter (ETRF)
- Use or nonuse of ETRFs for sampling dialysis fluid
- Sampling site of dialysis fluid
- Frequency for measuring endotoxin concentration in dialysis fluid
- Endotoxin concentration in dialysis fluid
- Frequency for measuring total viable microbial count (TVC) in dialysis fluid
- Sampling volume for TVC
- Cultivation medium for TVC
- TVC in dialysis fluid
- Patient survey

The following are the basic survey items that have been annually surveyed since 1983.

- Anonymized name
- Gender
- Date of birth
- Year and month of start of dialysis
- Year and month of transfer from another hospital
- Primary disease
- Residence (prefecture)

Table 5 Mean age of prevalent and incident dialysis patients

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Mean age of the prevalent dialysis patients	56.6	57.3	58.0	58.6	59.2	59.9	60.6	61.2	61.6	62.2	62.8
±S.D.	13.5	13.5	13.4	13.4	13.4	13.3	13.3	13.2	13.1	13.0	12.9
Mean age of the incident dialysis patients	59.8	60.4	61.0	61.5	62.2	62.7	63.4	63.8	64.2	64.7	65.4
±S.D.	14.4	14.3	14.2	14.2	14.0	13.9	13.9	13.9	13.7	13.6	13.5
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Mean age of the prevalent dialysis patients	63.3	63.9	64.4	64.9	65.3	65.8	66.2	66.6	66.9	67.2	67.5
±S.D.	12.9	12.8	12.8	12.7	12.7	12.6	12.6	12.6	12.5	12.5	12.5
Mean age of the incident dialysis patients	65.8	66.2	66.4	66.8	67.2	67.3	67.8	67.8	68.5	68.7	69.0
±S.D.	13.4	13.4	13.4	13.3	13.3	13.3	13.3	13.4	13.4	13.4	13.4

Table 6 Incident dialysis patient distribution by gender and age

Age at dialysis initiation	Male	Female	Subtotal	No information available	Total
<5	2	8	10		10
(%)	(0.0)	(0.1)	(0.0)		(0.0)
5~9	2	2	4		4
(%)	(0.0)	(0.0)	(0.0)		(0.0)
10~14	6	5	11		11
(%)	(0.0)	(0.0)	(0.0)		(0.0)
15~19	23	13	36		36
(%)	(0.1)	(0.1)	(0.1)		(0.1)
20~24	39	27	66		66
(%)	(0.2)	(0.2)	(0.2)		(0.2)
25~29	77	43	120		120
(%)	(0.3)	(0.4)	(0.3)		(0.3)
30~34	175	86	261		261
(%)	(0.7)	(0.7)	(0.7)		(0.7)
35~39	383	144	527		527
(%)	(1.6)	(1.2)	(1.4)		(1.4)
40~44	764	260	1024		1024
(%)	(3.1)	(2.2)	(2.8)		(2.8)
45~49	1052	370	1422		1422
(%)	(4.3)	(3.1)	(3.9)		(3.9)
50~54	1330	492	1822		1822
(%)	(5.4)	(4.2)	(5.0)		(5.0)
55~59	1770	680	2450		2450
(%)	(7.2)	(5.8)	(6.7)		(6.7)
60~64	2753	1045	3798		3798
(%)	(11.2)	(8.8)	(10.4)		(10.4)
65~69	3598	1471	5069		5069
(%)	(14.7)	(12.5)	(13.9)		(13.9)
70~74	3691	1687	5378		5378
(%)	(15.0)	(14.3)	(14.8)		(14.8)
75~79	3790	1895	5685		5685
(%)	(15.4)	(16.0)	(15.6)		(15.6)
80~84	3220	1934	5154		5154
(%)	(13.1)	(16.4)	(14.2)		(14.2)
85~89	1517	1291	2808		2808
(%)	(6.2)	(10.9)	(7.7)		(7.7)
90~94	318	318	636		636
(%)	(1.3)	(2.7)	(1.7)		(1.7)
95≦	41	42	83		83
(%)	(0.2)	(0.4)	(0.2)		(0.2)
Subtotal	24,551	11,813	36,364		36,364
(%)	(100.0)	(100.0)	(100.0)		(100.0)
Unknown	10	3	13		13
No information available					
Total	24,561	11,816	36,377		36,377
Mean age	68.14	70.91	69.04		69.04
S.D.	13.20	13.60	13.39		13.39

Values in parentheses under each figure represent the percentage relative to the subtotal in each column

- Dialysis modality
- Outcome (transfer, death, dropout, or transplantation)
- Outcome date
- (in case of facility transfer) Facility code
- Cause of death

The following were added to the above basic survey items and were surveyed using both paper and electronic media.

- Current status of the combination of PD + HD
- Treatment history of PD
- Number of past renal transplantations
- Frequency of dialysis session per week
- Dialysis time per session
- Blood flow rate
- Dilution mode in HDF
- Substitution fluid volume per HDF session
- Body height
- Predialysis and postdialysis body weight
- Predialysis and postdialysis blood urea nitrogen (BUN) concentration
- Predialysis and postdialysis serum creatinine concentration
- Predialysis serum albumin concentration
- Predialysis serum C-reactive protein (CRP) concentration
- Predialysis serum calcium concentration
- Predialysis serum phosphorus concentration
- Measurement method for serum parathyroid hormone (PTH) concentration
- Intact and whole PTH concentration
- Predialysis hemoglobin (Hb) concentration
- Use or nonuse of antihypertensive agent
- Smoking habit
- History of diabetes
- History of myocardial infarction
- History of cerebral hemorrhage
- History of cerebral infarction
- History of major amputation

Table 7 Prevalent dialysis patient distribution by gender and age

Age at the end of 2014	Male	Female	Subtotal	No information available	Total
<5	21	20	41		41
(%)	(0.0)	(0.0)	(0.0)		(0.0)
5~9	15	17	32		32
(%)	(0.0)	(0.0)	(0.0)		(0.0)
10~14	23	21	44		44
(%)	(0.0)	(0.0)	(0.0)		(0.0)
15~19	72	37	109		109
(%)	(0.0)	(0.0)	(0.0)		(0.0)
20~24	152	94	246		246
(%)	(0.1)	(0.1)	(0.1)		(0.1)
25~29	455	227	682		682
(%)	(0.2)	(0.2)	(0.2)		(0.2)
30~34	1165	599	1764		1764
(%)	(0.6)	(0.5)	(0.6)		(0.6)
35~39	2771	1254	4025		4025
(%)	(1.4)	(1.1)	(1.3)		(1.3)
40~44	5985	2611	8596		8596
(%)	(3.0)	(2.3)	(2.8)		(2.8)
45~49	9334	3971	13,305		13,305
(%)	(4.7)	(3.5)	(4.3)		(4.3)
50~54	12,319	5594	17,913		17,913
(%)	(6.2)	(5.0)	(5.8)		(5.8)
55~59	17,067	8283	25,350		25,350
(%)	(8.6)	(7.4)	(8.2)		(8.2)
60~64	26,673	13,679	40,352		40,352
(%)	(13.5)	(12.2)	(13.0)		(13.0)
65~69	34,272	17,987	52,259		52,259
(%)	(17.3)	(16.1)	(16.9)		(16.9)
70~74	31,614	17,753	49,367		49,367
(%)	(16.0)	(15.9)	(15.9)		(15.9)
75~79	26,319	15,932	42,251		42,251
(%)	(13.3)	(14.2)	(13.6)		(13.6)
80~84	18,970	13,117	32,087		32,087
(%)	(9.6)	(11.7)	(10.3)		(10.3)
85~89	8681	7978	16,659		16,659
(%)	(4.4)	(7.1)	(5.4)		(5.4)
90~94	1959	2428	4387		4387
(%)	(1.0)	(2.2)	(1.4)		(1.4)
95≦	258	360	618		618
(%)	(0.1)	(0.3)	(0.2)		(0.2)
Subtotal	198,125	111,962	310,087		310,087
(%)	(100.0)	(100.0)	(100.0)		(100.0)
Unknown	16	5	21		21
No information available					
Total	198,141	111,967	310,108		310,108
Mean age	66.75	68.94	67.54		67.54
S.D.	12.36	12.60	12.49		12.49

Values in parentheses under each figure represent the percentage relative to the subtotal in each column

- History of femoral neck fracture
- History of encapsulating peritoneal sclerosis (EPS)

The following were added to the basic survey items and were collected only by the USB survey.

- Serum total cholesterol concentration
- Serum high-density lipoprotein cholesterol (HDL-C) concentration
- Predialysis systolic blood pressure
- Predialysis diastolic blood pressure
- Predialysis pulse rate

The following were surveyed only for PD patients and were collected only by the USB survey.

- PD vintage
- Number of months in which PD was performed in 2014
- History of peritoneal equilibrium test (PET)
- Four-hour creatinine concentration dialysate/plasma ratio in PET (PET Cr D/P ratio)
- Type of PD fluid (PD fluid type)
- Volume of PD fluid per day (PD fluid volume)
- PD treatment time per day
- Daily urine volume (Urine volume)
- Mean ultrafiltration (UF) volume per day (UF volume)
- Kt/V by residual kidney (Residual kidney Kt/V)
- Kt/V by PD (PD Kt/V)
- Changing maneuver of PD fluids
- Use or nonuse of automated peritoneal dialysis (APD) machine
- Past histories of peritonitis during 2014
- Past histories of exit-site infections during 2014

Calculation of survival rate

The cumulative survival rate after the start of dialysis was actuarially calculated [4].

Table 8 Incident dialysis patient distribution by age and primary disease

Primary disease	<5	5~9	10~14	15~19	20~24	25~29	30~34	35~39	40~44	45~49	50~54	55~59	60~64
Chronic glomerulonephritis		1	2	8	22	39	72	139	215	276	311	399	607
(%)		(25.0)	(18.2)	(22.2)	(33.3)	(32.5)	(27.6)	(26.4)	(21.0)	(19.4)	(17.1)	(16.3)	(16.0)
Chronic pyelonephritis					2	2	2	10	4	10	10	24	22
(%)					(3.0)	(1.7)	(0.8)	(1.9)	(0.4)	(0.7)	(0.5)	(1.0)	(0.6)
RPGN		1			3	2	2	3	5	12	14	14	46
(%)		(25.0)			(4.5)	(1.7)	(0.8)	(0.6)	(0.5)	(0.8)	(0.8)	(0.6)	(1.2)
PIH							1	1	2	3	1	9	1
(%)							(0.4)	(0.2)	(0.2)	(0.2)	(0.1)	(0.4)	(0.0)
Unclassified nephritis	1		3	3	5	4	1	4	8	5	5	12	14
(%)	(10.0)		(27.3)	(8.3)	(7.6)	(3.3)	(0.4)	(0.8)	(0.8)	(0.4)	(0.3)	(0.5)	(0.4)
PKD				1	2	3	6	16	50	88	108	122	148
(%)				(2.8)	(3.0)	(2.5)	(2.3)	(3.0)	(4.9)	(6.2)	(5.9)	(5.0)	(3.9)
Nephrosclerosis			1	3	4	11	13	19	68	82	110	172	292
(%)			(9.1)	(8.3)	(6.1)	(9.2)	(5.0)	(3.6)	(6.6)	(5.8)	(6.0)	(7.0)	(7.7)
Hypertensive emergencies						2	11	20	18	17	24	17	29
(%)						(1.7)	(4.2)	(3.8)	(1.8)	(1.2)	(1.3)	(0.7)	(0.8)
Diabetes				2	2	9	77	194	472	733	977	1352	2094
(%)				(5.6)	(3.0)	(7.5)	(29.5)	(36.8)	(46.1)	(51.5)	(53.6)	(55.2)	(55.1)
Lupus				2	3	5	4	10	19	17	13	21	25
(%)				(5.6)	(4.5)	(4.2)	(1.5)	(1.9)	(1.9)	(1.2)	(0.7)	(0.9)	(0.7)
Amyloidosis								2	2	2	4	4	8
(%)								(0.4)	(0.2)	(0.1)	(0.2)	(0.2)	(0.2)
Gout									1	1	6	10	10
(%)									(0.1)	(0.1)	(0.3)	(0.4)	(0.3)
Inborn errors of metabolism				1	2	3	2		2	2	2		2
(%)				(2.8)	(3.0)	(2.5)	(0.8)		(0.2)	(0.1)	(0.1)		(0.1)
Tuberculosis												1	1
(%)												(0.0)	(0.0)
Urolithiasis							1	1	2	1	3	5	6
(%)							(0.4)	(0.2)	(0.2)	(0.1)	(0.2)	(0.2)	(0.2)
Neoplasm of kidney and urinary tract				1				1	2	2	4	6	12
(%)				(2.8)				(0.2)	(0.2)	(0.1)	(0.2)	(0.2)	(0.3)
Urinary tract obstructive						1	1	2	2	5	1	5	8

Table 8 Incident dialysis patient distribution by age and primary disease *(Continued)*

(%)						(0.8)	(0.4)	(0.4)	(0.2)	(0.4)	(0.1)	(0.2)	(0.2)
Myeloma				1	1				1	1	5	4	16
(%)				(2.8)	(1.5)				(0.1)	(0.1)	(0.3)	(0.2)	(0.4)
Hypoplastic kidney	4	1	2	7	4	5	9	5	2	1		2	4
(%)	(40.0)	(25.0)	(18.2)	(19.4)	(6.1)	(4.2)	(3.4)	(0.9)	(0.2)	(0.1)		(0.1)	(0.1)
Undetermined	1		1	3	7	16	30	62	98	101	151	177	313
(%)	(10.0)		(9.1)	(8.3)	(10.6)	(13.3)	(11.5)	(11.8)	(9.6)	(7.1)	(8.3)	(7.2)	(8.2)
Rejected kidney					3	6	12	9	14	18	26	27	16
(%)					(4.5)	(5.0)	(4.6)	(1.7)	(1.4)	(1.3)	(1.4)	(1.1)	(0.4)
Others	4	1	2	4	6	12	17	29	37	45	47	67	124
(%)	(40.0)	(25.0)	(18.2)	(11.1)	(9.1)	(10.0)	(6.5)	(5.5)	(3.6)	(3.2)	(2.6)	(2.7)	(3.3)
Subtotal	10	4	11	36	66	120	261	527	1024	1422	1822	2450	3798
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
No information available													
(%)													
Total	10	4	11	36	66	120	261	527	1024	1422	1822	2450	3798
(%)													

Values in parentheses under each figure represent the percentage relative to the subtotal in each row
The column "No information on birth date" shows the number of patients who provided no date of birth; thus, the calculation of age was impossible
RPGN Rapidly progressive glomerulonephritis, *PIH* Pregnancy-induced hypertension, *PKD* polycystic kidney disease

Table 8 Incident dialysis patient distribution by age and primary disease *(Continued)*

Primary disease	65~69	70~74	75~79	80~84	85~89	90~94	95≦	Subtotal	Unspecified	No information on birth date	Total	Mean age	S.D.
Chronic glomerulonephritis	839	905	995	943	563	116	14	6466			6466	68.66	14.41
(%)	(16.6)	(16.8)	(17.5)	(18.3)	(20.0)	(18.2)	(16.9)	(17.8)			(17.8)		
Chronic pyelonephritis	32	31	52	45	20	4		270	1		271	68.86	14.60
(%)	(0.6)	(0.6)	(0.9)	(0.9)	(0.7)	(0.6)		(0.7)	(7.7)		(0.7)		
RPGN	57	87	105	98	55	15		519			519	72.86	12.46
(%)	(1.1)	(1.6)	(1.8)	(1.9)	(2.0)	(2.4)		(1.4)			(1.4)		
PIH	5	7	7	3	2			42			42	64.81	14.13
(%)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)			(0.1)			(0.1)		
Unclassified nephritis	13	21	21	12	10	4		146			146	62.36	20.36
(%)	(0.3)	(0.4)	(0.4)	(0.2)	(0.4)	(0.6)		(0.4)			(0.4)		
PKD	125	118	88	74	41	8	1	999			999	63.05	13.11
(%)	(2.5)	(2.2)	(1.5)	(1.4)	(1.5)	(1.3)	(1.2)	(2.7)			(2.7)		
Nephrosclerosis	513	758	985	1185	726	187	22	5151			5151	75.01	11.37
(%)	(10.1)	(14.1)	(17.3)	(23.0)	(25.9)	(29.4)	(26.5)	(14.2)			(14.2)		
Hypertensive emergencies	26	33	41	46	24	7		315			315	64.95	16.72
(%)	(0.5)	(0.6)	(0.7)	(0.9)	(0.9)	(1.1)		(0.9)			(0.9)		
Diabetes	2654	2483	2288	1640	701	121	10	15,809			15,809	67.16	12.03
(%)	(52.4)	(46.2)	(40.2)	(31.8)	(25.0)	(19.0)	(12.0)	(43.5)			(43.5)		
Lupus	37	33	32	29	13	4		267	1		268	63.55	16.42
(%)	(0.7)	(0.6)	(0.6)	(0.6)	(0.5)	(0.6)		(0.7)	(7.7)		(0.7)		
Amyloidosis	15	15	18	13	5			88			88	69.95	11.60
(%)	(0.3)	(0.3)	(0.3)	(0.3)	(0.2)			(0.2)			(0.2)		
Gout	8	10	14	8	4			72	1		73	68.43	10.75
(%)	(0.2)	(0.2)	(0.2)	(0.2)	(0.1)			(0.2)	(7.7)		(0.2)		
Inborn errors of metabolism	2	2	1		2			23			23	49.17	21.58
(%)	(0.0)	(0.0)	(0.0)		(0.1)			(0.1)			(0.1)		
Tuberculosis	2	2	1	2	2	1		12			12	75.75	10.62
(%)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.2)		(0.0)			(0.0)		
Urolithiasis	7	9	7	15	4	2		63			63	70.17	13.79
(%)	(0.1)	(0.2)	(0.1)	(0.3)	(0.1)	(0.3)		(0.2)			(0.2)		
Neoplasm of kidney and urinary tract	31	36	32	33	12	6		178			178	72.91	10.90
(%)	(0.6)	(0.7)	(0.6)	(0.6)	(0.4)	(0.9)		(0.5)			(0.5)		

Table 8 Incident dialysis patient distribution by age and primary disease *(Continued)*

Urinary tract obstructive	14	15	15	16	8	2		95		95	70.07	13.71
(%)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)		(0.3)		(0.3)		
Myeloma	24	22	26	18	10	2	1	132		132	71.60	11.73
(%)	(0.5)	(0.4)	(0.5)	(0.3)	(0.4)	(0.3)	(1.2)	(0.4)		(0.4)		
Hypoplastic kidney	5	2	2	4		1		60		60	39.82	24.64
(%)	(0.1)	(0.0)	(0.0)	(0.1)		(0.2)		(0.2)		(0.2)		
Undetermined	469	568	724	726	498	117	30	4092	10	4102	72.04	13.52
(%)	(9.3)	(10.6)	(12.7)	(14.1)	(17.7)	(18.4)	(36.1)	(11.3)	(76.9)	(11.3)		
Rejected kidney	24	14	14	14	4	3		204		204	57.60	16.13
(%)	(0.5)	(0.3)	(0.2)	(0.3)	(0.1)	(0.5)		(0.6)		(0.6)		
Others	167	207	217	230	104	36	5	1361		1361	69.29	15.28
(%)	(3.3)	(3.8)	(3.8)	(4.5)	(3.7)	(5.7)	(6.0)	(3.7)		(3.7)		
Subtotal	5069	5378	5685	5154	2808	636	83	36,364	13	36,377	69.04	13.39
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)		
No information available												
(%)												
Total	5069	5378	5685	5154	2808	636	83	36,364	13	36,377	69.04	13.39
(%)												

Table 9 Prevalent dialysis patient distribution by age and primary disease

Primary disease	<5	5~9	10~14	15~19	20~24	25~29	30~34	35~39	40~44	45~49	50~54	55~59	60~64
Chronic glomerulonephritis	1	4	6	28	71	242	647	1490	3009	4586	5996	8561	13,680
(%)	(2.4)	(12.5)	(13.6)	(25.7)	(28.9)	(35.5)	(36.7)	(37.0)	(35.0)	(34.5)	(33.5)	(33.8)	(33.9)
Chronic pyelonephritis				1	6	19	35	90	133	170	191	251	353
(%)				(0.9)	(2.4)	(2.8)	(2.0)	(2.2)	(1.5)	(1.3)	(1.1)	(1.0)	(0.9)
RPGN		2			5	12	18	36	67	91	103	151	277
(%)		(6.3)			(2.0)	(1.8)	(1.0)	(0.9)	(0.8)	(0.7)	(0.6)	(0.6)	(0.7)
PIH							7	11	50	83	124	163	305
(%)							(0.4)	(0.3)	(0.6)	(0.6)	(0.7)	(0.6)	(0.8)
Unclassified nephritis	1	2	6	6	21	29	42	69	94	109	106	113	142
(%)	(2.4)	(6.3)	(13.6)	(5.5)	(8.5)	(4.3)	(2.4)	(1.7)	(1.1)	(0.8)	(0.6)	(0.4)	(0.4)
PKD	5	2		3	6	12	30	94	288	576	930	1274	1891
(%)	(12.2)	(6.3)		(2.8)	(2.4)	(1.8)	(1.7)	(2.3)	(3.4)	(4.3)	(5.2)	(5.0)	(4.7)
Nephrosclerosis			2	2	12	29	60	144	389	611	745	1209	2092
(%)			(4.5)	(1.8)	(4.9)	(4.3)	(3.4)	(3.6)	(4.5)	(4.6)	(4.2)	(4.8)	(5.2)
Hypertensive emergencies					3	9	44	94	150	188	217	220	294
(%)					(1.2)	(1.3)	(2.5)	(2.3)	(1.7)	(1.4)	(1.2)	(0.9)	(0.7)
Diabetes	2	1	2	8	7	35	313	1048	2859	4831	7042	10,197	16,451
(%)	(4.9)	(3.1)	(4.5)	(7.3)	(2.8)	(5.1)	(17.7)	(26.0)	(33.3)	(36.3)	(39.3)	(40.2)	(40.8)
Lupus			1	5	9	24	41	80	138	207	214	261	298
(%)			(2.3)	(4.6)	(3.7)	(3.5)	(2.3)	(2.0)	(1.6)	(1.6)	(1.2)	(1.0)	(0.7)
Amyloidosis								4	19	19	27	27	56
(%)								(0.1)	(0.2)	(0.1)	(0.2)	(0.1)	(0.1)
Gout						1	3	8	29	40	68	82	152
(%)						(0.1)	(0.2)	(0.2)	(0.3)	(0.3)	(0.4)	(0.3)	(0.4)
Inborn errors of metabolism	2			5	10	17	19	29	39	30	17	23	27
(%)	(4.9)			(4.6)	(4.1)	(2.5)	(1.1)	(0.7)	(0.5)	(0.2)	(0.1)	(0.1)	(0.1)
Tuberculosis										1	4	9	19
(%)										(0.0)	(0.0)	(0.0)	(0.0)
Urolithiasis							1	3	8	11	26	44	60
(%)							(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.2)	(0.1)
Neoplasm of kidney and urinary tract				1		1	3	7	7	11	19	39	76
(%)				(0.9)		(0.1)	(0.2)	(0.2)	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)

Table 9 Prevalent dialysis patient distribution by age and primary disease *(Continued)*

Urinary tract obstructive	1		1		3	9	27	42	41	43	42	32	66
(%)	(2.4)		(2.3)		(1.2)	(1.3)	(1.5)	(1.0)	(0.5)	(0.3)	(0.2)	(0.1)	(0.2)
Myeloma				2			1	1	6	6	10	12	29
(%)				(1.8)			(0.1)	(0.0)	(0.1)	(0.0)	(0.1)	(0.0)	(0.1)
Hypoplastic kidney	10	11	13	21	29	47	71	94	72	67	38	29	30
(%)	(24.4)	(34.4)	(29.5)	(19.3)	(11.8)	(6.9)	(4.0)	(2.3)	(0.8)	(0.5)	(0.2)	(0.1)	(0.1)
Undetermined	2		2	11	23	69	185	382	712	992	1236	1757	2937
(%)	(4.9)		(4.5)	(10.1)	(9.3)	(10.1)	(10.5)	(9.5)	(8.3)	(7.5)	(6.9)	(6.9)	(7.3)
Rejected kidney			2	1	12	22	64	91	181	240	315	367	332
(%)			(4.5)	(0.9)	(4.9)	(3.2)	(3.6)	(2.3)	(2.1)	(1.8)	(1.8)	(1.4)	(0.8)
Others	17	10	9	15	29	105	153	208	305	393	443	529	785
(%)	(41.5)	(31.3)	(20.5)	(13.8)	(11.8)	(15.4)	(8.7)	(5.2)	(3.5)	(3.0)	(2.5)	(2.1)	(1.9)
Subtotal	41	32	44	109	246	682	1764	4025	8596	13,305	17,913	25,350	40,352
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
No information available													
(%)													
Total	41	32	44	109	246	682	1764	4025	8596	13,305	17,913	25,350	40,352
(%)													

Values in parentheses under each figure represent the percentage relative to the subtotal in each row
The column "No information on birth date" shows the number of patients who provided no date of birth; thus, the calculation of age was impossible
RPGN Rapidly progressive glomerulonephritis, *PIH* Pregnancy-induced hypertension, *PKD* polycystic kidney disease

Table 9 Prevalent dialysis patient distribution by age and primary disease *(Continued)*

Primary disease	65~69	70~74	75~79	80~84	85~89	90~94	95≦	Subtotal	Unspecified	No information on birth date	Total	Mean age	S.D.
Chronic glomerulonephritis	16,778	15,287	12,066	8773	4446	1139	160	96,970			96,970	66.54	12.47
(%)	(32.1)	(31.0)	(28.6)	(27.3)	(26.7)	(26.0)	(25.9)	(31.3)			(31.3)		
Chronic pyelonephritis	494	466	372	261	150	42	7	3041	1		3042	65.46	13.88
(%)	(0.9)	(0.9)	(0.9)	(0.8)	(0.9)	(1.0)	(1.1)	(1.0)	(4.8)		(1.0)		
RPGN	381	438	391	317	165	35	5	2494			2494	68.92	12.99
(%)	(0.7)	(0.9)	(0.9)	(1.0)	(1.0)	(0.8)	(0.8)	(0.8)			(0.8)		
PIH	342	270	166	71	20	2		1614			1614	64.49	10.24
(%)	(0.7)	(0.5)	(0.4)	(0.2)	(0.1)	(0.0)		(0.5)			(0.5)		
Unclassified nephritis	143	185	136	96	51	19	3	1373			1373	60.35	17.10
(%)	(0.3)	(0.4)	(0.3)	(0.3)	(0.3)	(0.4)	(0.5)	(0.4)			(0.4)		
PKD	1980	1640	1177	727	299	62	10	11,006			11,006	65.01	11.29
(%)	(3.8)	(3.3)	(2.8)	(2.3)	(1.8)	(1.4)	(1.6)	(3.5)			(3.5)		
Nephrosclerosis	3258	4221	5003	5469	3625	1244	182	28,297	1		28,298	73.99	11.76
(%)	(6.2)	(8.6)	(11.8)	(17.0)	(21.8)	(28.4)	(29.4)	(9.1)	(4.8)		(9.1)		
Hypertensive emergencies	332	305	272	250	143	43	9	2573			2573	64.20	14.83
(%)	(0.6)	(0.6)	(0.6)	(0.8)	(0.9)	(1.0)	(1.5)	(0.8)			(0.8)		
Diabetes	22,304	20,127	16,494	10,789	4570	901	98	118,079	2		118,081	67.33	11.28
(%)	(42.7)	(40.8)	(39.0)	(33.6)	(27.4)	(20.5)	(15.9)	(38.1)	(9.5)		(38.1)		
Lupus	324	244	202	116	61	10	1	2236			2236	60.73	13.97
(%)	(0.6)	(0.5)	(0.5)	(0.4)	(0.4)	(0.2)	(0.2)	(0.7)			(0.7)		
Amyloidosis	77	86	70	47	15	4		451			451	67.50	11.65
(%)	(0.1)	(0.2)	(0.2)	(0.1)	(0.1)	(0.1)		(0.1)			(0.1)		
Gout	201	207	181	96	39	4	1	1112	1		1113	67.56	11.06
(%)	(0.4)	(0.4)	(0.4)	(0.3)	(0.2)	(0.1)	(0.2)	(0.4)	(4.8)		(0.4)		
Inborn errors of metabolism	23	13	7	4	7			272			272	48.99	16.94
(%)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)			(0.1)			(0.1)		
Tuberculosis	47	54	20	37	10	5		206			206	72.33	8.75
(%)	(0.1)	(0.1)	(0.0)	(0.1)	(0.1)	(0.1)		(0.1)			(0.1)		
Urolithiasis	97	103	94	85	38	10	1	581			581	70.48	11.08
(%)	(0.2)	(0.2)	(0.2)	(0.3)	(0.2)	(0.2)	(0.2)	(0.2)			(0.2)		
Neoplasm of kidney and urinary tract	139	173	154	174	62	17	3	886			886	72.53	10.68
(%)	(0.3)	(0.4)	(0.4)	(0.5)	(0.4)	(0.4)	(0.5)	(0.3)			(0.3)		

Table 9 Prevalent dialysis patient distribution by age and primary disease *(Continued)*

Urinary tract obstructive	90	102	89	88	36	10		722	1	723	63.81	16.72
(%)	(0.2)	(0.2)	(0.2)	(0.3)	(0.2)	(0.2)		(0.2)	(4.8)	(0.2)		
Myeloma	51	50	43	38	22	2	3	276		276	70.55	12.17
(%)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.0)	(0.5)	(0.1)		(0.1)		
Hypoplastic kidney	34	32	26	15	6	4		649		649	44.24	19.08
(%)	(0.1)	(0.1)	(0.1)	(0.0)	(0.0)	(0.1)		(0.2)		(0.2)		
Undetermined	3907	4152	4201	3732	2418	698	114	27,530	14	27,544	69.80	13.13
(%)	(7.5)	(8.4)	(9.9)	(11.6)	(14.5)	(15.9)	(18.4)	(8.9)	(66.7)	(8.9)		
Rejected kidney	257	115	73	58	22	10	1	2163		2163	56.37	12.59
(%)	(0.5)	(0.2)	(0.2)	(0.2)	(0.1)	(0.2)	(0.2)	(0.7)		(0.7)		
Others	1000	1097	1014	844	454	126	20	7556	1	7557	65.60	15.70
(%)	(1.9)	(2.2)	(2.4)	(2.6)	(2.7)	(2.9)	(3.2)	(2.4)	(4.8)	(2.4)		
Subtotal	52,259	49,367	42,251	32,087	16,659	4387	618	310,087	21	310,108	67.54	12.49
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)		
No information available												
(%)												
Total	52,259	49,367	42,251	32,087	16,659	4387	618	310,087	21	310,108	67.54	12.49
(%)												

Table 10 Annual changes of primary disease in the incident and prevalent dialysis patients

Incident patients											
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Diabetes	29.9	30.7	31.9	33.1	33.9	35.7	36.2	36.6	38.1	39.1	41.0
Chronic glomerulonephritis	41.4	40.5	39.4	38.9	36.6	35.0	33.6	32.5	32.4	31.9	29.1
Nephrosclerosis	6.2	6.1	6.3	6.4	6.8	6.7	7.0	7.6	7.6	7.8	8.5
PKD	2.6	2.5	2.4	2.5	2.4	2.4	2.2	2.4	2.3	2.4	2.3
RPGN	0.8	0.8	0.8	0.8	1.1	0.9	0.9	1.0	1.0	1.1	1.2
Lupus	1.2	1.2	1.1	1.3	1.0	1.1	1.2	0.9	1.0	0.9	0.7
Chronic pyelonephritis	1.1	1.4	1.2	1.1	1.2	1.1	1.1	1.0	1.1	0.9	1.0
Undetermined	3.3	3.9	4.5	5.0	5.5	5.6	6.1	7.6	9.0	8.4	8.8
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Diabetes	41.3	42.0	42.9	43.4	43.3	44.5	43.6	44.3	44.2	43.8	43.5
Chronic glomerulonephritis	28.1	27.4	25.6	23.8	22.8	21.9	21.0	20.2	19.4	18.8	17.8
Nephrosclerosis	8.8	9.0	9.4	10.0	10.6	10.7	11.7	11.8	12.3	13.1	14.2
PKD	2.7	2.3	2.4	2.3	2.5	2.3	2.4	2.5	2.5	2.5	2.7
RPGN	1.1	1.1	1.2	1.3	1.2	1.2	1.2	1.3	1.3	1.4	1.4
Lupus	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.7	0.7	0.7	0.7
Chronic pyelonephritis	0.9	1.0	0.8	0.8	0.7	0.7	0.8	0.7	0.8	0.8	0.7
Undetermined	9.3	9.5	9.9	10.2	10.6	10.7	10.7	10.9	11.0	11.3	11.3
Prevalent patients											
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Diabetes	18.2	19.2	20.4	21.6	22.7	24.0	25.1	26.0	27.2	28.1	29.2
Chronic glomerulonephritis	58.8	57.7	56.6	55.4	54.1	52.5	51.1	49.7	49.6	48.2	46.6
Nephrosclerosis	3.4	3.6	3.8	4.0	4.2	4.4	4.5	4.8	5.0	5.1	5.3
PKD	3.3	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.3	3.3	3.3
RPGN	1.9	1.8	1.7	1.6	1.6	1.5	1.5	1.4	1.4	1.3	1.3
Lupus	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	0.9
Chronic pyelonephritis	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Undetermined	2.9	3.1	3.2	3.6	3.9	4.2	4.4	5.0	5.6	5.9	6.3
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Diabetes	30.2	31.4	32.3	33.4	34.2	35.1	35.9	36.7	37.1	37.6	38.1
Chronic glomerulonephritis	45.1	43.6	42.2	40.4	39.0	37.6	36.2	34.8	33.6	32.4	31.3
Nephrosclerosis	5.7	5.9	6.2	6.5	6.8	7.1	7.5	7.9	8.3	8.7	9.1
PKD	3.4	3.3	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.5	3.5
RPGN	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.0	1.0
Lupus	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7
Chronic pyelonephritis	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8
Undetermined	6.4	6.6	7.0	7.4	7.6	7.7	8.0	8.2	8.5	8.7	8.9

PKD polycystic kidney disease, *RPGN* rapidly progressive glomerulonephritis

Contents of the 2014 annual dialysis data report of JSDT

I. Outline of JSDT Renal Data Registry (JRDR)
II. Results and discussion from JRDR

Chapter l: Basic demographics
Chapter 2: Current status of microbiological quality of dialysis fluid and its control
Chapter 3: Current status of hemodiafiltration
Chapter 4: Current status of peritoneal dialysis

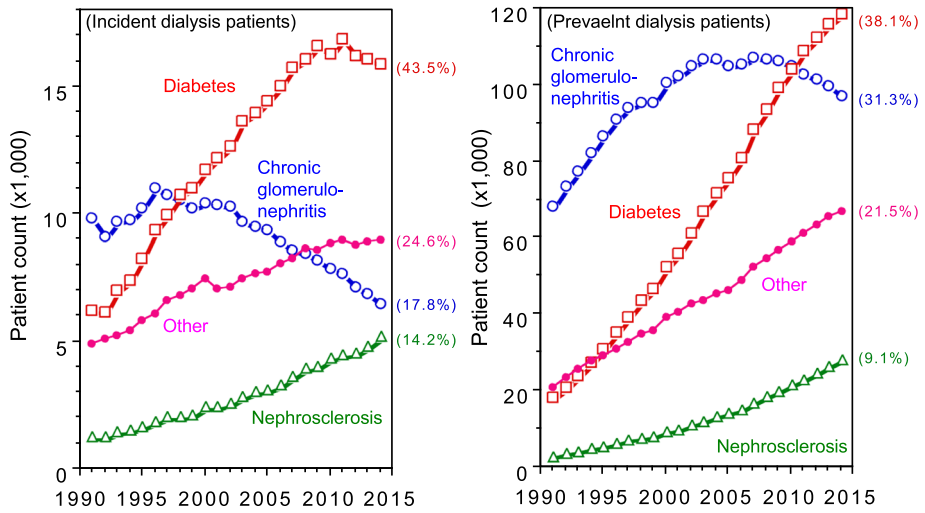

Fig. 3 Annual changes in the distributions of three major primary diseases in the incident patients (*left*) and the prevalent patients (*right*)

II. Results and discussion from JRDR

Chapter 1: Basic demographics

Number of dialysis patients

Table 1 shows a summary of the dynamics of dialysis patients in Japan at the end of 2014. The number of facilities that responded to the facility survey in 2014 was 4330, an increase of 62 (1.4%) from 4268 facilities in 2013. Dialysis facilities have been continuously increasing by 100 or less every year since 2000. In Table 1, data on dialysis vintage and the longest dialysis vintage were obtained from the patient survey. All the other results were obtained from the facility survey.

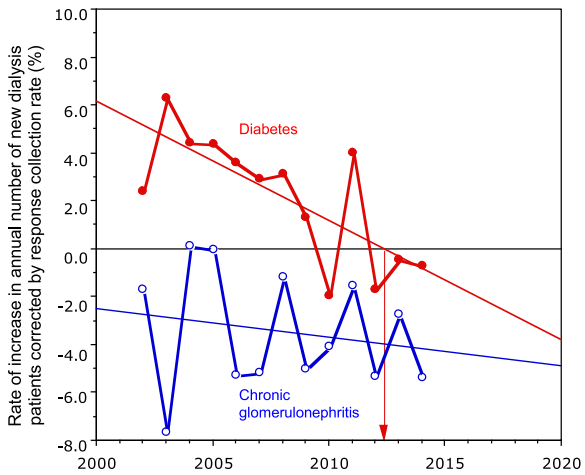

Fig. 4 Annual increasing rates of incident dialysis patients from diabetes and chronic glomerulonephritis

As determined from the facility survey, the prevalent dialysis patients in Japan at the end of 2014 were 320,448 (Table 1). Table 2 shows changes in number of prevalent, incident, and deceased dialysis patients over the last 20 years. The number of dialysis patients in 2014 increased by 6010, which was greater than 4431 in 2013. However, the increasing rate in prevalent dialysis patients has generally decreased since 2000. The annual increasing rate of the prevalent dialysis patients is defined as the ratio of the increase in dialysis patients each year to the dialysis patients at the end of the previous year. The future trend of dialysis patient population in Japan has been estimated by assuming that this trend of annual rate increase continues in the future. As reported previously, the dialysis patient population in Japan is expected to reach the maximum (approximately 348,000) around 2021 and then start decreasing [5].

The number of incident dialysis patients was 38,327 in 2014, as shown by the facility survey. The annual number of incident dialysis patients continued to increase from the start of the survey. Since 2008, incident dialysis patients remained around 38,000 (Table 2).

The annual increasing rates of incident dialysis patients from 2002 adjusted by the recovery rate for the facility survey are plotted in Fig. 1, similarly to the 2013 survey [2]. According to the regression line for the annual increasing rates of incident dialysis patients, the turning point when the incident dialysis patients stop increasing was expected to be in 2013, as shown in the 2013 survey report [2]. These lines of evidences suggested that incident dialysis patients will gradually decrease in the future.

Table 11 Causes of death in incident dialysis patients

Cause of death	Male	Female	Subtotal	No information available	Total
Heart failure	335	212	547		547
(%)	(22.8)	(25.5)	(23.8)		(23.8)
Cerebrovascular disorder	67	37	104		104
(%)	(4.6)	(4.5)	(4.5)		(4.5)
Infectious disease	386	206	592		592
(%)	(26.3)	(24.8)	(25.8)		(25.8)
Hemorrhage	31	21	52		52
(%)	(2.1)	(2.5)	(2.3)		(2.3)
Malignant tumors	186	77	263		263
(%)	(12.7)	(9.3)	(11.4)		(11.4)
Cachexia/Uremia	60	39	99		99
(%)	(4.1)	(4.7)	(4.3)		(4.3)
Cardiac infarction	46	29	75		75
(%)	(3.1)	(3.5)	(3.3)		(3.3)
Potassium poisoning/ Sudden death	23	15	38		38
(%)	(1.6)	(1.8)	(1.7)		(1.7)
Chronic hepatitis/ Cirrhosis	15	10	25		25
(%)	(1.0)	(1.2)	(1.1)		(1.1)
Suicide/Refusal of treatment (dialysis)	18	3	21		21
(%)	(1.2)	(0.4)	(0.9)		(0.9)
Intestinal obstruction	14	11	25		25
(%)	(1.0)	(1.3)	(1.1)		(1.1)
Pulmonary thrombus/ Pulmonary embolus	8	1	9		9
(%)	(0.5)	(0.1)	(0.4)		(0.4)
Death due to disaster	8	3	11		11
(%)	(0.5)	(0.4)	(0.5)		(0.5)
Other causes	156	102	258		258
(%)	(10.6)	(12.3)	(11.2)		(11.2)
Unspecified	115	65	180		180
(%)	(7.8)	(7.8)	(7.8)		(7.8)
Subtotal	1468	831	2299		2299
(%)	(100.0)	(100.0)	(100.0)		(100.0)
No information available					
Total	1468	831	2299		2299

Values in parentheses under each figure represent the percentage relative to the subtotal in each column

Table 12 Causes of deaths in prevalent dialysis patients

Cause of death	Male	Female	Subtotal	No information available	Total
Heart failure	4800	2975	7775		7775
(%)	(25.2)	(28.3)	(26.3)		(26.3)
Cerebrovascular disorder	1329	769	2098		2098
(%)	(7.0)	(7.3)	(7.1)		(7.1)
Infectious disease	4066	2096	6162		6162
(%)	(21.4)	(20.0)	(20.9)		(20.9)
Hemorrhage	280	191	471		471
(%)	(1.5)	(1.8)	(1.6)		(1.6)
Malignant tumors	1951	718	2669		2669
(%)	(10.3)	(6.8)	(9.0)		(9.0)
Cachexia/Uremia	652	518	1170		1170
(%)	(3.4)	(4.9)	(4.0)		(4.0)
Cardiac infarction	868	390	1258		1258
(%)	(4.6)	(3.7)	(4.3)		(4.3)
Potassium poisoning/ Sudden death	551	243	794		794
(%)	(2.9)	(2.3)	(2.7)		(2.7)
Chronic hepatitis/ Cirrhosis	206	72	278		278
(%)	(1.1)	(0.7)	(0.9)		(0.9)
Suicide/Refusal of treatment (dialysis)	166	49	215		215
(%)	(0.9)	(0.5)	(0.7)		(0.7)
Intestinal obstruction	181	129	310		310
(%)	(1.0)	(1.2)	(1.0)		(1.0)
Pulmonary thrombus/ Pulmonary embolus	55	24	79		79
(%)	(0.3)	(0.2)	(0.3)		(0.3)
Death due to disaster	112	45	157		157
(%)	(0.6)	(0.4)	(0.5)		(0.5)
Other causes	1603	1147	2750		2750
(%)	(8.4)	(10.9)	(9.3)		(9.3)
Unspecified	2209	1130	3339		3339
(%)	(11.6)	(10.8)	(11.3)		(11.3)
Subtotal	19,029	10,496	29,525		29,525
(%)	(100.0)	(100.0)	(100.0)		(100.0)
No information available					
Total	19,029	10,496	29,525		29,525

Values in parentheses under each figure represent the percentage relative to the subtotal in each column

The total count of deceased dialysis patients in 2014 was 30,707 (Table 1). The annual count of deaths continued to increase until 2011, but it has been around 30,000 since 2012 [2]. Similarly to the previous report, the trend of the annual increasing rates of deceased patients over the past 12 years from

Table 13 Annual changes in major causes of death

Cause of death	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Cardiac failure	29.9	28.2	25.4	24.1	23.9	24.1	24.3	23.2	25.5	25.1	25.0
Infectious disease	12.2	12.6	13.8	14.6	14.9	15.0	16.3	16.6	16.3	15.9	18.5
Malignant tumor	7.4	7.3	7.2	7.7	8.1	7.7	7.6	8.3	8.5	8.5	8.5
Cerebrovascular disease	13.5	14.1	13.5	12.9	12.6	12.1	11.3	11.3	11.6	11.2	10.7
Cardiac infarction	5.7	7.1	7.5	7.4	8.4	7.9	7.4	7.0	7.4	7.4	6.2
Others	4.1	4.5	5.8	6.3	6.7	7.0	7.7	7.9	9.1	9.0	9.7
Unspecified	2.6	2.8	3.2	2.5	3.5	3.9	3.6	8.1	5.7	6.6	5.6
Cause of death	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Cardiac failure	25.1	25.8	24.9	24.0	23.7	23.6	27.0	26.6	27.2	26.8	26.3
Infectious disease	18.8	19.2	19.9	18.9	19.9	20.7	20.3	20.3	20.4	20.8	20.9
Malignant tumor	9.0	9.0	9.2	9.2	9.2	9.4	9.8	9.1	9.1	9.4	9.0
Cerebrovascular disease	10.6	9.8	9.4	8.9	8.6	8.4	8.1	7.7	7.5	7.2	7.1
Cardiac infarction	5.4	5.1	4.4	4.4	4.1	4.0	4.7	4.6	4.5	4.3	4.3
Others	10.3	9.1	9.5	9.7	9.7	10.0	6.6	8.4	8.5	8.8	9.3
Unspecified	6.5	7.3	8.3	10.3	10.9	10.6	10.9	10.8	10.5	10.8	11.3

2002 was examined (Fig. 2). The increasing rate of deaths remained around 4% until 2011 with slight yearly fluctuations. However, the increasing rates following 3 years (2012–2014) was almost 0%. The regression line for the increasing rates of the annual number of deaths between 2012 and 2014 is obviously decreasing. If this trend continues, the annual number of deaths stops increasing in 2017. However, it can also be interpreted that the rate of increase in the annual number of deaths has fluctuated since 2012, requiring careful attention to future trends.

In the 4330 facilities that responded to the facility survey questionnaire, the total number of bedside consoles was 131,555, an increase of 3405 (2.7%) from the previous year. The capacity for simultaneous hemodialysis treatments in all facilities was 129,860, and the capacity for the maximum dialysis patients was 432,433, increases of 2.9 and 2.4% from the previous year, respectively. As mentioned above, the total number of patients on chronic dialysis in Japan is expected to reach a maximum of approximately 348,000 in 2021 and then gradually decrease; this is expected even when taking into consideration the number of patients treated in dialysis facilities that did not respond to this survey [5]. Therefore, the capacity for dialysis patients in 2014 had been already larger than the expected number of the maximum dialysis patients.

Table 14 Annual crude death rate

Year	Crude death rate (%)	Year	Crude death rate (%)
1993	9.4	2004	9.4
1994	9.5	2005	9.5
1995	9.7	2006	9.2
1996	9.4	2007	9.4
1997	9.4	2008	9.8
1998	9.2	2009	9.6
1999	9.7	2010	9.8
2000	9.2	2011	10.2
2001	9.3	2012	10.0
2002	9.2	2013	9.8
2003	9.3	2014	9.7

The percentage of patients on daytime dialysis was 84.1% of the dialysis patients in 2014, which was 0.4% higher than the previous year (Table 1). In contrast, the nighttime dialysis patient was 12.9%, which was 0.3% lower than 13.2% in the previous year. The absolute number of patients on nighttime dialysis remained in the range of 41,000–42,000 over the last 10 years (Table 3). The number of patients on home HD was 529, an increase of 68 (14.8%) from 461 in the previous year and which has been increasing rapidly since 2006 (Table 3).

The prevalent patients on PD was 9255, which was 2.9% of all dialysis patients. Although the number of PD patients was maximum at 9858 in 2009, it had been gradually decreasing since then (Table 3). The count of PD + HD patients was 1913 in the 2014 survey, and it had remained around 1900 since 2009. The count of non-PD + catheter

patients, it was probably for peritoneal lavage, was 278 and that of PD dropout patients during 2014 was 193.

As shown in Table 3, the number of hemodiafiltration (HDF) patients had been rapidly increasing since 2012 and reached 43,283 in 2014. The demographics of HDF patients are described in detail in Chapter 3: Current status of hemodiafiltration.

According to the patient survey, the longest dialysis vintage was 46 years and 6 months (Table 1). Table 4 shows the total number of dialysis patients in each prefecture of Japan determined from the facility survey.

Mean age

The dialysis patient population in Japan is aging yearly. Table 5 shows the changes in the mean age of the prevalent and incident dialysis patients obtained from the patient survey. The mean age of the incident dialysis patients in 2014 was 69.0 ± 13.4 years [mean ± standard deviation (S.D.)] and that of the prevalent dialysis patients was 67.5 ± 12.5 years. In last two decades from 1994 to 2014, the mean age of dialysis patients had become 6.0 years older from 57.3 to 63.3 years in the first decade, and 4.2 years older from 63.3 to 67.5 years in the second decade. Similarly, the mean age of incident dialysis patients had become 5.3 years older from 60.4 to 65.8 years in the first decade and from 65.8 to 69.0 years in the second decade. These findings showed that the rate of aging of both prevalent and incident dialysis patients was also slowing down. The incident patient distribution by gender and age was summarized in Table 6, and the prevalent patient distribution by gender and age was summarized in Table 7.

Table 15 Cumulative survival rates by incident year since 1983

Year of introduction	Number of patients	1-year survival rate	2-year survival rate	3-year survival rate	4-year survival rate	5-year survival rate	6-year survival rate	7-year survival rate	8-year survival rate	9-year survival rate	10-year survival rate	11-year survival rate	12-year survival rate	13-year survival rate	14-year survival rate	15-year survival rate
1983	9856	0.818	0.747	0.680	0.630	0.585	0.552	0.519	0.480	0.450	0.419	0.389	0.365	0.342	0.322	0.301
1984	10,687	0.816	0.735	0.670	0.619	0.576	0.536	0.495	0.461	0.430	0.402	0.373	0.348	0.323	0.302	0.282
1985	11,582	0.794	0.720	0.659	0.607	0.561	0.517	0.481	0.440	0.409	0.380	0.355	0.330	0.307	0.284	0.266
1986	12,585	0.798	0.724	0.665	0.616	0.563	0.516	0.474	0.439	0.402	0.373	0.345	0.321	0.299	0.278	0.261
1987	13,510	0.814	0.737	0.669	0.605	0.552	0.502	0.457	0.418	0.385	0.357	0.331	0.306	0.286	0.264	0.245
1988	14,719	0.824	0.739	0.664	0.599	0.541	0.493	0.450	0.412	0.377	0.346	0.319	0.296	0.274	0.252	0.234
1989	14,505	0.848	0.760	0.684	0.613	0.555	0.506	0.460	0.421	0.384	0.352	0.326	0.300	0.279	0.258	0.241
1990	16,495	0.838	0.748	0.672	0.606	0.551	0.497	0.454	0.413	0.379	0.348	0.320	0.295	0.274	0.255	0.238
1991	18,151	0.827	0.734	0.660	0.595	0.535	0.484	0.440	0.402	0.370	0.340	0.313	0.289	0.268	0.249	0.231
1992	19,837	0.820	0.727	0.650	0.585	0.527	0.479	0.434	0.396	0.363	0.335	0.309	0.285	0.265	0.245	0.228
1993	20,814	0.832	0.742	0.666	0.596	0.540	0.489	0.444	0.406	0.373	0.342	0.316	0.291	0.267	0.249	0.232
1994	21,307	0.829	0.742	0.668	0.602	0.542	0.488	0.445	0.407	0.372	0.340	0.311	0.288	0.267	0.246	0.227
1995	22,796	0.840	0.753	0.678	0.608	0.549	0.500	0.456	0.416	0.381	0.349	0.319	0.295	0.272	0.249	0.228
1996	24,830	0.831	0.749	0.672	0.607	0.553	0.505	0.454	0.416	0.380	0.348	0.319	0.292	0.267	0.247	0.228
1997	25,391	0.837	0.751	0.680	0.619	0.562	0.511	0.465	0.422	0.385	0.351	0.322	0.294	0.270	0.249	0.228
1998	26,697	0.844	0.765	0.697	0.634	0.573	0.522	0.473	0.431	0.395	0.362	0.332	0.304	0.278	0.256	0.235
1999	27,631	0.850	0.773	0.705	0.639	0.579	0.527	0.480	0.439	0.399	0.362	0.330	0.300	0.272	0.250	0.231
2000	29,125	0.855	0.777	0.711	0.647	0.588	0.533	0.487	0.443	0.403	0.367	0.333	0.305	0.280	0.256	
2001	30,660	0.854	0.777	0.707	0.641	0.585	0.532	0.484	0.441	0.401	0.364	0.330	0.299	0.272		
2002	31,333	0.857	0.780	0.712	0.649	0.589	0.533	0.484	0.439	0.397	0.359	0.327	0.298			
2003	32,358	0.859	0.785	0.716	0.653	0.594	0.538	0.490	0.441	0.399	0.362	0.331				
2004	33,458	0.865	0.790	0.723	0.660	0.600	0.544	0.492	0.445	0.401	0.362					
2005	34,534	0.861	0.789	0.721	0.656	0.596	0.538	0.484	0.437	0.396						
2006	35,960	0.870	0.798	0.729	0.666	0.604	0.546	0.493	0.448							
2007	36,711	0.866	0.794	0.725	0.658	0.594	0.537	0.487								
2008	37,787	0.866	0.796	0.727	0.660	0.597	0.542									
2009	38,313	0.872	0.797	0.727	0.662	0.605										
2010	38,213	0.876	0.803	0.732	0.669											
2011	37,946	0.872	0.797	0.729												
2012	36,278	0.891	0.828													
2013	36,369	0.897														

Table 15 Cumulative survival rates by incident year since 1983 *(Continued)*

Year of introduction	16-year survival rate	17-year survival rate	18-year survival rate	19-year survival rate	20-year survival rate	21-year survival rate	22-year survival rate	23-year survival rate	24-year survival rate	25-year survival rate	26-year survival rate	27-year survival rate	28-year survival rate	29-year survival rate	30-year survival rate	31-year survival rate
1983	0.282	0.265	0.249	0.235	0.222	0.207	0.193	0.182	0.173	0.162	0.151	0.142	0.131	0.120	0.110	0.103
1984	0.264	0.247	0.233	0.221	0.207	0.194	0.183	0.174	0.162	0.153	0.144	0.135	0.125	0.117	0.108	
1985	0.248	0.231	0.216	0.202	0.187	0.174	0.163	0.151	0.142	0.133	0.124	0.116	0.106	0.099		
1986	0.244	0.228	0.215	0.203	0.191	0.178	0.168	0.157	0.148	0.139	0.130	0.120	0.110			
1987	0.230	0.213	0.197	0.184	0.175	0.164	0.154	0.143	0.134	0.125	0.117	0.109				
1988	0.218	0.203	0.190	0.180	0.168	0.157	0.147	0.138	0.129	0.121	0.111					
1989	0.225	0.210	0.195	0.184	0.171	0.159	0.149	0.140	0.130	0.121						
1990	0.222	0.207	0.193	0.181	0.169	0.157	0.145	0.136	0.127							
1991	0.217	0.202	0.189	0.177	0.165	0.154	0.144	0.134								
1992	0.212	0.198	0.184	0.171	0.158	0.146	0.136									
1993	0.215	0.199	0.185	0.172	0.160	0.150										
1994	0.211	0.197	0.184	0.171	0.159											
1995	0.209	0.194	0.179	0.167												
1996	0.209	0.193	0.180													
1997	0.210	0.193														
1998	0.217															
1999																
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Primary diseases

Three major primary diseases of end-stage kidney disease (ESKD) were diabetes, chronic glomerulonephritis, and nephrosclerosis. The three major and other primary diseases of ESKD were summarized by gender and age in the incident patients (Table 8) and in the prevalent patients (Table 9). Diabetes was the most frequent primary disease as 43.5%, followed by chronic glomerulonephritis as 17.8% (Table 10 upper panel). The number and percentage of diabetes of the cause of ESKD on the incident dialysis patients had been increased until the end of 2009 and reached 16,549 and 44.5%, respectively, in 2009 (Table 10 upper panel, Fig. 3 Left). However, they had stopped increasing and started decreasing since 2011. Annual increasing rates of chronic glomerulonephritis and diabetes after 2002 were plotted in Fig. 4. The increasing rates were collected by the responsive rate to the survey. The increasing rate of diabetes had been positive until 2009 but turned to be negative since 2012. It suggests that the number of the incident dialysis patients with diabetes is expected to gradually decrease continuously in the future. In contrast, the increasing rate of chronic glomerulonephritis had been negative for more than the recent 10 years, indicating that the number of the incident dialysis patients with chronic glomerulonephritis continued to decrease. Nephrosclerosis was the third most common primary disease (14.2%) after diabetes and chronic glomerulonephritis. In accordance with the

Table 16 Facility distribution on ET measurement by frequency and concentration

Endotoxin concentration in dialysis fluid (EU/ml)	Every day	Every week	Every 2 weeks	Every month	Several times per year	Once a year	None	Subtotal	Unspecified	No information available	Total
<0.001	20	131	205	2295	280	233	1	3165	2		3167
(%)	(0.6)	(4.1)	(6.5)	(72.5)	(8.8)	(7.4)	(0.0)	(100.0)			
0.001≦, <0.01	5	22	27	371	75	46		546	2		548
(%)	(0.9)	(4.0)	(4.9)	(67.9)	(13.7)	(8.4)		(100.0)			
0.01≦, <0.05	1	9	10	123	37	31		211			211
(%)	(0.5)	(4.3)	(4.7)	(58.3)	(17.5)	(14.7)		(100.0)			
0.05≦, <0.1		1	2	39	12	9		63			63
(%)		(1.6)	(3.2)	(61.9)	(19.0)	(14.3)		(100.0)			
0.1≦, <0.25		1	5	26	9	7		48			48
(%)		(2.1)	(10.4)	(54.2)	(18.8)	(14.6)		(100.0)			
0.25≦, <0.5			1	11	2	6		20			20
(%)			(5.0)	(55.0)	(10.0)	(30.0)		(100.0)			
0.5≦	1		2	15	1	3		22			22
(%)	(4.5)		(9.1)	(68.2)	(4.5)	(13.6)		(100.0)			
Subtotal	27	164	252	2880	416	335	1	4075	4		4079
(%)	(0.7)	(4.0)	(6.2)	(70.7)	(10.2)	(8.2)	(0.0)	(100.0)			
Unspecified		1	1	4	5	11	79	22	63		164
(%)		(1.0)	(1.0)	(4.0)	(5.0)	(10.9)	(78.2)	(100.0)			
No information available							53		2	6	61
(%)							(100.0)	(100.0)			
Total	27	165	253	2884	421	346	133	4229	69	6	4304
(%)	(0.6)	(3.9)	(6.0)	(68.2)	(10.0)	(8.2)	(3.1)	(100.0)			

Values in parentheses under each figure represent the percentage relative to the subtotal in each row

Table 17 Facility distribution on microbial measurement by frequency and TVC

TVC (cfu/mL)	Every day	Every week	Every 2 weeks	Every month	Several times per year	Once a year	None	Subtotal	Unspecified	No information available	Total
<0.1	11	100	185	1962	273	273	1	2805	6		2811
(%)	(0.4)	(3.6)	(6.6)	(69.9)	(9.7)	(9.7)	(0.0)	(100.0)			
0.1≦, <1		18	40	364	68	60		550	1		551
(%)		(3.3)	(7.3)	(66.2)	(12.4)	(10.9)		(100.0)			
1≦, <10	3	6	23	267	44	29		372			372
(%)	(0.8)	(1.6)	(6.2)	(71.8)	(11.8)	(7.8)		(100.0)			
10≦, <100	1	1	5	111	20	17	1	156			156
(%)	(0.6)	(0.6)	(3.2)	(71.2)	(12.8)	(10.9)	(0.6)	(100.0)			
100≦	1	2	1	22	9	5		40			40
(%)	(2.5)	(5.0)	(2.5)	(55.0)	(22.5)	(12.5)		(100.0)			
Subtotal	16	127	254	2726	414	384	2	3923	7		3930
(%)	(0.4)	(3.2)	(6.5)	(69.5)	(10.6)	(9.8)	(0.1)	(100.0)			
Unspecified		1	6	18	8	11	141	185	79		264
(%)		(0.5)	(3.2)	(9.7)	(4.3)	(5.9)	(76.2)	(100.0)			
No information available							99	99	4	7	110
(%)							(100.0)	(100.0)			
Total	16	128	260	2744	422	395	242	4207	90	7	4304
(%)	(0.4)	(3.0)	(6.2)	(65.2)	(10.0)	(9.4)	(5.8)	(100.0)			

Values in parentheses under each figure represent the percentage relative to the subtotal in each row
TVC total viable microbial count

Table 18 Facility distribution on microbial measurement by cultivating medium and sampling volume

Sampling volume	Nutrient agar	R2A	TGEA	Blood agar	TSA	Others	Subtotal	Unspecified	No information available	Total
<1	54	161	45	3	3	12	278	22		300
(%)	(19.4)	(57.9)	(16.2)	(1.1)	(1.1)	(4.3)	(100.0)			
1≦, < 10	90	404	44	6	5	14	563	42		605
(%)	(16.0)	(71.8)	(7.8)	(1.1)	(0.9)	(2.5)	(100.0)			
10≦, <50	62	645	352	4	13	74	1150	25		1175
(%)	(5.4)	(56.1)	(30.6)	(0.3)	(1.1)	(6.4)	(100.0)			
50≦, < 100	45	642	571	1	13	85	1357	17	1	1375
(%)	(3.3)	(47.3)	(42.1)	(0.1)	(1.0)	(6.3)	(100.0)			
100≦, <500	19	263	146		2	17	447	13		460
(%)	(4.3)	(58.8)	(32.7)		(0.4)	(3.8)	(100.0)			
500≦, < 1000	2	10	4	1			17	1		18
(%)	(11.8)	(58.8)	(23.5)	(5.9)			(100.0)			
1000≦, <10,000		8	5			1	14	1		15
(%)		(57.1)	(35.7)			(7.1)	(100.0)			
10,000≦		1	1				2			2
(%)		(50.0)	(50.0)				(100.0)			
Subtotal	272	2134	1168	15	36	203	3828	121	1	3950
(%)	(7.1)	(55.7)	(30.5)	(0.4)	(0.9)	(5.3)	(100.0)			
Unspecified	3	8	1				12	232		244
(%)	(25.0)	(66.7)	(8.3)				(100.0)			
No information available									110	110
(%)										
Total	275	2142	1169	15	36	203	3840	353	110	4304
(%)	(7.2)	(55.8)	(30.4)	(0.4)	(0.9)	(5.3)	(100.0)			

Values in parentheses under each figure represent the percentage relative to the subtotal in each row
R2A Reasoner's No. 2 agar, *TGEA* Tryptone glucose extract agar, *TSA* Trypticase soy agar

aging of incident dialysis patients, the percentage of patients with nephrosclerosis continued to increase steadily. The percentage of patients with "unspecified" primary diseases was the fourth highest (11.3%). In addition, polycystic kidney disease (PKD), rapidly progressive glomerulonephritis (RPGN), lupus, and chronic pyelonephritis were also observed as primary diseases. However, the percentages of these primary diseases among the incident dialysis patients were 0.7–2.7%, which were much lower than the percentages of patients with the abovementioned top three primary diseases and unspecified diseases, and had shown no marked increase or decrease over the past 20 years.

Table 19 Facility counts by ETRF installation

	With ETRF	Without ETRF	Subtotal	No information available	Total
Number of facilities	4136	159	4295	9	4304
(%)	(96.3)	(3.7)	(100.0)		

Values in parentheses under each figure represent the percentage relative to the subtotal in the row

Chronic glomerulonephritis was the most common primary disease in the prevalent dialysis patients but the percentage of chronic glomerulonephritis has been decreasing. In contrast, the percentage of diabetes has been increasing and it has been the most common primary disease in the prevalent dialysis patients since 2011. (Table 10 lower panel, Fig. 3 Right) In 2014, the percentage of diabetes further increased (38.1%), whereas that of chronic glomerulonephritis further decreased (31.3%). Nephrosclerosis was the third highest percentage of primary disease in the prevalent dialysis patients in 2014 (9.1%). The percentage of nephrosclerosis has been increasing. The percentage of patients with "unspecified" primary diseases was the fourth highest (8.9%). In addition, polycystic

Table 20 Bedside console counts by ETRF installation

Numbers of bedside consoles	Facility status of ETRF installation		Subtotal	No information available	Total
	More than one bedside console with ETRF in the facility	No bedside consoles with ETRF in the facility			
Number of bedside consoles with ETRF	116,527	0	116,527	0	116,527
(%)	(100.0)	(0.0)	(100.0)		
Number of bedside consoles without ETRF	11,657	3178	14,835	193	15,028
(%)	(78.6)	(21.4)	(100.0)		
Total	128,184	3178	131,362	193	131,555
(%)	(97.6)	(2.4)	(100.0)		

Values in parentheses under each figure represent the percentage relative to the subtotal in each row
ETRF endotoxin retentive filter

kidney disease, chronic pyelonephritis, lupus, and RPGN were also observed as primary diseases. However, the percentages of these primary diseases were only 0.7–3.5% and had shown no marked increase or decrease over the past 20 years.

Causes of death

The causes of death in the incident dialysis patients in 2014 were summarized in Table 11. The leading cause of death of them was infectious diseases (25.8%), followed by cardiac failure (23.8%), malignant tumors (11.4%), other causes (11.2%), and unspecified causes (7.8%). The causes of death in the prevalent dialysis patients in 2014 were summarized in Table 12. Table 13 shows annual changes in the percentages of the leading causes of death in prevalent dialysis patients. Among the prevalent dialysis patients, the leading cause of death in 2014 was cardiac failure (26.3%). The percentage of cardiac failure in prevalent dialysis patients had markedly decreased by the early 1990s, and it has remained almost unchanged. The second leading cause of death was infectious diseases (20.9%); the percentage of it had been increasing by 2009, and it has remained almost unchanged. The percentage of malignant tumors was 9.0%. The percentage cerebrovascular disease had continued to decrease since 1995 and was 7.1% in 2014. The percentage of myocardial infarction was 4.3% in 2014.

Table 21 Facility distribution on endotoxin measurement by endotoxin concentration and ETRF installation on sampling

With or without ETRF when the dialysate was sampled	<0.001	0.001≦, <0.01	0.01≦, <0.05	0.05≦, <0.1	0.1≦, < 0.25	0.25≦, <0.5	0.5≦	Subtotal	Unspecified	No information available	Total
Without ETRF	412	120	51	10	15	5	5	618	72	21	711
(%)	(13.1)	(22.2)	(24.8)	(16.4)	(31.9)	(27.8)	(23.8)	(15.3)	(62.6)	(100.0)	(17.0)
With ETRF	2742	421	155	51	32	13	16	3430	43		3473
(%)	(86.9)	(77.8)	(75.2)	(83.6)	(68.1)	(72.2)	(76.2)	(84.7)	(37.4)		(83.0)
Subtotal	3154	541	206	61	47	18	21	4048	115	21	4184
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
Unspecified	13	7	5	2	1	2	1	31	49	4	84
(%)											
No information available										36	36
(%)											
Total	3167	548	211	63	48	20	22	4079	164	61	4304
(%)											

Values in parentheses under each figure represent the percentage relative to the subtotal in each column
ETRF endotoxin retentive filter

Table 22 Facility distribution on microbial measurement by TVC and ETRF installation on sampling

With or without ETRF when the dialysate was sampled	<0.1	0.1~	1~	10~	100	Subtotal	Unspecified	No information available	Total
Without ETRF	339	108	73	45	14	579	100	32	711
(%)	(12.1)	(19.8)	(20.2)	(29.6)	(35.0)	(14.8)	(46.1)	(47.1)	(17.0)
With ETRF	2461	437	289	107	26	3320	117	36	3473
(%)	(87.9)	(80.2)	(79.8)	(70.4)	(65.0)	(85.2)	(53.9)	(52.9)	(83.0)
Subtotal	2800	545	362	152	40	3899	217	68	4184
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
Unspecified	11	6	10	4		31	47	6	84
(%)									
No information available								36	36
(%)									
Total	2811	551	372	156	40	3930	264	110	4304
(%)									

Values in parentheses under each figure represent the percentage relative to the subtotal in each column
ETRF endotoxin retentive filter, *TVC* total viable microbial count

The classification codes for the causes of death were revised in the 2003 and 2010 surveys. We speculate that these revisions might have had some influence on the distributions of causes of death. These revisions were detailed in the annual data report 2010 [6].

Annual crude death rate

The annual crude death rate was calculated from the facility survey data as shown in Table 14. The annual crude death rate is defined as the percentage of patients who died each year with respect to the mean

Table 23 Facility distribution by endotoxin concentration and TVC

Bacterial counts in dialysate (cfu/mL)	<0.001	0.001≦, <0.01	0.01≦, <0.05	0.05≦, <0.1	0.1≦, <0.25	0.25≦, <0.5	0.5≦	Subtotal	Unspecified	No information available	Total
<0.1	2602	153	29	9	7	3	3	2806	5		2811
(%)	(92.7)	(5.5)	(1.0)	(0.3)	(0.2)	(0.1)	(0.1)	(100.0)			
0.1~	291	186	43	16	5	2	4	547	4		551
(%)	(53.2)	(34.0)	(7.9)	(2.9)	(0.9)	(0.4)	(0.7)	(100.0)			
1~	137	125	67	11	21	5	4	370	2		372
(%)	(37.0)	(33.8)	(18.1)	(3.0)	(5.7)	(1.4)	(1.1)	(100.0)			
10~	40	45	35	17	7	6	6	156			156
(%)	(25.6)	(28.8)	(22.4)	(10.9)	(4.5)	(3.8)	(3.8)	(100.0)			
100	12	6	9	4	3	3	3	40			40
(%)	(30.0)	(15.0)	(22.5)	(10.0)	(7.5)	(7.5)	(7.5)	(100.0)			
Subtotal	3082	515	183	57	43	19	20	3919	11		3930
(%)	(78.6)	(13.1)	(4.7)	(1.5)	(1.1)	(0.5)	(0.5)	(100.0)			
Unspecified	61	23	16	5	4	1	1	111	151	2	264
(%)	(55.0)	(20.7)	(14.4)	(4.5)	(3.6)	(0.9)	(0.9)	(100.0)			
No information available	24	10	12	1	1		1	49	2	59	110
(%)	(49.0)	(20.4)	(24.5)	(2.0)	(2.0)		(2.0)	(100.0)			
Total	3167	548	211	63	48	20	22	4079	164	61	4304
(%)	(77.6)	(13.4)	(5.2)	(1.5)	(1.2)	(0.5)	(0.5)	(100.0)			

Values in parentheses under each figure represent the percentage relative to the subtotal in each row
TVC total viable microbial count

Table 24 Annual changes in frequency of endotoxin measurement

Frequency of measurement (per month)	2006	2007	2008	2009	2010	2011	2012	2013	2014
1≦	953	1153	1253	1373	2810	2914	3141	3238	3329
(%)	(27.3)	(31.5)	(33.1)	(36.0)	(70.6)	(71.9)	(76.3)	(77.7)	(78.7)
<1	2535	2511	2531	2436	1170	1137	977	929	900
(%)	(72.7)	(68.5)	(66.9)	(64.0)	(29.4)	(28.1)	(23.7)	(22.3)	(21.3)
Subtotal	3488	3664	3784	3809	3980	4051	4118	4167	4229
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
Unspecified	185	209	244	193	92	99	77	65	69
No information available	312	179	53	48	52	27	8	3	6
Total	3985	4052	4081	4050	4124	4177	4203	4235	4304

Values in parentheses under each figure represent the percentage relative to the total in each column

annual dialysis patient counts. Table 14 shows the annual crude death rates between 1993 and 2014. It had remained in the range of 9.0–9.9% until 2010 but was in the range of 10.0–10.9% in 2011 and 2012. However, it was again in the range of 9.0–9.9% (9.8% in 2013 and 9.7% in 2014).

Cumulative survival rate of incident dialysis patients since 1983

The cumulative survival rates of the incident dialysis patients by the year of starting dialysis since 1983 are summarized in Table 15. The 1- to 10-year survival rates were the lowest for patients who started dialysis in 1992 and were increasing in patients in 1993 or later. However, the 5-year survival rate for patients who started dialysis between 2003 and 2009 and the 10-year survival rate for between 1998 and 2004 remained almost unchanged. The 20- or more year survival rates tended to decrease.

Chapter 2: Current status of microbiological quality of dialysis fluid and its control

Measurement of endotoxin concentration in dialysis fluid

Among 4304 facilities that had at least one bedside console, 4229 facilities (98.3%) responded to the question about the frequency for measuring endotoxin. The JSDT standard [7] for microbiological quality of dialysis fluid recommends that the endotoxin concentration in dialysis fluid should be measured at least once a month. The percentage of the facilities that satisfied this recommendation was 78.7%, a slight increase from the previous year as 77.7% (Table 16).

Four thousand seventy-nine facilities (94.8%) responded to the question about the endotoxin concentration.

Table 25 Annual change in endotoxin concentration in dialysis fluid

	2006	2007	2008	2009	2010	2011	2012	2013	2014
<0.001	817	1688	–	1865	2343	2549	2787	2963	3167
(%)	(29.8)	(53.0)	–	(56.1)	(62.1)	(66.0)	(70.7)	(73.9)	(77.6)
0.001≦, <0.05	1627	1295	–	933	1115	1042	938	849	759
(%)	(59.2)	(40.6)	–	(28.1)	(29.6)	(27.0)	(23.8)	(21.2)	(18.6)
0.05≦	302	203	–	527	314	271	216	195	153
(%)	(11.0)	(6.4)	–	(15.8)	(8.3)	(7.0)	(5.5)	(4.9)	(3.8)
Subtotal	2746	3186	–	3325	3772	3862	3941	4007	4079
(%)	(100.0)	(100.0)	–	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
Unspecified	–	215	–	253	105	112	197	148	164
No information available	1239	651	–	472	247	203	65	80	61
Total	3985	4052	–	4050	4124	4177	4203	4235	4304

Values in parentheses under each figure represent the percentage relative to the subtotal in each column
In the 2008 survey, the measurement unit for the endotoxin level in the dialysate was changed from EU/L to EU/mL. The values in 2008 are considered to include many errors and are not shown here

Table 26 Annual changes in frequency of TVC measurement

Frequency of measurement (per month)	2006	2007	2008	2009	2010	2011	2012	2013	2014
1≦	371	580	751	934	2649	2794	3018	3091	3148
(%)	(11.5)	(16.9)	(20.8)	(25.8)	(67.8)	(70.0)	(73.7)	(74.7)	74.8%
<1	2857	2861	2856	2693	1260	1196	1077	1046	1059
(%)	(88.5)	(83.1)	(79.2)	(74.2)	(32.2)	(30.0)	(26.3)	(25.3)	(25.2)
Subtotal	3228	3441	3607	3627	3909	3990	4095	4137	4207
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
Unspecified	386	412	418	367	158	159	100	94	90
No information available	371	199	56	56	57	28	8	4	7
Total	3985	4052	4081	4050	4124	4177	4203	4235	4304

Values in parentheses under each figure represent the percentage relative to the subtotal in each column
TVC total viable microbial count

According to the standard, ultrapure dialysis fluid (UPD) defined as endotoxin <0.001 EU/mL and total viable microbial count (TVC) <0.1 cfu/mL is recommended for all dialysis modalities; and standard dialysis fluid defined as endotoxin <0.05 EU/mL and TVC <100 cfu/mL is the minimum desirable quality to ensure the safety of dialysis therapy [7]. Endotoxin concentration of <0.001 and <0.05 EU/mL were achieved in 77.6 and 96.2% of the 4079 facilities, respectively. These percentages were higher than those in the previous year as 73.9 and 95.1%, respectively (Table 16).

Measurement of TVC in dialysis fluid

Four thousand twenty-seven (97.7%) among all 4304 facilities responded to the question about the frequency of measurement of TVC. The JSDT standard [7] recommends that the TVC in dialysis fluid should be measured at least once a month. The percentage of the facilities that satisfied this recommendation was 74.8% as similar as 74.7% in 2013 (Table 17).

Three thousand nine hundred thirty facilities (91.3%) responded to the question about the TVC in dialysis fluid. As previously addressed, JSDT guideline defined two qualities on TVC: UPD as <0.1 cfu/mL and the standard dialysis fluid as 100 cfu/mL. TVC of <0.1 and <100 cfu/mL were achieved in 71.5 and 99.0% of the facilities that responded, respectively (Table 17).

Three thousand eight hundred forty of the facilities (89.2%) responded to the question about the culturing media for TVC. In the JSDT standard, Reasoner's No. 2 agar (R2A) and tryptone glucose extract agar (TGEA) are recommended for TVC in dialysis fluid. The survey results showed that either of these media was used by 86.2% of the facilities that responded.

Table 27 Annual changes in TVC in dialysis fluid

TVC (cfu/mL)	2006	2007	2008	2009	2010	2011	2012	2013	2014
<0.1	508	750	915	1123	1819	2017	2397	2570	2811
(%)	(48.4)	(47.9)	(50.7)	(54.5)	(53.1)	(56.4)	(63.8)	(67.1)	(71.5)
0.1≦, <100	509	775	847	901	1542	1498	1305	1214	1079
(%)	(48.5)	(49.5)	(46.9)	(43.7)	(45.0)	(41.9)	(34.7)	(31.7)	(27.5)
100≦	32	40	43	38	62	62	55	46	40
(%)	(3.1)	(2.6)	(2.4)	(1.8)	(1.8)	(1.7)	(1.5)	(1.2)	(1.0)
Subtotal	1049	1565	1805	2062	3423	3577	3757	3830	3930
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
Unspecified	2036	552	575	494	216	227	320	273	264
No information available	900	1935	1701	1494	485	373	126	132	110
Total	3985	4052	4081	4050	4124	4177	4203	4235	4304

Values in parentheses under each figure represent the percentage relative to the subtotal in each column
TVC total viable microbial count

Table 28 Annual patient count by in-center extracorporeal dialysis modality

Dialysis method		2009	2010	2011	2012	2013	2014
Facility HD		253,807	262,973	270,072	268,275	264,211	255,641
HDF	On-line HDF	6852	4829	4890	14,069	23,536	36,090
	(%)	(40.7)	(32.5)	(34.6)	(64.8)	(75.0)	(83.4)
	Off-line HDF	9299	9421	8573	7157	7149	6315
	(%)	(55.2)	(63.4)	(60.7)	(32.9)	(22.8)	(14.6)
	Push/Pull HDF	237	159	145	109	263	537
	(%)	(1.4)	(1.1)	(1.0)	(0.5)	(0.8)	(1.2)
	AFBF	465	458	507	390	423	341
	(%)	(2.8)	(3.1)	(3.6)	(1.8)	(1.3)	(0.8)
HDF subtotal		16,853	14,867	14,115	21,725	31,371	43,283
	(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
HD + HDF total		270,660	277,840	284,187	290,000	295,582	298,924

Values in parentheses under each figure represent the percentage relative to the HDF subtotal in each column
HD hemodialysis, *HDF* hemodiafiltration

Three thousand nine hundred fifty of the facilities (91.8%) responded to the question about the sampling volume for TVC. As previously addressed, the JSDT standard recommended that UPD should be indicated for all types of extracorporeal dialysis treatments [7]. The requirement of TVC for UPD is <0.1 cfu/mL so it needs equal or greater than 10 mL of sampling volume of dialysis fluid. At least 10 mL of sampling was performed in 77.1% of the facilities that responded (Table 18). As previously addressed, UPD should satisfy both an endotoxin <0.001 EU/mL and TVC of <0.1 cfu/mL. However, the percentage of the facilities that satisfied TVC of <0.1 cfu/mL (71.5%) was approximately 6% lower than that of the facilities that satisfied the endotoxin <0.001 EU/mL (77.6%), indicating the need for the improvement of dialysis fluid quality control.

Installation of endotoxin retentive filters

Four thousand two hundred ninety-five (99.8%) responded to questions regarding the installation of endotoxin retentive filters (ETRFs). Among these 4295 facilities, 96.3% had at least one bedside console equipped with an ETRF (Table 19). The 4304 facilities that responded to the questions about the installation of ETRFs had a total of 131,555 bedside consoles, 88.6% of which were equipped with an ETRF. The percentage of bedside consoles equipped with an ETRF increased by 2.6% from the previous year (86.0%) (Table 20) [2].

Theoretically, UPD can be achieved by using an ETRF based on its retentive performance. If facilities cannot achieve UPD even with ETRF, these facilities may have some problems in preventing the contaminations, such as a high contamination level of raw water, a high level of secondary contamination, contamination of ETRF itself, or contamination during sampling. These facilities need to optimize their maneuver of the disinfection of the entire system. The percentages of facilities that did not achieve the required endotoxin of <0.001 EU/mL and TVC of <0.1 cfu/mL with ETRFs were 20.1 and 25.9%, respectively (Tables 21 and 22). Standard dialysis fluid should have an endotoxin of <0.050 EU/mL and TVC of <100 cfu/mL. Among the facilities that had bedside consoles equipped with an ETRF, 3.3% did not achieve the required endotoxin and 0.8% did not achieve the required TVC. In contrast, 66.7 and 58.5% of the facilities without ETRFs satisfied the endotoxin and TVC of UPD, respectively. These results suggest that the technologies for purifying dialysis fluid have advanced to ensure the purification in the entire dialysate supply system. However, the data also suggested that dialysis fluid was contaminated by mal-handlings of an ETRF in some cases.

Endotoxin concentration and TVC in dialysis fluid

According to the JSDT standard for on the microbiological quality of dialysis fluid, UPD is recommended for all dialysis methods [7]. UPD is defined as an endotoxin of <0.001 EU/mL (lower than the detection limit) and TVC of <0.1 cfu/mL [7]. Among the 4304 facilities that had at least one bedside console, 3919 (91.1%) responded to each question of endotoxin and TVC in dialysis fluid, among which, 2602 satisfied the above standards for UPD. They accounted for 66.4%

Table 29 Patient distribution on all types of HDF by gender and age

Age	Male	Female	Subtotal	No information available	Total
<5	2		2		2
(%)	(0.0)		(0.0)		(0.0)
5~9					
(%)					
10~14					
(%)					
15~19	7	5	12		12
(%)	(0.0)	(0.0)	(0.0)		(0.0)
20~24	24	12	36		36
(%)	(0.1)	(0.1)	(0.1)		(0.1)
25~29	87	37	124		124
(%)	(0.3)	(0.2)	(0.3)		(0.3)
30~34	199	96	295		295
(%)	(0.7)	(0.6)	(0.7)		(0.7)
35~39	514	212	726		726
(%)	(1.9)	(1.3)	(1.7)		(1.7)
40~44	1155	491	1646		1646
(%)	(4.2)	(3.1)	(3.8)		(3.8)
45~49	1671	781	2452		2452
(%)	(6.1)	(4.9)	(5.7)		(5.7)
50~54	2142	1016	3158		3158
(%)	(7.8)	(6.4)	(7.3)		(7.3)
55~59	2837	1452	4289		4289
(%)	(10.4)	(9.1)	(9.9)		(9.9)
60~64	4064	2369	6433		6433
(%)	(14.9)	(14.8)	(14.9)		(14.9)
65~69	4802	2863	7665		7665
(%)	(17.6)	(17.9)	(17.7)		(17.7)
70~74	4010	2467	6477		6477
(%)	(14.7)	(15.5)	(15.0)		(15.0)
75~79	2927	1903	4830		4830
(%)	(10.7)	(11.9)	(11.2)		(11.2)
80~84	1903	1352	3255		3255
(%)	(7.0)	(8.5)	(7.5)		(7.5)
85~89	781	706	1487		1487
(%)	(2.9)	(4.4)	(3.4)		(3.4)
90~94	171	180	351		351
(%)	(0.6)	(1.1)	(0.8)		(0.8)
95≦	17	25	42		42
(%)	(0.1)	(0.2)	(0.1)		(0.1)
Subtotal	27,313	15,967	43,280		43,280
(%)	(100.0)	(100.0)	(100.0)		(100.0)
Unknown	3		3		3
No information available					
Total	27,316	15,967	43,283		43,283
Mean age	64.32	66.30	65.05		65.05
S.D.	12.40	12.27	12.39		12.39

Values in parentheses under each figure represent the percentage relative to the subtotal in each column
HDF hemodiafiltration

Table 30 Patient distribution by in-center HD/HDF and primary disease

Primary disease	In-cnter HD	(%)	HDF	(%)
Chronic glomerular nephritis	76,117	(29.8)	16,311	(37.7)
Chronic pyelonephritis	2456	(1.0)	462	(1.1)
RPGN	2106	(0.8)	304	(0.7)
PIH	1156	(0.5)	378	(0.9)
Unclassified nephritis	1058	(0.4)	207	(0.5)
PKD	9081	(3.6)	1593	(3.7)
Nephrosclerosis	24,036	(9.4)	3132	(7.2)
Hypertensive emergencies	2110	(0.8)	346	(0.8)
Diabetes	100,830	(39.4)	14,284	(33.0)
Lupus	1757	(0.7)	394	(0.9)
Amyloidosis	376	(0.1)	64	(0.1)
Gout	907	(0.4)	163	(0.4)
Inborn errors of metabolism	201	(0.1)	50	(0.1)
Tuberculosis	175	(0.1)	24	(0.1)
Urolithiasis	488	(0.2)	72	(0.2)
Neoplasm of kidney and urinary tract	771	(0.3)	100	(0.2)
Urinary tract obstructive	616	(0.2)	80	(0.2)
Myeloma	245	(0.1)	23	(0.1)
Hypoplastic kidney	455	(0.2)	111	(0.3)
Undetermined	22,799	(8.9)	3763	(8.7)
Rejected kidney	1613	(0.6)	450	(1.0)
Others	6288	(2.5)	972	(2.2)
Subtotal	255,641	(100.0)	43,283	(100.0)
No information available				
Total	255,641		43,283	

Values in parentheses on the right side of each figure represent the percentage relative to the subtotal in each column
HD hemodialysis, *HDF* hemodiafiltration, *RPGN* Rapidly progressive glomerulonephritis, *PIH* Pregnancy-induced hypertension, *PKD* polycystic kidney disease

Table 31 Patient distribution on all types of HDF by gender and dialysis vintage

Gender	0~1	2~4	5~9	10~14	15~19	20~24	25~29	30~34	35~39	40~	Subtotal	Unknown	No information available	Total	Mean	S.D.
Male	3795	6465	7093	4101	2442	1489	926	593	338	63	27,305	11	0	27,316	9.15	8.41
(%)	(68.7)	(69.0)	(65.2)	(61.3)	(57.9)	(52.7)	(51.5)	(49.7)	(53.8)	(46.3)	(63.1)					
Female	1731	2910	3784	2592	1776	1338	871	601	290	73	15,966	1	0	15,967	11.36	9.43
(%)	(31.3)	(31.0)	(34.8)	(38.7)	(42.1)	(47.3)	(48.5)	(50.3)	(46.2)	(53.7)	(36.9)					
Subtotal	5526	9375	10,877	6693	4218	2827	1797	1194	628	136	43,271	12	0	43,283	9.97	8.86
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)					
No information available	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total	5526	9375	10,877	6693	4218	2827	1797	1194	628	136	43,271	12		43,283	9.97	8.86

Values in parentheses under each figure represent the percentage relative to the subtotal in each column
HDF hemodiafiltration

Table 32 Patient distribution on in-center extracorporal dialysis by modality and dialysis vintage

Dialysis modality	0~1	2~4	5~9	10~14	15~19	20~24	25~29	30~34	35~39	40~	Subtotal	Unknown	No information available	Total	Mean	S.D.
In-center HD	58,953	65,244	65,126	32,837	16,641	8638	4382	2374	1132	245	255,572	69		255,641	6.85	7.01
(%)	(91.4)	(87.4)	(85.7)	(83.1)	(79.8)	(75.3)	(70.9)	(66.5)	(64.3)	(64.3)	(85.5)	(85.2)		(85.5)		
Off-line HDF	561	1022	1473	1050	719	538	426	314	169	40	6312	3		6315	12.54	9.97
(%)	(0.9)	(1.4)	(1.9)	(2.7)	(3.4)	(4.7)	(6.9)	(8.8)	(9.6)	(10.5)	(2.1)	(3.7)		(2.1)		
On-line HDF	4836	8177	9144	5508	3429	2242	1340	864	448	93	36,081	9		36,090	9.54	8.59
(%)	(7.5)	(11.0)	(12.0)	(13.9)	(16.4)	(19.6)	(21.7)	(24.2)	(25.5)	(24.4)	(12.1)	(11.1)		(12.1)		
Push/Pull HDF	97	115	162	77	37	25	17	6	1		537			537	7.95	7.24
(%)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.3)	(0.2)	(0.1)		(0.2)			(0.2)		
AFBF	32	61	98	58	33	22	14	10	10	3	341			341	11.07	9.41
(%)	(0.0)	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)	(0.2)	(0.3)	(0.6)	(0.8)	(0.1)			(0.1)		
Total	64,479	74,619	76,003	39,530	20,859	11,465	6179	3568	1760	381	298,843	81		298,924	7.29	7.49
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)		(100.0)		

Values in parentheses under each figure represent the percentage relative to the subtotal in each column
HDF hemodiafiltration, *AFBF* acetate free biofiltration

Table 33 Patient distribution by dilution mode and HDF modality

	Predilution	Postdilution	Predilution and postdilution	Other dilution mode	Subtotal	Unspecified	No information available	Total
On-line HDF	29,881	1342	0	1317	32,540	1	3549	36,090
(%)	(91.8)	(4.1)	(0.0)	(4.0)	(100.0)			
Off-line HDF	638	4275	5	5	4923		1392	6315
(%)	(13.0)	(86.8)	(0.1)	(0.1)	(100.0)			
Push/Pull HDF	8	88	0	266	362		175	537
(%)	(2.2)	(24.3)	(0.0)	(73.5)	(100.0)			
AFBF	2	154		1	157		184	341
(%)	(1.3)	(98.1)	(0.0)	(0.6)	(100.0)			
Total	30,529	5859	5	1589	37,982	1	5300	43,283
(%)	(80.4)	(15.4)	(0.0)	(4.2)	(100.0)			

Values in parentheses under each figure represent the percentage relative to the subtotal in each row
HDF hemodiafiltration, *AFBF* acetate free biofiltration

of the facilities that responded to the questions and 60.5% of all the facilities, which were higher than those in the previous year, 60.8 and 54.9%, respectively (Table 23).

Changes in status of quality control of dialysis fluid

In the early 2000s, microbial contamination of dialysis fluid was considered an important factor affecting the quality of dialysis treatment. Moreover, a concern on the high possibility of bacterial contaminations in centralized dialysis fluid delivery system (CDDS) widely used in Japan was raised by overseas researchers. In response to this, the survey of the endotoxin level and TVC in dialysis fluid was started in 2006. The results have been referenced in revising the JSDT standard and the targets of endotoxin and TVC were changed in 2008, 2010, and 2012 [7–9]. Such a large-scale survey on dialysis fluid quality has been carried out and used for the revision of the standard only in Japan. With the above historical background, how the status of bacteriological contamination of dialysis fluid changed between 2006 and 2014 is reviewed below [2, 6, 10–15].

The percentage of facilities that measured endotoxin in dialysis fluid at least once a month was 36.0% in 2009, increased to 70.6% in 2010 because of the revision of the medical reimbursement, and continued to gradually increase to 78.7% in 2014 (Table 24). The measured endotoxin in dialysis fluid decreased yearly; 77.6% of the facilities achieved the required endotoxin of UPD (<0.001 EU/mL), and 96.2% of the facilities achieved the required endotoxin concentration of standard dialysis fluid (<0.050 EU/mL) (Table 25). In the 2008 survey, the endotoxin unit was changed from EU/L to EU/mL in accordance with the international standards. Because many errors resulting from the misunderstanding of the unit were found in the responses, the endotoxin concentration in dialysis fluid in the 2008 was excluded.

The target of TVC in dialysis fluid was not included in the JSDT guidelines on dialysate quality control standards in 2005 [16]. Owing to the revision of the standard in 2008, it was recommended to measure TVC at least once a month similarly as well as endotoxin level [7]. In 2007 or previously, only 10–19% of the facilities measured TVC at least once a month. In 2010, however, the

Table 34 Mean substitution volume by dilution mode and online/offline

		Predillution	Postdilution	Predilution and postdilution	Other dilution mode	Subtotal	Unspecified	No information available	Total
On-line HDF	Number of patients	29,881	1342	0	1317	32,540	1	3549	36,090
	Mean volumes of substitution fluid per session (L)	39.6	10.6		1.5	37.4			37.4
	S.D.	15.8	5.0		1.2	17.4			17.4
Off-line HDF	Number of patients	638	4275	5	5	4923	0	1392	6315
	Mean volumes of substitution fluid per session (L)	10.2	8.0	9.0	1.3	8.3			8.3
	S.D.	6.6	2.3	1.4	0.5	3.3			3.3

HDF hemodiafiltration

Table 35 Annual changes in substitution volume of predilution online HDF

Year	1~	10~	20~	30~	40~	50~	60~	70~	80~	Subtotal	Unknown	Total	Mean	S.D.
2012	415	711	1829	2320	3373	913	1102	345	145	11,153	122	11,275	39.1	16.7
(%)	(3.7)	(6.4)	(16.4)	(20.8)	(30.2)	(8.2)	(9.9)	(3.1)	(1.3)	(100.0)				
2013	464	936	2728	3730	6791	1558	2009	445	316	18,977	267	19,244	40.6	15.8
(%)	(2.4)	(4.9)	(14.4)	(19.7)	(35.8)	(8.2)	(10.6)	(2.3)	(1.7)	(100.0)				
2014	1030	1347	4583	5399	10,512	2138	2693	563	450	28,715	1166	29,881	39.6	15.8
(%)	(3.6)	(4.7)	(16.0)	(18.8)	(36.6)	(7.4)	(9.4)	(2.0)	(1.6)	(100.0)				

Values in parentheses under each figure represent the percentage relative to the subtotal in each row
HDF hemodiafiltration

percentage of such facilities rapidly increased to 67.8% because of the revision of the medical reimbursement in that year and it gradually increased to 74.8% in 2014 (Table 26). The percentage of facilities that satisfied TVC for UPD (<0.1 cfu/mL) gradually increased to 71.5% in 2014. The percentage of facilities that satisfied standard dialysis fluid (<100 cfu/mL) was 99.0% (Table 27).

Chapter 3: Current status of hemodiafiltration

Basal characteristics of HDF patients

Since the revision of the medical reimbursement for HDF made in April 2012 [9], the number of patients treated by online HDF have been rapidly increasing. The HDF patient count was 14,069 in 2012 and increased by 2.5-fold up to 36,090 in 2014 (Table 28) [2, 6, 13–15] whereas, the count of the patients on offline HDF decreased from 7157 in 2012 to 6315 in 2014. The percentage of patients on HDF of all dialysis patients has increased from 7.5% in 2012 to 14.5% in 2014.

The HDF patients' distributions by age and gender were summarized (Table 29). For both males and females, the number of patients on HDF in the age group of 65–70 years was the largest, showing no significant difference in the age distribution by gender.

The primary diseases of the HDF patients were compared with in-center HD patients (Table 30). The prevalence of diabetes was lower in HDF patients than in in-center HD patients. Chronic glomerulonephritis was the most common in the HDF patients (37.7%), followed by diabetes (33.0%). This finding may be attributable to the fact that many of the HDF patients have a longer dialysis vintage than the in-center HD patients.

The dialysis vintages of HDF patients were evaluated by gender (Table 31) and were compared among various extracorporeal dialysis modalities (Table 32). For dialysis vintages of <20 years, the percentage of male patients was higher than that of female patients. For dialysis vintages of ≥20 years, the ratio of males to females was nearly 1:1. Even among the patients with dialysis vintages of <2 years, 7.5% underwent online HDF. The percentage of patients on online HDF increased with increasing dialysis vintage. This suggests that at the time immediately after the start of dialysis, online HDF might be selected for the prevention of dialysis-related complications in the future.

Dilution mode and substitution volume

The majority of the patients on online HDF (91.8%) was treated by predilution, whereas that of offline HDF (86.8%) was performed in postdilution (Table 33). The mean substitution volume was compared between the patients on online and offline HDF by dilution mode (Table 34). In online HDF, the mean volumes were 39.6 and 10.6 L for predilution and postdilution, respectively. In offline HDF, the mean volumes were 10.2 and 8.0 L for predilution and postdilution, respectively.

Table 36 Annual changes in substitution volume of postdilution online HDF

Year	1~	5~	10~	15~	20~	Subtotal	Unknown	Total	Mean	S.D.
2012	31	289	460	113	24	917	36	953	10.6	3.9
(%)	(3.4)	(31.5)	(50.2)	(12.3)	(2.6)	(100.0)				
2013	172	536	474	104	35	1321	118	1439	9.2	4.5
(%)	(13.0)	(40.6)	(35.9)	(7.9)	(2.6)	(100.0)				
2014	89	482	501	104	137	1313	29	1342	10.6	5.0
(%)	(6.8)	(36.7)	(38.2)	(7.9)	(10.4)	(100.0)				

Values in parentheses under each figure represent the percentage relative to the subtotal in each row
HDF hemodiafiltration

Table 37 Annual changes in substitution volume of predilution offline HDF

Year	1~	5~	10~	15~	20~	Subtotal	Unknown	Total	Mean	S.D.
2012	20	200	207	7	22	456	29	485	9.2	3.8
(%)	(4.4)	(43.9)	(45.4)	(1.5)	(4.8)	(100.0)				
2013	40	252	227	5	36	560	20	580	9.4	4.7
(%)	(7.1)	(45.0)	(40.5)	(0.9)	(6.4)	(100.0)				
2014	89	222	209	15	83	618	20	638	10.2	6.6
(%)	(14.4)	(35.9)	(33.8)	(2.4)	(13.4)	(100.0)				

Values in parentheses under each figure represent the percentage relative to the subtotal in each row
HDF hemodiafiltration

Changes in the substitution volume per session of online HDF between 2012 and 2014 are shown for the predilution (Table 35) and postdilution (Table 36) [2, 15]. For the predilution, the numbers of patients in all groups stratified by the volume of substitution fluid increased. However, the mean substitution volume in the entire online HDF patients remained almost unchanged at approximately 40 L in 2012–2014. The group of patients with 40–50 L of substitution volume was the largest in each year, and the percentage of this group increased over time. For the postdilution, the numbers of patients in the stratified groups with ≥10 L of substitution fluid tended to increase. In particular, the number of patients in the group with ≥20 L of substitution greatly increased over time, although the absolute number was still small. This finding indicates that an increasing number of patients has undergone postdilution online HDF using a large volume of substitution fluid, which is mainly performed in Europe.

The changes in the substitution volume per session of offline HDF between 2012 and 2014 are shown for the predilution (Table 37) and the postdilution (Table 38) [2, 15]. The number of patients on predilution offline HDF was small but slightly increased, and the substitution volume among them also tended to increase. In contrast, in 2014, the number of patients on postdilution offline HDF decreased by approximately 1000 from the previous year. However, the percentages of patients with different volumes of substitution fluid have hardly changed in the 3 years and the mean volume of substitution fluid remained at approximately 8 L.

The dialysis prescription is usually affected by the patient's body size. The substitution volumes for HDF therapy were evaluated by body weight according to the dilution mode and gender. In the male patients on predilution HDF with body weight <50 kg, the percentages of the substitution volume as 20–40 and 40–80 L were similar. In case of body weight ≥50 kg, the percentage of those using 40–80 L of substitution fluid increased and exceeded 60% in the group of male patients who weighed ≥60 kg (Table 39). In the female patients on predilution HDF with body weight <40 kg, the percentage of 20–40 L of substitution fluid was almost the same as that of patients using 40–80 L. In case of body weight ≥50 kg, the percentage of 20–40 L of substitution fluid was almost the same as 40–80 L. The titration of substitution volume according to body weight was observed only in males but not in females (Table 40). In the postdilution mode, the male patients with body weight <50 kg were mostly treated with 5–10 L of substitution volume. In the male patients with body weight 60–70 kg, the patients treated with 10–20 L of substitution fluid was similar to that of 5–10 L. In the patients with body weight ≥70 kg, the percentage of patients using 10–20 L of substitution fluid was the highest (Table 41). In the female patients, the percentage of patients using 5–10 L of substitution fluid was greater than 50% in all weight groups (Table 42).

Table 38 Annual changes in substitution volume of postdilution offline HDF

Year	1~	5~	10~	15~	20~	Subtotal	Unknown	Total	Mean	S.D.
2012	492	2845	1620	16	5	4978	71	5049	7.8	2.3
(%)	(9.9)	(31.5)	(50.2)	(12.3)	(2.6)	(100.0)				
2013	508	2775	1722	16	13	5034	180	5214	7.9	2.4
(%)	(10.1)	(55.1)	(34.2)	(0.3)	(0.3)	(100.0)				
2014	338	2235	1492	11	7	4083	192	4275	8.0	2.3
(%)	(8.3)	(54.7)	(36.5)	(0.3)	(0.2)	(100.0)				

Values in parentheses under each figure represent the percentage relative to the subtotal in each row
HDF hemodiafiltration

Table 39 Male patient distribution on predilution HDF by postdialysis body weight and substitution volume

Substitution volume (L/session)	Postdialysis body weight (kg)						Total
	<40	40~50	50~60	60~70	70~80	80~	
<5	6	67	110	87	33	9	312
(%)	(3.0)	(2.7)	(1.7)	(1.6)	(1.4)	(0.7)	(1.7)
5~	11	88	165	108	53	15	440
(%)	(5.5)	(3.5)	(2.6)	(2.0)	(2.3)	(1.1)	(2.4)
10~	22	179	335	228	91	47	902
(%)	(11.1)	(7.1)	(5.2)	(4.3)	(3.9)	(3.4)	(5.0)
20~	80	1022	2183	1588	610	343	5826
(%)	(40.2)	(40.6)	(34.1)	(30.1)	(26.2)	(24.8)	(32.2)
40~	76	1128	3511	3187	1494	927	10,323
(%)	(38.2)	(44.9)	(54.8)	(60.3)	(64.2)	(67.0)	(57.0)
80~	4	31	99	86	45	43	308
(%)	(2.0)	(1.2)	(1.5)	(1.6)	(1.9)	(3.1)	(1.7)
Total	199	2515	6403	5284	2326	1384	18,111
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Values in parentheses under each figure represent the percentage relative to the subtotal in each column
HDF hemodiafiltration

Table 41 Male patient distribution on postdilution HDF by postdialysis body weight and substitution volume

Substitution fluid volume (L/session)	Postdialysis body weight (kg)						Total
	<40	40~50	50~60	60~70	70~80	80~	
<5	4	39	78	38	21	10	190
(%)	(10.0)	(7.6)	(6.7)	(4.5)	(6.3)	(4.6)	(6.1)
5~	23	276	575	395	138	76	1483
(%)	(57.5)	(53.9)	(49.6)	(46.7)	(41.3)	(35.0)	(47.7)
10~	11	186	478	380	158	118	1331
(%)	(27.5)	(36.3)	(41.2)	(45.0)	(47.3)	(54.4)	(42.8)
20~	2	11	29	32	17	13	104
(%)	(5.0)	(2.1)	(2.5)	(3.8)	(5.1)	(6.0)	(3.3)
40~	0	0	0	0	0	0	0
(%)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
80~	0	0	0	0	0	0	0
(%)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Total	40	512	1160	845	334	217	3108
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Values in parentheses under each figure represent the percentage relative to the subtotal in each column
HDF hemodiafiltration

Blood flow rate and dialysis time

The distributions of blood flow rate in each HDF modality were summarized in Table 43. At least half of the online HDF patients were treated at a blood flow rate of ≥220 mL/min, whereas at least half of the offline HDF patients were treated at a blood flow rate of <220 mL/min. The mean blood flow rate was a little higher in predilution in online HDF but it was higher in postdilution in offline HDF.

Table 44 shows the distributions of dialysis session time in each HDF modality. The dialysis time per session

Table 40 Female patient distribution on predilution HDF by postdialysis body weight and substitution volume

Substitution volume (L/session)	Postdialysis body weight (kg)						Total
	<40	40~50	50~60	60~70	70~80	80~	
<5	48	79	43	17	3	0	190
(%)	(3.0)	(1.8)	(1.6)	(1.8)	(1.1)	(0.0)	(1.9)
5~	81	163	78	33	6	3	364
(%)	(5.1)	(3.6)	(2.9)	(3.6)	(2.1)	(2.2)	(3.6)
10~	136	302	131	42	9	4	624
(%)	(8.5)	(6.7)	(4.9)	(4.5)	(3.2)	(2.9)	(6.2)
20~	672	1664	890	297	106	44	3673
(%)	(42.2)	(36.9)	(33.4)	(32.0)	(37.5)	(31.9)	(36.3)
40~	641	2247	1487	520	157	80	5132
(%)	(40.2)	(49.9)	(55.8)	(56.0)	(55.5)	(58.0)	(50.7)
80~	15	49	38	19	2	7	130
(%)	(0.9)	(1.1)	(1.4)	(2.0)	(0.7)	(5.1)	(1.3)
Total	1593	4504	2667	928	283	138	10,113
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Values in parentheses under each figure represent the percentage relative to the subtotal in each column
HDF hemodiafiltration

Table 42 Female patient distribution on postdilution HDF by postdialysis body weight and substitution volume

Substitution fluid volume (liter per session)	Postdialysis body weight (kg)						Total
	<40	40~50	50~60	60~70	70~80	80~	
<5	60	88	51	9	5	0	213
(%)	(13.9)	(9.5)	(10.1)	(6.0)	(12.2)	(0.0)	(10.2)
5~	255	490	259	83	24	10	1121
(%)	(58.9)	(52.6)	(51.3)	(55.3)	(58.5)	(50.0)	(53.9)
10~	113	336	189	53	11	8	710
(%)	(26.1)	(36.1)	(37.4)	(35.3)	(26.8)	(40.0)	(34.1)
20~	5	17	6	5	1	2	36
(%)	(1.2)	(1.8)	(1.2)	(3.3)	(2.4)	(10.0)	(1.7)
40~	0	0	0	0	0	0	0
(%)							
80~	0	0	0	0	0	0	0
(%)							
Total	433	931	505	150	41	20	2080
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Values in parentheses under each figure represent the percentage relative to the subtotal in each column
HDF hemodiafiltration

Table 43 Patient distribution on online/offline HDF by blood flow rate and dilution mode

HDF method		100~	120~	140~	160~	180~	200~	220~	240~	260~	280~	300~	350~	400~	Subtotal	Unknown	Total	Mean	S.D.
On-line HDF	Predilution	21	47	782	309	1752	9277	4802	7148	856	813	2133	313	178	28,431	352	28,783	228.2	41.0
	(%)	(0.1)	(0.2)	(2.8)	(1.1)	(6.2)	(32.6)	(16.9)	(25.1)	(3.0)	(2.9)	(7.5)	(1.1)	(0.6)	(100.0)				
	Postdilution	0	3	52	33	136	434	241	274	37	38	60	7	4	1319	7	1326	219.9	39.1
	(%)	(0.0)	(0.2)	(3.9)	(2.5)	(10.3)	(32.9)	(18.3)	(20.8)	(2.8)	(2.9)	(4.5)	(0.5)	(0.3)	(100.0)				
Off-line HDF	Predilution	3	8	63	23	71	258	84	98	2	4	15	2	0	631	3	634	204.5	36.0
	(%)	(0.5)	(1.3)	(10.0)	(3.6)	(11.3)	(40.9)	(13.3)	(15.5)	(0.3)	(0.6)	(2.4)	(0.3)	(0.0)	(100.0)				
	Postdilution	6	17	205	96	484	1712	686	648	97	82	117	9	6	4165	29	4194	212.1	35.0
	(%)	(0.1)	(0.4)	(4.9)	(2.3)	(11.6)	(41.1)	(16.5)	(15.6)	(2.3)	(2.0)	(2.8)	(0.2)	(0.1)	(100.0)				

Values in parentheses under each figure represent the percentage relative to the subtotal in each row.
HDF hemodiafiltration

Table 44 Patient distribution on online/offline HDF, by dialysis time & dilution mode

HDF method		<3.0	3.0~	3.5~	4.0~	4.5~	5.0~	5.5~	6.0~	Subtotal	Unknown	Total	Mean	S.D.
On-line HDF	Predilution	55	1512	1764	18,954	2900	2980	181	267	28,613	170	28,783	4.11	0.50
	(%)	(0.2)	(5.3)	(6.2)	(66.2)	(10.1)	(10.4)	(0.6)	(0.9)	(100.0)				
	Postdilution	1	108	100	858	126	112	7	7	1319	7	1326	4.04	0.50
	(%)	(0.1)	(8.2)	(7.6)	(65.0)	(9.6)	(8.5)	(0.5)	(0.5)	(100.0)				
Off-line HDF	Predilution	4	74	20	433	42	53	0	6	632	2	634	4.00	0.57
	(%)	(0.6)	(11.7)	(3.2)	(68.5)	(6.6)	(8.4)	(0.0)	(0.9)	(100.0)				
	Postdilution	5	214	198	2822	396	483	22	35	4175	19	4194	4.12	0.51
	(%)	(0.1)	(5.1)	(4.7)	(67.6)	(9.5)	(11.6)	(0.5)	(0.8)	(100.0)				

Values in parentheses under each figure represent the percentage relative to the subtotal in each row
HDF hemodiafiltration

Table 45 Comparison of characteristics between in-center HD and HDF patients by dilution mode

		In-center HD	On-line HDF		Off-line HDF	
			Predilution	Postdillution	Predilution	Postdillution
Basic indices	Number of patients	228,971	28,783	1326	634	4194
	Male	147,033	18,463	824	394	2473
	Male (%)	64.2	64.1	62.1	62.1	59.0
	Percentage of diabetes	39.5	33.5	30.8	30.1	30.0
	Age	68.1 ± 12.3	64.6 ± 12.5	64.8 ± 12.2	66.8 ± 12.1	65.7 ± 11.9
	Dialysis vintage (years)	7.0 ± 7.0	9.5 ± 8.5	11.0 ± 9.3	12.0 ± 9.8	12.9 ± 10.0
	Postdialysis body weight (male)	59.6 ± 12.2	61.7 ± 12.4	61.0 ± 12.3	58.2 ± 11.5	60.2 ± 12.5
	Postdialysis body weight (female)	48.6 ± 10.6	49.2 ± 10.3	48.8 ± 10.1	47.3 ± 9.6	47.4 ± 9.5
Indices for urea kinetics	dilalysis time (minute)	238.4 ± 31.4	246.8 ± 30.2	242.4 ± 29.7	240.3 ± 34.2	247.4 ± 30.4
	Blood flow rate (mL/min)	204.9 ± 36.4	228.2 ± 41.0	219.9 ± 39.1	204.5 ± 36.0	212.2 ± 35.0
	Kt/V (male)*	1.40 ± 0.26	1.45 ± 0.27	1.45 ± 0.26	1.39 ± 0.25	1.45 ± 0.26
	Kt/V (female)*	1.62 ± 0.31	1.71 ± 0.31	1.70 ± 0.31	1.60 ± 0.32	1.69 ± 0.31
	normalized protein catablic rate (g/kg/day, male)*	0.85 ± 0.17	0.87 ± 0.16	0.87 ± 0.16	0.86 ± 0.16	0.87 ± 0.17
	normalized protein catablic rate (g/kg/day, female)*	0.88 ± 0.18	0.91 ± 0.18	0.91 ± 0.17	0.89 ± 0.17	0.90 ± 0.18
Indices for nutrition	Serum albumin (g/dL)	3.60 ± 0.44	3.65 ± 0.37	3.60 ± 0.41	3.52 ± 0.45	3.57 ± 0.43
	Serum CRP level (mg/dL)	0.64 ± 1.94	0.49 ± 1.47	0.56 ± 1.79	0.83 ± 2.46	0.74 ± 2.09
	Predialysis serum creatinin (male)*	10.98 ± 2.80	11.51 ± 2.66	11.53 ± 2.74	11.13 ± 2.81	11.10 ± 2.75
	Predialysis serum creatinin (female)*	9.12 ± 2.34	9.66 ± 2.12	9.66 ± 2.11	9.16 ± 2.24	9.16 ± 2.13
	Percent creatinin generation rate*	98.74 ± 25.96	102.74 ± 23.46	103.17 ± 24.13	96.86 ± 24.72	99.04 ± 24.60
Indices for CKD-MBD	Predialysis serum calcium (mg/dl)	9.18 ± 0.74	9.17 ± 0.73	9.25 ± 0.75	9.34 ± 0.80	9.29 ± 0.82
	Predialysis serum phosphorus (mg/dl)	5.20 ± 1.43	5.38 ± 1.42	5.31 ± 1.37	5.29 ± 1.51	5.28 ± 1.51
	Intact PTH level (pg/ml)	170.0 ± 161.0	178.1 ± 168.9	176.1 ± 157.7	178.5 ± 212.1	168.6 ± 163.9
	Predialysis serum total cholesterol (mg/dl)	154.7 ± 35.3	158.39 ± 35.55	162.50 ± 36.07	152.4 ± 36.0	154.9 ± 35.7
Indices for anemia	Predialysis hemoglobin (g/dL)	10.69 ± 1.28	10.88 ± 1.24	10.80 ± 1.24	10.78 ± 1.51	10.68 ± 1.36

Note: Total number of each index was different from each other because response rate for the question was different in each other
HD hemodilaysis, *HDF* hemodiafiltration, *CKD-MBD* chronic kidney disease-mineral & bone disorder
*For the indices from age to predialysis Hb concentration, "mean ± S.D." are shown

Table 46 Patient distribution by modality and combination of PD

				Main dialysis methods[a]								
				In-center HD	HDF	Hemo-filtration	Hemo-adsorption	Home HD	PD	Total	(%)	(%)
Combined use of PD and another modality	Patients who did not undergo PD (Non-PD patients)	Non-PD + non-catheter patients		255,316	43,239	91	1630	518	0	300,794	(99.9)	(97.0)
		(%)		(84.9)	(14.4)	(0.0)	(0.5)	(0.2)	(0.0)	(100.0)		
		Non-PD + catheter patients[b]		245	22	1	0	1	0	269	(0.1)	(0.1)
		(%)		(91.1)	(8.2)	(0.4)	(0.0)	(0.4)	(0.0)	(100.0)		
		Total number of non-PD patients		255,561	43,261	92	1630	519	0	301,063	(100.0)	(97.1)
		(%)		(84.9)	(14.4)	(0.0)	(0.5)	(0.2)	(0.0)	(100.0)		
	Patients who underwent PD (PD patients)[c]	PD only		0	0	0	0	0	7188	7188	(79.7)	(2.3)
		(%)		(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(100.0)	(100.0)		
		Patients who underwent PD and another modality (PD + HD patients)	PD + HD 1/week	0	0	0	0	0	1544	1544	(17.1)	(0.5)
			(%)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(100.0)	(100.0)		
			PD + HD 2/week	28	8	0	0	0	141	177	(2.0)	(0.1)
			(%)	(15.8)	(4.5)	(0.0)	(0.0)	(0.0)	(79.7)	(100.0)		
			PD + HD 3/week	29	10	0	0	1	0	40	(0.4)	(0.0)
			(%)	(72.5)	(25.0)	(0.0)	(0.0)	(2.5)	(0.0)	(100.0)		
			PD + HD 4/week	1	0	0	0	0	0	1	(0.0)	(0.0)
			(%)	(100.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(100.0)		
			PD + HD other frequencies	8	2	0	0	0	63	73	(0.8)	(0.0)
			(%)	(11.0)	(2.7)	(0.0)	(0.0)	(0.0)	(86.3)	(100.0)		
			Total PD + HD patients	66	20	0	0	1	1748	1835	(20.3)	(0.6)
			(%)	(3.6)	(1.1)	(0.0)	(0.0)	(0.1)	(95.3)	(100.0)		
		Total number of PD patients		66	20	0	0	1	8936	9023	(100.0)	(2.9)
		(%)		(0.7)	(0.2)	(0.0)	(0.0)	(0.0)	(99.0)	(100.0)		
	Total number of non-PD and PD patients			255,627	43,281	92	1630	520	8936	310,086		(100.0)
	(%)			(82.4)	(14.0)	(0.0)	(0.5)	(0.2)	(2.9)	(100.0)		

Table 46 Patient distribution by modality and combination of PD *(Continued)*

	Unspecified	14	2	0	0	1	5	22
	(%)	(63.6)	(9.1)	(0.0)	(0.0)	(4.5)	(22.7)	(100.0)
	No information available	0	0	0	0	0	0	0
	(%)	–	–	–	–	–	–	–
Total		255,641	43,283	92	1630	521	8941	310,108
(%)		(82.4)	(14.0)	(0.0)	(0.5)	(0.2)	(2.9)	(100.0)

Note: The selection of the classification code for the dialysis method of the patients classified in the shaded area in the table, i.e., PD + HD patients, was left to the subjective decision of the respondents
HD hemodialysis, *HDF* hemodiafiltration, *PD* peritoneal dialysis
[a]Main dialysis methods are classified on the basis of the classification codes for dialysis methods that have conventionally been used in the annual survey
[b]In this survey, patients who did not undergo PD despite having a peritoneal catheter for PD (including those who underwent only peritoneal lavage) were tentatively classified as patients who did not undergo PD (i.e., non-PD patients) to analyze the survey data. It is not intended to standardize the above definition
[c]In this survey, both patients who underwent PD only and those who underwent PD and another method were tentatively classified as patients who underwent PD (i.e., PD patients) to analyze the survey data. It is not intended to standardize the above definition

was independent of the HDF method and dilution mode. Many HDF patients tended to undergo HDF for 4.0–4.5 h per session.

Comparison between in-center HD and HDF patients

Characteristics of the patients treated by in-center HD and HDF were compared by dilution mode (Table 45). The patients with dialysis vintage of ≥2 years and treated on 3 times per week dialysis program were included to the comparison. The mean age of the in-center HD patients was the highest, whereas the online HDF patients were younger than the patients who underwent other types of dialysis. The dialysis vintage was the shortest in the in-center HD patients and the longest in the offline HDF patients. The postdialysis body weight and percentile creatinine generation rate (%CGR), which is an index of muscle mass, were high in the online HDF patients. CRP was low in the online HDF patients. The indices related to mineral and bone disorder on chronic kidney disease (CKD-MBD) and Hb showed no remarkable differences between the modalities.

Chapter 4: Current status of peritoneal dialysis

The results of the facility survey shown in Table 1 revealed that the prevalent PD patient count was 9255 at the end of 2014. Moreover, the number of patients who had a PD catheter but were supposed to use it only for peritoneal lavage was 278. The number of patients who started PD in 2014 but stopped PD and introduced to another method during 2014 was 193. The detailed results of the PD survey are reported separately. Therefore, only a basic summary of the results is included in this report.

Combination therapy of PD and other dialysis modalities

Prevalent patient distributions on the combination of PD and other dialysis modalities (PD + HD) were summarized in Table 46. The main dialysis methods are categorized on the basis of the classification codes for dialysis methods that have been conventionally used in the patient survey. Among the 310,086 patients who responded to questions regarding the status of PD + HD in the patient survey, 301,063 (97.1%) underwent a non-PD dialysis modalities such as HD (non-PD patients) and 9023 (2.9%) underwent PD alone or PD + HD. The count of non-PD patients increased from 2013 as 297,773, whereas that of PD patients decreased by 98 from 2013 as 9121.

Among the 301,063 of non-PD patients, 269 patients had a PD catheter (i.e., non-PD + catheter patients). Most of these patients were switched to HD from PD but did not have their PD catheter removed. There was also one non-PD + catheter patient among the 519 patients who underwent home HD. In this survey report, non-PD + catheter patients were tentatively classified and counted as patients who did not undergo PD in the analysis of the survey data. Note that this is only a tentative classification and that the Committee of Renal Data Registry (CRDR) of JSDT does not intend to standardize the above definition.

The count of PD-only patients was 7188, which was smaller than that in 2013 as 7324. The percentage of PD-only patients in all 9023 PD patients was 79.7%, which was smaller than that in 2013 as 80.3%. Moreover, the number of patients of PD + HD was 1835, which was larger than that in 2013 as 1797. The percentage of PD + HD patients in the entire PD patient population was 20.3%, which was larger than that in 2013 as 19.7%.

Table 47 PD patient distribution by PD vintage and PD combination

Combined use of PD and another method	<1 yr.	1 yr. ~	2 yrs. ~	4 yrs. ~	6 yrs. ~	8 yrs. ~	10 yrs. ~	Subtotal	No information available	Total	Mean	S.D.
PD only	1252	948	1269	640	269	101	109	4588	2600	7188	2.80	2.72
(%)	(96.7)	(89.8)	(83.6)	(73.1)	(59.1)	(46.5)	(41.3)	(80.8)	(77.8)	(79.7)		
PD + HD 1/week	35	93	219	205	151	86	113	902	642	1544	5.69	3.92
(%)	(2.7)	(8.8)	(14.4)	(23.4)	(33.2)	(39.6)	(42.8)	(15.9)	(19.2)	(17.1)		
PD + HD 2/week	4	7	12	20	27	26	26	122	55	177	7.53	4.15
(%)	(0.3)	(0.7)	(0.8)	(2.3)	(5.9)	(12.0)	(9.8)	(2.1)	(1.6)	(2.0)		
PD + HD 3/week		3	3	2	2		5	15	25	40	6.58	5.05
(%)		(0.3)	(0.2)	(0.2)	(0.4)		(1.9)	(0.3)	(0.7)	(0.4)		
PD + HD other frequencies	4	4	14	8	6	4	11	51	22	73	6.47	4.99
(%)	(0.3)	(0.4)	(0.9)	(0.9)	(1.3)	(1.8)	(4.2)	(0.9)	(0.7)	(0.8)		
Total	1295	1055	1517	875	455	217	264	5678	3344	9022	3.40	3.27
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)		

Values in parentheses under each figure represent the percentage relative to the total in each column
Tabulation target: PD patients (including those who underwent PD and HD or HDF)
HD hemodialysis, *PD* peritoneal dialysis

Among 1835 PD + HD patients, 1544 (84.1%) underwent a non-PD dialysis modality once a week, 177 (9.6%) in twice a week, 40 (2.2%) in three times a week, and one patient in four times a week. There were also 73 patients (4.0%) of PD + HD at frequencies other than those mentioned above.

There were various main dialysis method codes in 1835 PD + HD patients (shaded area in Table 46) because the choice of a code for the main dialysis method was just dependent on the responder's decision.

This classification of the main dialysis modality for the PD + HD patients have been a tentative one by CRDR, a standardized classification for the PD + HD patients had not been established.

PD + HD and PD vintage

Table 47 shows the prevalent patient distribution by PD + HD and PD vintage. The responses for both the PD vintage and the status of PD + HD were recovered in 5678 PD + HD patients. The percentage of PD + HD patients even with a PD vintage of <1 year was 3.3% and increased with PD vintage: ≥1–<2 years, 10.1%; ≥2–<4 years, 16.3%; ≥4–<6 years, 26.9%; ≥6–<8 years, 40.9%; ≥8–<10 years, 53.5%; and ≥10 years, 58.7%. The majority (82.8%) of the PD + HD patients underwent HD or HDF once a week.

Abbreviations

AFBF: Acetate free biofiltration; APD: Automated peritoneal dialysis; BUN: Blood urea nitrogen; CRDR: The Committee of Renal Data Registry of the Japanese Society for Dialysis Therapy; ESKD: End-stage kidney disease; ETRF: Endotoxin retentive filter; HD: Hemodialysis; HDF: Hemodiafiltration; JRDR: JSDT renal data registry; JSDT: The Japanese Society for Dialysis Therapy; Kt/V: Index for standardized dialysis dose defined as; PD: Peritoneal dialysis; PIH: Pregnancy-induced hypertension; PKD: Polycystic kidney disease; Pmp: Per million population; RPGN: Rapidly progressive glomerulonephritis; TVC: Total viable microbial count; UF: Ultrafiltration; USB: Universal serial bus

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Availability of data and materials

When anyone want to use the data and materials from the current manuscript without modifications, all data and materials are freely available with stating "data from JSDT".

When anyone want to use the data and materials from the current manuscript with modifications, any re-calculations or something, they have to state the following sentence in their publication. "The data reported here have been provided by the Japanese Society for Dialysis Therapy (JSDT). The interpretation and reporting of these data are the responsibility of the authors and in no way should be seen as an official policy or interpretation of the JSDT."

Authors' contributions

IM was the director of CRDR in 2014 and directed all of the 2014 JRDR survey. IM and SN finalized the results of the survey and made this manuscript. SO and AW designed the survey sheets and made a special program mounted in MS Excel worksheet for the convenience of self-assessment for the dialysis quality of each dialysis facility. SN, NK, and TH had the responsibilities on the data analysis. KW had the responsibility on the ethical aspect of the JRDR survey. KN was the president of JSDT in 2014, and checked all the results from the 2014 JRDR survey, and approved them to be published. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

Consent for publication

Not applicable.

Ethics approval and consent to participate

The JSDT registry was approved by the ethical committee of JSDT, the approval no. is 1.

The aims of JSDT Renal Data Registry (JRDR) were well explained for the participated dialysis patients through the dialysis facilities.

It does not always need to get the documented approval form from the patients because all the collected data were the existing ones and there were no new interventions.

The original data had been totally anonymized so there are no risks for deteriorating the privacy of the dialysis facilities and the patients.

The data presented in the current manuscript does not contain any images, videos, or voice recording which might have a risk for identifying an individual.

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