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An Overview of Regular Dialysis Treatment in Japan (As of 31 December 2013)

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Abstract: A nationwide survey of 4325 dialysis facilities was conducted at the end of 2013, among which 4268 (98.7%) responded. The number of new dialysis patients was 38 095 in 2013. Since 2008, the number of new dialysis patients has remained almost the same without any marked increase or decrease. The number of dialysis patients who died in 2013 was 30 751. The dialysis patient population has been growing every year in Japan; it was 314 438 at the end of 2013. The number of dialysis patients per million at the end of 2013 was 2470. The crude death rate of dialysis patients in 2013 was 9.8%. The mean age of new dialysis patients was 68.7 years and the mean age of the entire dialysis patient population was 67.2 years. The most common primary cause of renal failure among new dialysis patients was diabetic nephropathy (43.8%). The actual number of new dialysis patients with diabetic nephropathy has almost been unchanged for the last few years. Diabetic nephropathy was also the most common primary disease among the entire dialysis patient population (37.6%), followed by chronic glomerulonephritis (32.4%). The percentage of dialysis patients with diabetic nephropathy has been increasing continuously, whereas the percentage of dialysis patients with chronic glomerulonephritis has been decreasing. The number of patients who underwent hemodiafiltration (HDF) at the end of 2013 was 31 371, a marked increase from that in 2012. This number is more than twice that at the end of 2011 and approximately 1.5 times the number at the end of 2012. In particular, the number of patients who underwent online HDF increased approximately fivefold over the last 2 years. Among 151 426 dialysis patients with primary causes of renal failure other than diabetic nephropathy, 10.8% had a history of diabetes. Among those with a history of diabetes, 26.8% used glycoalbumin as an indicator of blood glucose level; and 33.0 and 27.6% were administered insulin and dipeptidyl peptidase (DPP)–4 inhibitor, respectively, as a medication of diabetes. The facility survey showed that 9392 patients underwent peritoneal dialysis (PD). The patient survey revealed that 1920 of these PD patients also underwent another dialysis method using extracorporeal circulation, such as hemodialysis (HD) or HDF. The number of patients who underwent HD at home at the end of 2013 was 461, a marked increase from that at the end of 2012 (393). **Key Words:** Diabetes, Dialysis patient population, On-line hemodiafiltration, Survival rate.

The Japanese Society for Dialysis Therapy (JSDT) has been annually conducting a statistical survey of dialysis facilities across the country since 1968. Initially, only the numbers of patients and beds in dialysis facilities were annually surveyed. Later, individual dialysis patients treated in facilities that participated in the surveys were also targeted and their data have been registered in an electronic database since 1983 (1). On the basis of this report, not only the current status of regular dialysis treatment in Japan is reviewed but also JSDT guidelines and recommendations on future medical policies, such as the revision of medical service fees, are formulated. The annual JSDT statistical surveys are respected worldwide as an unbiased complete patient census.

In the 2013 survey, the following items were included in addition to the basic survey items.

1. Hemodiafiltration (HDF): In April 2012, the use of online HDF was officially included in the setting of additional points in the health insurance

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system in Japan. The number of patients who underwent online HDF increased by nearly 10 000 by the end of 2012. In the 2013 survey, the reason for selecting HDF was added to the survey items.
2. Dialysate quality: This has been surveyed annually since 2006.
3. Diabetes: In 2012, JSDT released guidelines entitled "Management of Diabetic Patients on Hemodialysis 2012". Accordingly, the indices and current status of treatment of dialysis patients with diabetes were surveyed. The history of diabetes was also surveyed to clarify the occurrence of diabetes in patients with chronic renal failure on regular dialysis.
4. Peritoneal dialysis (PD): The current status of patients on PD has been surveyed annually since 2009 in cooperation with the Japanese Society for Peritoneal Dialysis. The survey results are expected to be the basis for revising the guidelines for PD.

In this report, the data obtained from the 2013 survey are summarized with regard to the following items.

A. Basic demographics
B. Items associated with HDF
C. Current status of dialysate quality control
D. Items associated with diabetes
E. Items associated with PD

Starting in the 2012 survey, the detailed results of the survey items associated with PD have been reported separately from this report. Therefore, only a basic summary of the results is included in this report.

All the figures and tables included in a CD-ROM that contains detailed data from each annual survey ("Overview of Regular Dialysis Treatment in Japan, the CD-ROM Report", hereafter referred to as the CD-ROM Report) have been available since 2012 on the members-only pages of the JSDT website so as to widely disseminate the survey findings among JSDT members. These pages contain all the findings from the first survey conducted in 1968 to the latest survey. Any JSDT member can access these pages. Please refer to a recently published reverse dictionary for details of the survey items included in the previous surveys (2). On the other hand, the summaries of survey results in "The Illustrated, Overview of Regular Dialysis Treatment in Japan" (hereafter referred to as the Report) are available not only to JSDT members but also to the general public on the JSDT website (http://www.jsdt.or.jp/). Please refer to a review report for the historical background of the annual survey (1).

SUBJECTS AND METHODS

Method of survey

This survey is conducted annually by sending questionnaires to target dialysis facilities. A total of 4325 facilities surveyed were either member facilities of JSDT, nonmember facilities offering regular maintenance hemodialysis (HD), or nonmember facilities offering PD but not HD as of 31 December 2013. The number of facilities participating in this survey increased by 46 (1.08%) from the previous year (4279 facilities) (3).

The questionnaires were mainly sent and collected by postal mail; some were also faxed. Universal serial bus (USB) memory devices with stored electronic spreadsheets in Microsoft Excel 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 items related to dialysis facilities such as the number of patients, the number of staff members, and the number of dialyzers used at individual facilities. 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 2014. The acceptance of responses submitted after this deadline ended on 28 April 2014 for the preparation of the Report and on 1 September 2014 for the preparation of the CD-ROM Report (4,5).

For the CD-ROM Report, the number of facilities that responded to the facility survey was 4268 (98.7%), and the number of facilities that responded to both the facility and patient surveys was 4177 (96.6%). Moreover, the number of facilities that completed the questionnaires using the electronic medium (3698 facilities, 86.6%) increased from the 2012 survey (3654 facilities, 86.2%). This increase contributed to the accurate and simplified analysis of survey data. This annual report is based on the data tabulated for the CD-ROM Report (5).

Survey items

The 2013 survey includes the following items. The items in the previous surveys are provided on the members-only pages of the JSDT website (http://www.jsdt.or.jp/).

**Facility survey*

The number of dialysis specialists at each facility was added to the list of survey items (6). The new survey items are indicated by an asterisk.

TABLE 1. *Current status of regular dialysis treatment in Japan (as of 31 December 2013)*

Number of facilities		4268 facilities	(increase of 30 facilities, 0.7% increase)
Equipment	Number of bedside consoles	128 150 units	(increase of 3147 units, 2.5% increase)
Capacity	Total number of patients who can simultaneously receive dialysis	126 260 patients	(increase of 2985 patients, 2.4% increase)
	Maximum capacity	422 161 patients	(increase of 7866 patients, 1.9% increase)
Total number of patients regularly undergoing dialysis		314 438 patients	(increase of 4431 patients)
Number of patients per million		2470.1 patients	(increase of 38.9 patients)
Number of patients for different dialysis methods	Daytime	263 184 patients	(83,7%)
	Nighttime	41 401 patients	(13.2%)
	Home HD	461 patients	(0.1%)
	PD	9392 patients	(3.1%)
Number of PD + HD patients[1]		1920 patients	
Number of non-PD + catheter patients[2]		292 patients	
Number of PD dropout patients[3]		174 patients	
Annual number of new dialysis patients		38 095 patients	(increase of 40 patients, 0.1% increase)
Annual number of deceased patients		30 751 patients	(increase of 41 patients, 0.1% increase)

Period on dialysis (years)	Male	Female	Unspecified	Total	(%)
0≦ < 5	97 174	47 890	0	145 064	(47.3)
5≦ < 10	49 153	28 044	0	77 197	(25.2)
10≦ < 15	23 686	15 804	0	39 490	(12.9)
15≦ < 20	11 906	8968	0	20 874	(6.8)
20≦ < 25	6157	5264	0	11 421	(3.7)
25≦ < 30	3499	3112	0	6611	(2.2)
30≦ < 35	2102	1807	0	3909	(1.3)
35≦	1212	1034	0	2246	(0.7)
Unknown / No information available	76	37	0	113	(0.0)
Total	194 965	111 960	0	306 925	(100.0)
Longest period on dialysis		45 years and 7 months			

*The above data were obtained from the facility survey. *The above data were obtained from the patient survey. [1]Number of PD + HD patients: Number of patients who underwent both PD and HD, HDF, hemoadsorption, or hemofiltration (excluding those who underwent only peritoneal lavage). [2]Number of non-PD + catheter patients: Number of 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) [3]Number of PD dropout patients: Number of new patients who were started on PD in 2012 but introduced to another dialysis method within 2013

TABLE 2. *Changes in dialysis patient population in Japan (from the facility survey)*

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Dialysis patient population at the end of each year	143 709	154 413	167 192	175 988	185 322	197 213	206 134	219 183	229 538	237 710
Number of patients started on dialysis each year	24 296	26 398	28 409	28 870	29 641	31 483	32 018	33 243	33 710	33 966
Number of dialysis patients who died each year	13 187	14 406	15 174	16 102	16 687	18 524	18 938	19 850	20 614	21 672
Number of patients per million	1149.4	1229.7	1328.4	1394.9	1465.2	1556.7	1624.1	1721.9	1801.2	1862.7
Collection rate for facility survey* (%)	99.7	99.8	99.8	99.7	99.7	99.7	99.9	99.0	99.6	99.1
Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Dialysis patient population at the end of each year	248 166	257 765	264 473	275 242	283 421	290 661	298 252	304 856	310 007	314 438
Number of patients started on dialysis each year	35 084	36 063	36 373	36 934	38 180	37 566	37 512	38 613	38 055	38 095
Number of dialysis patients who died each year	22 715	23 983	24 034	25 253	27 266	27 646	28 882	30 743	30 710	30 751
Number of patients per million	1943.5	2017.6	2069.9	2154.2	2219.6	2279.5	2329.1	2385.4	2431.2	2470.1
Collection rate for facility survey* (%)	98.7	98.9	98.4	98.9	99.0	98.5	98.6	99.0	99.0	98.7

*Based on the number of facilities

- Name and address of facility
- Year and month when the facility started providing dialysis treatment
- Total number of patients who can concurrently receive dialysis
- Maximum capacity
- Number of bedside consoles
- Number of workers engaged in dialysis treatment (*e.g.*, doctors, nurses, clinical engineers, nutritionists, case workers)
- Number of dialysis specialists*
- Number of patients who underwent dialysis at the end of 2013 (daytime dialysis, nighttime dialysis, home HD, PD)
- Number of patients who did not undergo PD despite having a peritoneal catheter for PD (including those who underwent only peritoneal lavage) among those who underwent daytime dialysis, nighttime dialysis, or home HD (hereafter, denoted as non-PD + catheter patients)
- Number of patients who underwent both PD and another blood purification method by extracorporeal circulation such as HD or HDF (hereafter, denoted as PD + HD patients)
- Numbers of inpatients who underwent dialysis in 2013
- Number of new patients who were started on dialysis in 2013
- Number of new patients who were started on PD in 2013 but introduced to HD or another blood purification method in 2013 (hereafter, denoted as PD dropout patients)
- Number of dialysis patients who died in 2013
- Number of bedside consoles equipped with an endotoxin retentive filter (ETRF)
- Use or nonuse of ETRFs for sampling dialysate
- Site from which dialysate was sampled for dialysate test
- Frequency of measurement of endotoxin level in dialysate
- Endotoxin level in dialysate
- Frequency of measurement of bacterial count in dialysate
- Volume of sample for measurement of bacterial count in dialysate
- Medium used for cultivation of bacteria in dialysate
- Bacterial count in dialysate

**Patient survey*

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

- Pseudonym of patients
- Gender
- Date of birth
- Year and month of start of dialysis
- Year and month of transfer from another hospital
- Primary disease
- Patient's residence (prefecture)
- Treatment method
- Outcome, year and month (transfer, death, dropout, or transplantation) (Code of facility to which the patient is transferred)
- Cause of death

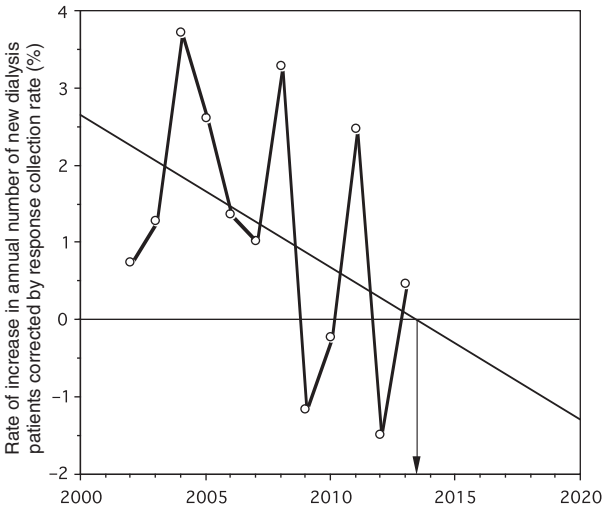

FIG. 1. Change in rate of increase in annual number of new dialysis patients corrected by response collection rate.

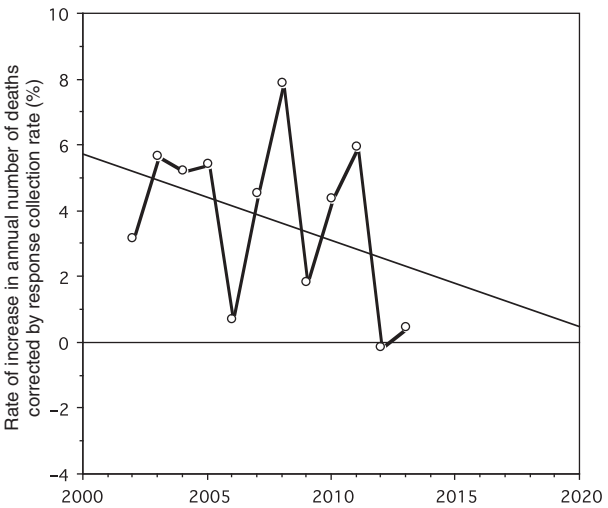

FIG. 2. Change in rate of increase in annual number of deaths corrected by response collection rate.

The following items were added to the basic survey items and were surveyed using both paper and electronic media. The new survey items are indicated by an asterisk.

- Current status of combined use of PD and another method such as HD or HDF (hereafter, denoted as current status of PD + HD)
- History of undergoing PD
- Number of renal transplantations
- Frequency of dialysis (*e.g.*, HD) per week
- Duration of dialysis (*e.g.*, HD) per session
- Blood flow rate
- Mode of dilution of dialysate for HDF
- Volume of substitution fluid per HDF session
- Reason for selecting HDF*
- Height
- Predialysis and postdialysis weights
- Predialysis and postdialysis blood urea nitrogen (BUN) levels
- Predialysis and postdialysis serum creatinine levels
- Predialysis serum albumin level
- Predialysis serum C-reactive protein (CRP) level
- Predialysis serum calcium level
- Predialysis serum phosphorus level
- Measurement method for serum parathyroid hormone (PTH) level
- Serum PTH levels (intact or whole PTH)
- Predialysis hemoglobin (Hb) level
- History of diabetes
- Use or nonuse of antihypertensive agent
- Smoking habit
- History of myocardial infarction
- History of cerebral hemorrhage
- History of cerebral infarction
- History of quadruple amputation
- History of femoral neck fracture
- History of encapsulating peritoneal sclerosis (EPS)

TABLE 3. *Changes in number of patients treated by different dialysis methods*

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Facility survey[†]	Number of patients based on facility survey	237 710	248 166	257 765	264 473	275 242	283 421	290 661	298 252	304 856	310 007	314 438
	(%)[§]	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
	Number of daytime dialysis patients	187 533	196 337	206 340	213 454	223 953	231 517	238 848	246 146	253 916	258 131	263 184
	(%)[§]	(78.9)	(79.1)	(80.0)	(80.7)	(81.4)	(81.7)	(82.2)	(82.5)	(83.3)	(83.3)	(83.7)
	Number of nighttime dialysis patients	41 202	42 600	41 871	41 641	41 742	42 405	41 719	42 052	40 971	41 969	41 401
	(%)[§]	(17.3)	(17.2)	(16.2)	(15.7)	(15.2)	(15.0)	(14.4)	(14.1)	(13.4)	(13.5)	(13.2)
	Number of home HD patients	110	114	127	147	187	193	236	277	327	393	461
	(%)[§]	(0.0)	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
	Number of PD patients[‖]	8479	8774	9243	9003	9362	9300	9858	9773	9642	9514	9392
	(%)[§]	(3.6)	(3.5)	(3.6)	(3.4)	(3.4)	(3.3)	(3.4)	(3.3)	(3.2)	(3.1)	(3.0)
	Number of PD + HD patients**							1720	1983	1902	1932	1920
	(%)[§]							(0.6)	(0.7)	(0.6)	(0.6)	(0.6)
	Number of non-PD + catheter patients[††]							437	406	369	347	292
	(%)[§]							0.2	(0.1)	(0.1)	(0.1)	(0.1)
Patient survey[‡]	Number of patients based on patients survey	229 446	236 606	240 513	249 957	264 356	273 237	281 996	289 449	295 735	301 545	306 925
	(%)[¶]	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
	HD	206 829	213 474	216 880	223 737	235 960	245 090	253 807	262 973	270 072	268 275	264 211
	(%)[¶]	(90.1)	(90.2)	(90.2)	(89.5)	(89.3)	(89.7)	(90.0)	(90.9)	(91.3)	(89.0)	(86.1)
	HDF	13 732	14 183	14 083	16 163	17 759	17 380	16 853	14 867	14 115	21 725	31 371
	(%)[¶]	(6.0)	(6.0)	(5.9)	(6.5)	(6.7)	(6.4)	(6.0)	(5.1)	(4.8)	(7.2)	(10.2)
	PD[‖]	7874	8004	8103	7971	8630	8636	9164	9298	9094	8996	9037
	(%)[¶]	(3.4)	(3.4)	(3.4)	(3.2)	(3.3)	(3.2)	(3.2)	(3.2)	(3.1)	(3.0)	(2.9)

[†]Data obtained from the facility survey. [‡]Data obtained from the patient survey. [§]The percentage to the total number of patients based on facility survey at each year. [¶]The percentage to the total number of patients based on patient survey at each year. [‖]The figures mean "number of CAPD patients" from 2002 to 2008. (CAPD, continuous ambulatory peritoneal dialysis). **Number of PD + HD patients: Number of patients who underwent both PD and HD, HDF, hemoadsorption, or hemofiltration (excluding those who underwent only peritoneal lavage). [††]Number of non-PD + catheter patients: Number of 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)

TABLE 4. *Numbers of dialysis patients on regular dialysis in 47 prefectures*

Names of prefectures	Daytime	Nighttime	Home HD	PD	Total
Hokkaido	13 218	1442	11	409	15 080
Aomori Prefecture	3020	280	0	69	3369
Iwate Prefecture	2507	374	0	111	2992
Miyagi Prefecture	4210	861	0	76	5147
Akita Prefecture	1709	101	2	55	1867
Yamagata Prefecture	2168	311	8	67	2554
Fukushima Prefecture	4057	408	0	150	4615
Ibaraki Prefecture	6563	875	2	128	7568
Tochigi Prefecture	5003	779	2	76	5860
Gunma Prefecture	4711	795	6	82	5594
Saitama Prefecture	14 190	1833	74	307	16 404
Chiba Prefecture	11 636	1650	5	305	13 596
Tokyo	23 863	5206	51	1157	30 277
Kanagawa Prefecture	15 795	2822	24	588	19 229
Niigata Prefecture	3794	978	1	169	4942
Toyama Prefecture	2060	286	2	101	2449
Ishikawa Prefecture	2245	320	0	76	2641
Fukui Prefecture	1538	180	3	71	1792
Yamanashi Prefecture	1921	206	1	57	2185
Nagano Prefecture	3871	751	4	133	4759
Gifu Prefecture	4016	628	18	98	4760
Shizuoka Prefecture	8761	1314	7	194	10 276
Aichi Prefecture	13 453	2959	44	672	17 128
Mie Prefecture	3607	533	5	89	4234
Shiga Prefecture	2372	453	28	137	2990
Kyoto Prefecture	5005	997	8	233	6243
Osaka Prefecture	19 045	2817	37	566	22 465
Hyogo Prefecture	11 290	1624	58	269	13 241
Nara Prefecture	2897	287	6	159	3349
Wakayama Prefecture	2622	326	9	36	2993
Tottori Prefecture	1253	132	0	77	1462
Shimane Prefecture	1319	142	1	67	1529
Okayama Prefecture	3879	655	4	201	4739
Hiroshima Prefecture	6260	694	18	407	7379
Yamaguchi Prefecture	2927	363	0	126	3416
Tokushima Prefecture	2267	287	3	165	2722
Kagawa Prefecture	2167	200	8	194	2569
Ehime Prefecture	3222	385	0	136	3743
Kochi Prefecture	2009	278	0	26	2313
Fukuoka Prefecture	11 319	2251	3	648	14 221
Saga Prefecture	1976	294	1	19	2290
Nagasaki Prefecture	3267	503	2	142	3914
Kumamoto Prefecture	5213	982	1	159	6355
Oita Prefecture	3394	351	3	147	3895
Miyazaki Prefecture	3253	459	0	55	3767
Kagoshima Prefecture	4714	468	1	102	5285
Okinawa Prefecture	3598	561	0	81	4240
Total	263 184	41 401	461	9392	314 438

※The total number of patients regularly undergoing dialysis is the total in the column for the number of patients in Sheet I, and does not necessarily agree with the total number of patients counted in accordance with the method of dialysis.

The following items were added to the basic survey items and were only collected from the facilities that used the electronic medium. The new survey items are indicated by an asterisk.

- Hb A1c (HbA1c) level: surveyed for the first time in 12 years since the 2001 survey (but for the first time as the National Glycohemoglobin Standardization Program [NGSP] values)
- Glycoalbumin level*
- Use or nonuse of insulin*
- Use or nonuse of dipeptidyl peptidase-4 (DPP4) inhibitor*
- Use or nonuse of other oral diabetes drugs*
- Serum total cholesterol level (total cholesterol)
- Serum high-density lipoprotein cholesterol (HDL-C) level
- Predialysis systolic blood pressure
- Predialysis diastolic blood pressure
- Predialysis pulse
- Number of years on ongoing PD (PD vintage)
- Number of months in which PD was performed in 2013
- Performance or nonperformance of peritoneal equilibrium test (PET)
- Four-hour creatinine dialysate/plasma ratio in PET (PET Cr D/P ratio)
- Type of dialysate used for PD (PD solution type)
- Volume of PD solution per day (PD solution volume)
- PD duration per day
- Daily urine output (Urine output)
- Mean amount of water removed per day (Amount of water removed)
- Kt/V for residual kidney (Residual kidney Kt/V)
- Kt/V for PD (PD Kt/V)
- Use or nonuse of automated peritoneal dialysis (APD) machine
- Method of changing PD solution
- Annual frequency of peritonitis episodes (Frequency of peritonitis)
- Annual frequency of exit-site infections

Calculation of survival rate

The cumulative survival rate after the start of dialysis was actuarially calculated (7).

RESULTS AND DISCUSSION

Basic demographics

Number of patients

Table 1 shows a summary of the dynamics of the dialysis patient population in Japan at the end of 2013 obtained in this survey. The number of facilities that responded to the facility survey in 2013 was 4268, an increase of 30 (0.7%) from the previous year (4238). The number of such facilities continued to increase by at least 100 every year before 2000. However, the annual increase in this number

tended to decrease in the 2000s, and the annual increase in the number was only 50 or less in the 2010s. In Table 1, data on the number of years on dialysis (dialysis vintage) and the longest dialysis vintage were obtained from the patient survey. All the other results were obtained from the facility survey.

As determined from the facility survey, the total number of dialysis patients in Japan at the end of 2013 was 314 438, an increase of approximately 4400 from the previous year (310 007) (Table 1). Table 2 shows changes in the number of dialysis patients over the last 20 years. In the 2000s, the annual rate of increase in dialysis patient population in Japan decreased. This tendency became marked after 2010. The annual rate of increase in dialysis patient population, defined as the ratio of the increase in dialysis patient population each year to the dialysis patient population at the end of the previous year, had decreased linearly each year. If this trend continues, the dialysis patient population in Japan is expected to become maximum and start decreasing around 2021 (8).

The number of new patients who were started on dialysis (the annual number of new dialysis patients) was 38 095 in 2013. The annual number of new dialysis patients continued to increase from the start of the annual survey and reached 38 180 in 2008. After-

TABLE 5. *Changes in mean ages of new patients started on dialysis and of all dialysis patients at the end of each year*

	′92	′93	′94	′95	′96	′97	′98	′99	′00	′01	′02
Mean age of all the dialysis patients at the end of each year	56.0	56.6	57.3	58.0	58.6	59.2	59.9	60.6	61.2	61.6	62.2
±S.D.	13.5	13.5	13.5	13.4	13.4	13.4	13.3	13.3	13.2	13.1	13.0
Mean age of new patients started on dialysis each year	59.5	59.8	60.4	61.0	61.5	62.2	62.7	63.4	63.8	64.2	64.7
±S.D.	14.5	14.4	14.3	14.2	14.2	14.0	13.9	13.9	13.9	13.7	13.6
	′03	′04	′05	′06	′07	′08	′09	′10	′11	′12	′13
Mean age of all the dialysis patients at the end of each year	62.8	63.3	63.9	64.4	64.9	65.3	65.8	66.2	66.6	66.9	67.2
±S.D.	12.9	12.9	12.8	12.8	12.7	12.7	12.6	12.6	12.6	12.5	12.5
Mean age of new patients started on dialysis each year	65.4	65.8	66.2	66.4	66.8	67.2	67.3	67.8	67.8	68.5	68.7
±S.D.	13.5	13.4	13.4	13.4	13.3	13.3	13.3	13.3	13.4	13.4	13.4

TABLE 6. *Gender and age distributions of new patients started on dialysis in 2013*

Age at introduction into dialysis	Male		Female		Subtotal		No information available	Total	
<5	10	(0.0)	8	(0.1)	18	(0.0)		18	(0.0)
5–9	5	(0.0)	3	(0.0)	8	(0.0)		8	(0.0)
10–14	7	(0.0)	5	(0.0)	12	(0.0)		12	(0.0)
15–19	14	(0.1)	10	(0.1)	24	(0.1)		24	(0.1)
20–24	34	(0.1)	28	(0.2)	62	(0.2)		62	(0.2)
25–29	88	(0.4)	52	(0.4)	140	(0.4)		140	(0.4)
30–34	206	(0.8)	106	(0.9)	312	(0.9)		312	(0.9)
35–39	384	(1.6)	172	(1.4)	556	(1.5)		556	(1.5)
40–44	746	(3.0)	302	(2.5)	1048	(2.9)		1048	(2.9)
45–49	1045	(4.2)	379	(3.2)	1424	(3.9)		1424	(3.9)
50–54	1351	(5.5)	474	(4.0)	1825	(5.0)		1825	(5.0)
55–59	1842	(7.5)	713	(6.0)	2555	(7.0)		2555	(7.0)
60–64	2943	(11.9)	1160	(9.7)	4103	(11.2)		4103	(11.2)
65–69	3604	(14.6)	1444	(12.1)	5048	(13.8)		5048	(13.8)
70–74	3736	(15.1)	1680	(14.1)	5416	(14.8)		5416	(14.8)
75–79	3802	(15.4)	1951	(16.4)	5753	(15.7)		5753	(15.7)
80–84	3036	(12.3)	1904	(16.0)	4940	(13.5)		4940	(13.5)
85–89	1436	(5.8)	1156	(9.7)	2592	(7.1)		2592	(7.1)
90–94	341	(1.4)	324	(2.7)	665	(1.8)		665	(1.8)
95≦	34	(0.1)	51	(0.4)	85	(0.2)		85	(0.2)
Subtotal	24 664	(100.0)	11 922	(100.0)	36 586	(100.0)		36 586	(100.0)
Unknown	13		3		16			16	
No information available									
Total	24 677		11 925		36 602			36 602	
Mean age	67.85		70.37		68.67			68.67	
S.D.	13.16		13.82		13.44			13.44	

Values in parentheses on the right side of each figure represent the percentage relative to the total in each column.

ward, the annual number of new dialysis patients remained approximately 38 000 and did not increase, as observed before 2008 (Table 2). Here, changes in the rate of increase in the number of new dialysis patients from 2002 corrected by the response collection rate of the facility survey are plotted in Figure 1 similarly to the 2012 survey (3). The regression line for the rate of increase in the number of new dialysis patients intersects with the *X*-axis at the point corresponding to a period within 2013. This suggests that the annual number of new dialysis patients became maximum around 2013, after which it is expected to start decreasing gradually.

The total number of dialysis patients who died (annual number of deaths) was 30 751 in 2013 (Table 1). The annual number of deaths continued to increase until 2011, but it decreased slightly in 2012 (3). However, the annual number of deaths increased again in 2013, although slightly (Table 2). Similarly to the annual number of new dialysis patients, the regression line for the rate of increase in the annual number of deaths over the past 11 years from 2002 was considered (Fig. 2). Although the rate of increase in the annual number of deaths fluctuated each year, overall the regression line indicated a gradually decreasing tendency. From this trend, the rate of increase in the annual number of deaths is expected to fall below zero (namely, the annual number of deaths starts decreasing) around 2022. This means that the annual number of deaths will continue to increase for years. If the annual number of new dialysis patients starts decreasing while the annual number of deaths continues to increase, the dialysis patient population in Japan is expected to start decreasing in the future.

In the 4268 facilities that responded to the facility survey questionnaire, the total number of bedside consoles was 128 150, an increase of 3147 (2.5%) from the previous year. The total number of patients who can concurrently receive dialysis in all facilities was 126 260 and the maximum dialysis capacity was 422 161 patients in 2013, increases of 2.4 and 1.9% from the previous year, respectively. As mentioned above, the number of patients undergoing regular maintenance dialysis in Japan is expected to reach a maximum of approximately 350 000 in 2021 and then to gradually decrease; this expectation is formed taking into consideration the number of patients treated in dialysis facilities that did not respond to this survey (8). Therefore, the maximum dialysis capacity in 2013 was already sufficiently greater than the expected maximum number of dialysis patients.

The percentage of patients who underwent daytime dialysis was 83.7% of the dialysis patient population in 2013, which was 0.4 percent higher than

TABLE 7. *Gender and age distributions of all dialysis patients in 2013 for different ages and both genders*

Age at introduction into dialysis	Male		Female		Subtotal		No information available	Total	
<5	25	(0.0)	17	(0.0)	42	(0.0)		42	(0.0)
5–9	11	(0.0)	15	(0.0)	26	(0.0)		26	(0.0)
10–14	28	(0.0)	20	(0.0)	48	(0.0)		48	(0.0)
15–19	61	(0.0)	33	(0.0)	94	(0.0)		94	(0.0)
20–24	177	(0.1)	100	(0.1)	277	(0.1)		277	(0.1)
25–29	511	(0.3)	239	(0.2)	750	(0.2)		750	(0.2)
30–34	1240	(0.6)	630	(0.6)	1870	(0.6)		1870	(0.6)
35–39	2991	(1.5)	1390	(1.2)	4381	(1.4)		4381	(1.4)
40–44	6084	(3.1)	2736	(2.4)	8820	(2.9)		8820	(2.9)
45–49	9047	(4.6)	3970	(3.5)	13 017	(4.2)		13 017	(4.2)
50–54	12 155	(6.2)	5700	(5.1)	17 855	(5.8)		17 855	(5.8)
55–59	17 408	(8.9)	8670	(7.7)	26 078	(8.5)		26 078	(8.5)
60–64	28 801	(14.8)	15 231	(13.6)	44 032	(14.3)		44 032	(14.3)
65–69	32 092	(16.5)	17 026	(15.2)	49 118	(16.0)		49 118	(16.0)
70–74	30 296	(15.5)	17 326	(15.5)	47 622	(15.5)		47 622	(15.5)
75–79	25 993	(13.3)	15 944	(14.2)	41 937	(13.7)		41 937	(13.7)
80–84	17 960	(9.2)	12 742	(11.4)	30 702	(10.0)		30 702	(10.0)
85–89	8044	(4.1)	7464	(6.7)	15 508	(5.1)		15 508	(5.1)
90–94	1800	(0.9)	2330	(2.1)	4130	(1.3)		4130	(1.3)
95≦	232	(0.1)	374	(0.3)	606	(0.2)		606	(0.2)
Subtotal	194 956	(100.0)	111 957	(100.0)	306 913	(100.0)		306 913	(100.0)
Unknown	9		2		11			11	
No information available			1		1			1	
Total	194 965		111 960		306 925			306 925	
Mean age	66.42		68.57		67.21			67.21	
S.D.	12.38		12.64		12.51			12.51	

Values in parentheses on the right side of each figure represent the percentage relative to the total in each column.

the previous year. In contrast, the percentage of patients who underwent nighttime dialysis was 13.2%, which was 0.3 percent lower than the previous year (13.5%). The absolute number of patients who underwent nighttime dialysis remained in the range of 41 000–42 000 over the last 10 years (Table 3).

The number of patients who underwent HD at home was 461, an increase of 68 (17.3%) from the previous year (393). The number of such patients has been increasing rapidly since 2006 (Table 3).

The number of patients who underwent PD was 9392, which was 3.0% of the entire dialysis patient population. Although the number of such patients reached 9858 in 2009, which was the largest after 2002, it tended to decrease since then (Table 3). The number of PD + HD patients, the survey of which was started in the 2009 survey, was 1920 in the 2013 survey. The number of non-PD + catheter patients was 292. The number of PD dropout patients in 2013 was 174. The number of PD + HD patients increased in 2010 but has remained almost unchanged at approximately 1900 since then.

As shown in Table 3, the number of HDF patients continued to decrease since 2008 but rapidly increased approximately 1.5-fold from 14 115 in 2011 to 21 725 in 2012 (3). In 2013, the number of HDF patients reached 31 371, an increase of approximately 10 000 from that in 2012 and at least twice that in 2011. The demographics of HDF patients are described in detail in "B. Items associated with HDF".

According to the patient survey, the longest dialysis vintage was 45 years and 7 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 patients obtained from the patient survey. The mean age of new patients who were started on dialysis in 2013 was 68.7 ± 13.4 years (mean ± standard deviation [S.D.], here and hereafter) compared with a mean age of 67.2 ± 12.5 years for all dialysis patients in 2013. The dialysis patient population aged by 6.1 years from the end of 1993 (56.7 years) to the end of 2003 (62.8 years) and by 4.4 years from the end of 2003 to the end of 2013. Thus, the rate of aging of the dialysis patient population was decreasing. Similarly, the mean age of new patients who were started on dialysis increased by 5.6 years from the end of 1993 (59.8 years) to the end of 2003 (65.4 years), but by only 3.3 years from the end of 2003 to the end of 2013. These findings show that the rate of aging of new dialysis patients was also decreasing.

Table 6 shows the gender and age distributions of patients who were started on dialysis in 2013 and Table 7 shows those of all dialysis patients in 2013. The data in these tables were taken from the patient survey.

Primary diseases of dialysis patients

Table 8 shows the age distribution of patients with different primary diseases who were started on dialysis in 2013. Table 9 shows the age distribution of all dialysis patients with different primary diseases at the end of 2013. Figure 3 shows changes in the numbers of new dialysis patients and of all dialysis patients over the years for the three leading primary diseases.

Table 10 (upper panel) shows changes in the percentage of new patients who were started on dialysis each year for various primary causes of renal failure (primary diseases). The percentage of new patients with diabetic nephropathy as the primary disease was the highest (43.8%), followed by chronic glomerulonephritis (18.8%). The number and percentage of new patients who had diabetic nephropathy as the primary disease and were started on dialysis continued to increase until the end of 2009 and reached 16 549 and 44.5%, respectively, in 2009. Since then, however, the number and percentage has remained relatively unchanged at approximately 16 000 and 44%, respectively, as shown in Figure 3 (left). Here, changes after 2002 in the rates of increases in the annual numbers of new dialysis patients with chronic glomerulonephritis and those with diabetic nephropathy as the primary disease (corrected by the response collection rate) are plotted in Figure 4. The rate of increase in the annual number of new dialysis patients with chronic glomerulonephritis has been negative since 2002, indicating that the number of new dialysis patients with chronic glomerulonephritis continued to decrease. In contrast, the rate of increase in the annual number of new dialysis patients with diabetic nephropathy has been positive until 2009 and then tended to decrease. Since 2010, this rate has fluctuated over the years. The regression line for the rate of increase in the annual number of new dialysis patients with diabetic nephropathy fell below zero around 2012.

That is, the number of new dialysis patients with diabetic nephropathy is expected to gradually decrease in the future.

Nephrosclerosis was the third most common primary disease (13.1%) after diabetic nephropathy and chronic glomerulonephritis. In accordance with

TABLE 8. *Age distribution of new patients with different primary diseases started on dialysis in 2013*

Primary disease	<5	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44
Chronic glomerulonephritis			4	5	20	48	96	137	211
(%)			(0.1)	(0.1)	(0.3)	(0.7)	(1.4)	(2.0)	(3.1)
Chronic pyelonephritis					1	5	5	7	9
(%)					(0.3)	(1.7)	(1.7)	(2.4)	(3.1)
Rapidly progressive glomerulonephritis						5	2	3	6
(%)						(1.0)	(0.4)	(0.6)	(1.2)
Nephropathy of pregnancy/ pregnancy toxemia							1	3	3
(%)							(2.6)	(7.7)	(7.7)
Other nephritides that cannot be classified		2		1	6	4	4	6	3
(%)		(1.5)		(0.7)	(4.4)	(3.0)	(3.0)	(4.4)	(2.2)
Polycystic kidney	3	1			1	1	8	18	43
(%)	(0.3)	(0.1)			(0.1)	(0.1)	(0.9)	(2.0)	(4.7)
Nephrosclerosis	1			1	1	6	15	29	79
(%)	(0.0)			(0.0)	(0.0)	(0.1)	(0.3)	(0.6)	(1.7)
Malignant hypertension					2	4	12	13	22
(%)					(0.7)	(1.4)	(4.1)	(4.5)	(7.6)
Diabetic nephropathy	1		1	2	3	18	84	227	517
(%)	(0.0)		(0.0)	(0.0)	(0.0)	(0.1)	(0.5)	(1.4)	(3.2)
SLE nephritis			1		1	7	10	15	17
(%)			(0.4)		(0.4)	(2.7)	(3.8)	(5.7)	(6.5)
Amyloidal kidney								2	2
(%)								(2.1)	(2.1)
Gouty kidney						1	2	3	3
(%)						(1.1)	(2.2)	(3.4)	(3.4)
Renal failure due to congenital abnormality of metabolism					2	3	1	2	3
(%)					(11.1)	(16.7)	(5.6)	(11.1)	(16.7)
Kidney and urinary tract tuberculosis									
(%)									
Kidney and urinary tract stone					1			1	1
(%)					(1.8)			(1.8)	(1.8)
Kidney and urinary tract tumor								2	
(%)								(1.2)	
Obstructive urinary tract disease		1	1			1	2	2	1
(%)		(1.0)	(1.0)			(1.0)	(2.1)	(2.1)	(1.0)
Myeloma								1	3
(%)								(0.7)	(2.2)
Hypoplastic kidney	3	2	3	1	4	1	6	2	5
(%)	(6.1)	(4.1)	(6.1)	(2.0)	(8.2)	(2.0)	(12.2)	(4.1)	(10.2)
Undetermined				3	6	19	40	51	75
(%)				(0.1)	(0.1)	(0.5)	(1.0)	(1.2)	(1.8)
Reintroduction after transplantation			1	1	2	4	3	9	18
(%)			(0.5)	(0.5)	(1.0)	(1.9)	(1.5)	(4.4)	(8.7)
Others	10	2	1	10	12	13	21	22	27
(%)	(0.7)	(0.1)	(0.1)	(0.7)	(0.9)	(0.9)	(1.5)	(1.6)	(1.9)
Subtotal	18	8	12	24	62	140	312	555	1048
(%)	(0.0)	(0.0)	(0.0)	(0.1)	(0.2)	(0.4)	(0.9)	(1.5)	(2.9)
No information available								1	
(%)								(33.3)	
Total	18	8	12	24	62	140	312	556	1048
(%)	(0.0)	(0.0)	(0.0)	(0.1)	(0.2)	(0.4)	(0.9)	(1.5)	(2.9)

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

the aging of new dialysis patients, the percentage of patients with nephrosclerosis as the primary disease continued to increase. The percentage of patients with "undetermined" primary diseases was the fourth highest (11.3%). In addition, polycystic kidney disease, rapidly progressive glomerulonephritis,

TABLE 8. *(Continued)*

Primary disease	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84
Chronic glomerulonephritis	239	340	436	754	893	1029	996	984
(%)	(3.5)	(4.9)	(6.3)	(11.0)	(13.0)	(15.0)	(14.5)	(14.3)
Chronic pyelonephritis	15	15	12	26	38	42	51	33
(%)	(5.2)	(5.2)	(4.2)	(9.0)	(13.2)	(14.6)	(17.7)	(11.5)
Rapidly progressive glomerulonephritis	5	14	21	48	59	91	101	93
(%)	(1.0)	(2.7)	(4.1)	(9.4)	(11.5)	(17.7)	(19.7)	(18.1)
Nephropathy of pregnancy/ pregnancy toxemia	1	4	4	8	6	3	4	1
(%)	(2.6)	(10.3)	(10.3)	(20.5)	(15.4)	(7.7)	(10.3)	(2.6)
Other nephritides that cannot be classified	7	9	6	10	15	13	20	17
(%)	(5.2)	(6.7)	(4.4)	(7.4)	(11.1)	(9.6)	(14.8)	(12.6)
Polycystic kidney	86	93	117	126	130	109	83	69
(%)	(9.4)	(10.2)	(12.8)	(13.8)	(14.2)	(11.9)	(9.1)	(7.5)
Nephrosclerosis	84	111	158	305	486	667	926	1053
(%)	(1.8)	(2.3)	(3.3)	(6.4)	(10.2)	(14.0)	(19.4)	(22.0)
Malignant hypertension	18	16	21	14	33	37	39	34
(%)	(6.2)	(5.5)	(7.2)	(4.8)	(11.4)	(12.8)	(13.4)	(11.7)
Diabetic nephropathy	772	964	1 415	2 192	2 617	2 446	2 391	1 583
(%)	(4.8)	(6.0)	(8.8)	(13.7)	(16.3)	(15.3)	(14.9)	(9.9)
SLE nephritis	14	15	27	29	32	29	31	16
(%)	(5.3)	(5.7)	(10.3)	(11.0)	(12.2)	(11.0)	(11.8)	(6.1)
Amyloidal kidney	2	4	7	10	13	20	22	11
(%)	(2.1)	(4.1)	(7.2)	(10.3)	(13.4)	(20.6)	(22.7)	(11.3)
Gouty kidney	6	7	11	10	10	12	14	6
(%)	(6.7)	(7.9)	(12.4)	(11.2)	(11.2)	(13.5)	(15.7)	(6.7)
Renal failure due to congenital abnormality of metabolism	1		1	2	1			1
(%)	(5.6)		(5.6)	(11.1)	(5.6)			(5.6)
Kidney and urinary tract tuberculosis			1		3	5	3	2
(%)			(5.9)		(17.6)	(29.4)	(17.6)	(11.8)
Kidney and urinary tract stone	2	1	3	9	11	3	6	11
(%)	(3.6)	(1.8)	(5.4)	(16.1)	(19.6)	(5.4)	(10.7)	(19.6)
Kidney and urinary tract tumor	1	2	8	18	21	35	32	30
(%)	(0.6)	(1.2)	(4.7)	(10.7)	(12.4)	(20.7)	(18.9)	(17.8)
Obstructive urinary tract disease	4	4	6	7	14	12	17	10
(%)	(4.2)	(4.2)	(6.3)	(7.3)	(14.6)	(12.5)	(17.7)	(10.4)
Myeloma	3	7	4	16	16	22	33	21
(%)	(2.2)	(5.2)	(3.0)	(11.9)	(11.9)	(16.3)	(24.4)	(15.6)
Hypoplastic kidney		3	4	3	2	1	5	2
(%)		(6.1)	(8.2)	(6.1)	(4.1)	(2.0)	(10.2)	(4.1)
Undetermined	104	143	193	356	463	609	731	730
(%)	(2.5)	(3.5)	(4.7)	(8.6)	(11.2)	(14.8)	(17.7)	(17.7)
Reintroduction after transplantation	16	19	23	24	24	20	18	14
(%)	(7.8)	(9.2)	(11.2)	(11.7)	(11.7)	(9.7)	(8.7)	(6.8)
Others	44	54	77	136	161	210	230	218
(%)	(3.1)	(3.9)	(5.5)	(9.7)	(11.5)	(15.0)	(16.5)	(15.6)
Subtotal	1424	1825	2555	4103	5048	5415	5753	4939
(%)	(3.9)	(5.0)	(7.0)	(11.2)	(13.8)	(14.8)	(15.7)	(13.5)
No information available						1		1
(%)						(33.3)		(33.3)
Total	1424	1825	2555	4103	5048	5416	5753	4940
(%)	(3.9)	(5.0)	(7.0)	(11.2)	(13.8)	(14.8)	(15.7)	(13.5)

systemic lupus erythematosus (SLE) nephritis, and chronic pyelonephritis were also observed as primary diseases. However, the percentages of new dialysis patients with these primary diseases among all new dialysis patients were 0.7–2.5%, which was much smaller than the percentages of patients with the

TABLE 8. *(Continued)*

Primary disease	85–89	90–94	95≦	Total	Unspecified	No information on birth date	Total	Mean age	s.d.
Chronic glomerulonephritis	526	141	17	6 876	8		6 884	68.51	14.19
(%)	(7.6)	(2.1)	(0.2)	(100.0)					
Chronic pyelonephritis	22	7		288			288	67.70	15.09
(%)	(7.6)	(2.4)		(100.0)					
Rapidly progressive glomerulonephritis	48	15	2	513			513	72.94	11.82
(%)	(9.4)	(2.9)	(0.4)	(100.0)					
Nephropathy of pregnancy/ pregnancy toxemia	1			39			39	60.00	13.31
(%)	(2.6)			(100.0)					
Other nephritides that cannot be classified	4	7	1	135			135	62.49	20.40
(%)	(3.0)	(5.2)	(0.7)	(100.0)					
Polycystic kidney	24	4		916			916	62.37	13.22
(%)	(2.6)	(0.4)		(100.0)					
Nephrosclerosis	645	191	19	4 777			4 777	74.61	11.62
(%)	(13.5)	(4.0)	(0.4)	(100.0)					
Malignant hypertension	15	9	1	290			290	64.22	17.32
(%)	(5.2)	(3.1)	(0.3)	(100.0)					
Diabetic nephropathy	675	108	15	16 031	4		16 035	66.82	12.17
(%)	(4.2)	(0.7)	(0.1)	(100.0)					
SLE nephritis	18	1		263			263	61.49	16.63
(%)	(6.8)	(0.4)		(100.0)					
Amyloidal kidney	3	1		97			97	69.30	11.04
(%)	(3.1)	(1.0)		(100.0)					
Gouty kidney	4			89			89	63.65	13.88
(%)	(4.5)			(100.0)					
Renal failure due to congenital abnormality of metabolism	1			18			18	45.72	19.90
(%)	(5.6)			(100.0)					
Kidney and urinary tract tuberculosis	3			17			17	74.82	8.63
(%)	(17.6)			(100.0)					
Kidney and urinary tract stone	6	1		56			56	69.63	13.99
(%)	(10.7)	(1.8)		(100.0)					
Kidney and urinary tract tumor	18	1	1	169			169	73.31	9.81
(%)	(10.7)	(0.6)	(0.6)	(100.0)					
Obstructive urinary tract disease	7	6	1	96			96	68.72	17.08
(%)	(7.3)	(6.3)	(1.0)	(100.0)					
Myeloma	6	2	1	135			135	71.20	11.13
(%)	(4.4)	(1.5)	(0.7)	(100.0)					
Hypoplastic kidney	1	1		49			49	44.27	25.44
(%)	(2.0)	(2.0)		(100.0)					
Undetermined	440	142	20	4 125	3		4 128	71.90	13.22
(%)	(10.7)	(3.4)	(0.5)	(100.0)					
Reintroduction after transplantation	8	1	1	206			206	59.99	15.96
(%)	(3.9)	(0.5)	(0.5)	(100.0)					
Others	117	27	6	1 398			1 398	68.56	16.20
(%)	(8.4)	(1.9)	(0.4)	(100.0)					
Subtotal	2592	665	85	36 583	15		36 598	68.67	13.43
(%)	(7.1)	(1.8)	(0.2)	(100.0)					
No information available				3	1		4	63.33	25.15
(%)				(100.0)					
Total	2592	665	85	36 586	16		36 602	68.67	13.44
(%)	(7.1)	(1.8)	(0.2)	(100.0)					

abovementioned top three primary diseases and undetermined diseases, and had shown no marked increase or decrease over the past 20 years.

Table 10 (lower) shows changes in the percentages of all dialysis patients with various primary diseases at the end of each year. Previously, chronic glomerulonephritis was the most common primary disease in the dialysis patient population. However, the percentage of patients with this primary disease continued to decrease, and the absolute number of such patients also started to decrease around 2005. In contrast, the number of patients with diabetic nephropathy continued to increase and exceeded that of patients with chronic glomerulonephritis in 2011 to become the most common primary disease in the dialysis patient population. In 2013, the percentage of patients with diabetic nephropathy further increased (37.6%), whereas that of patients with chronic glomerulonephritis further decreased (32.4%).

The primary diseases accounting for the third highest percentage of patients in the dialysis patient population in 2013 were undetermined and nephrosclerosis (both 8.7%). The percentage of patients with nephrosclerosis as the primary disease continuously increased. In addition, polycystic kidney disease, chronic pyelonephritis, SLE nephritis, and rapidly progressive glomerulonephritis were also observed as primary diseases. However, the percentages of patients with 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

Table 11 shows the classification of causes of death of patients who were started on dialysis in 2013 and who died by the end of 2013. The leading cause of death of patients who were started on dialysis in 2013 was infectious diseases (26.0%). This was followed by cardiac failure (23.8%), malignant tumors (12.1%), other causes (9.9%), and unspecified causes (7.3%).

Table 12 shows the classification of the causes of death of all dialysis patients who died in 2013. Table 13 shows changes in the percentages of the leading causes of death in all dialysis patients. Among all dialysis patients, the leading cause of death in 2013 was cardiac failure (26.8%). The percentage of patients who died of cardiac failure among all dialysis patients markedly decreased in the 1990s, after which it remained almost unchanged. The second leading cause of death among all dialysis patients was infectious diseases (20.8%); the percentage of patients who died of infectious diseases continued to increase until 2009 after which it remained almost unchanged. The percentage of patients who died of malignant tumors was 9.4%. The percentage of patients who died of cerebrovascular disorder has continued to decrease since 1995 and reached 7.2% in 2013. The percentage of patients who died of myocardial infarction was 4.3%.

Note that the classification codes for the causes of death were considerably revised in the 2003 and 2010 surveys. For details of these revisions, please refer to the 2010 survey report (9).

Annual crude death rate

The annual crude death rate was calculated from the facility survey data (Table 14). The annual crude death rate is defined as the percentage of patients who died each year with respect to the mean annual dialysis patient population. Table 14 shows the annual crude death rates between 1992 and 2013. The annual crude death rate has remained in the range of 9.0–9.9% since 1992 but tended to gradually increase after 2000. This is because the growth in dialysis patient population has slowed down since 2000, whereas the number of deaths was steadily increasing, as mentioned above. The annual crude death rate was 10.2%, exceeding 10%, in 2011. However, the annual crude death rate was 10.0% in 2012 and 9.8% in 2013, which was lower than 10%. The annual crude death rate is expected to gradually increase because the annual number of deaths will continue to increase in the future, as described above.

Cumulative survival rate of new patients who were started on dialysis in and after 1983

The cumulative survival rates of new patients who were started on dialysis in and after 1983 are summarized according to the year of starting dialysis (Table 15). The one- to 10-year survival rates were lowest for patients who were started on dialysis in 1992 and was increasing for patients who were started on dialysis in 1993 or later. However, the 5-year survival rate for patients who were started on dialysis between 2004 and 2008 and the 10-year survival rate for patients who were started on dialysis between 1999 and 2003 remained almost unchanged. The 20-year survival rate was calculated for the first time in the 2003 survey for patients who were started on dialysis in 1983. The 25-year survival rate was calculated for the first time in the 2008 survey for patients who were started on dialysis in 1983. These survival rates tended to decrease between their first surveys and the 2013 survey.

Items associated with HDF

Changes in number of HDF patients

According to the 2012 report, the number of patients who underwent online HDF increased approximately threefold to 14 069 in 2012 because of the marked revision of the health insurance system for HDF made in April 2012 (3,10). In 2013, the number of patients who underwent online HDF further increased by 9467 to reach 23 536. The number of patients who underwent offline HDF slightly decreased to 7149. The total number of patients who underwent HDF including the other types of HDF increased to 31 371, an increase of approximately 10 000 from the previous year. The percentage of patients who underwent any type of HDF

TABLE 9. *Age distribution of all dialysis patients with different primary diseases in 2013*

Primary disease	<5	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44
Chronic glomerulonephritis	2	2	10	28	86	275	743	1 671	3 221
(%)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.3)	(0.7)	(1.7)	(3.2)
Chronic pyelonephritis				1	5	25	46	92	127
(%)				(0.0)	(0.2)	(0.8)	(1.5)	(3.0)	(4.1)
Rapidly progressive glomerulonephritis		2			7	11	22	42	72
(%)		(0.1)			(0.3)	(0.5)	(0.9)	(1.7)	(3.0)
Nephropathy of pregnancy/pregnancy toxemia							6	19	48
(%)							(0.4)	(1.1)	(2.9)
Other nephritides that cannot be classified		2	2	4	19	32	46	77	95
(%)		(0.1)	(0.1)	(0.3)	(1.4)	(2.4)	(3.4)	(5.8)	(7.1)
Polycystic kidney	4	1		3	4	14	30	104	299
(%)	(0.0)	(0.0)		(0.0)	(0.0)	(0.1)	(0.3)	(1.0)	(2.8)
Nephrosclerosis			2	2	12	20	58	172	384
(%)			(0.0)	(0.0)	(0.0)	(0.1)	(0.2)	(0.6)	(1.4)
Malignant hypertension					7	11	42	83	151
(%)					(0.3)	(0.4)	(1.7)	(3.3)	(6.0)
Diabetic nephropathy	1	1	1	8	4	49	314	1 142	2 812
(%)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.3)	(1.0)	(2.4)
SLE nephritis			2	1	5	25	46	100	144
(%)			(0.1)	(0.0)	(0.2)	(1.1)	(2.0)	(4.4)	(6.3)
Amyloidal kidney								7	21
(%)								(1.5)	(4.6)
Gouty kidney						1	4	20	30
(%)						(0.1)	(0.4)	(1.8)	(2.6)
Renal failure due to congenital abnormality of metabolism	1		1	6	10	15	18	35	40
(%)	(0.4)		(0.4)	(2.3)	(3.8)	(5.7)	(6.8)	(13.3)	(15.2)
Kidney and urinary tract tuberculosis									
(%)									
Kidney and urinary tract stone								4	7
(%)								(0.7)	(1.2)
Kidney and urinary tract tumor					1		3	8	10
(%)					(0.1)		(0.3)	(0.9)	(1.2)
Obstructive urinary tract disease	1	1	1		5	16	26	40	41
(%)	(0.1)	(0.1)	(0.1)		(0.7)	(2.1)	(3.5)	(5.3)	(5.5)
Myeloma				1				2	7
(%)				(0.4)				(0.7)	(2.6)
Hypoplastic kidney	17	6	15	16	35	39	78	83	81
(%)	(2.7)	(1.0)	(2.4)	(2.6)	(5.6)	(6.2)	(12.5)	(13.3)	(12.9)
Undetermined			1	9	22	79	185	378	716
(%)			(0.0)	(0.0)	(0.1)	(0.3)	(0.7)	(1.4)	(2.7)
Reintroduction after transplantation			3	2	12	29	54	103	199
(%)			(0.1)	(0.1)	(0.6)	(1.3)	(2.5)	(4.7)	(9.1)
Others	16	11	10	13	43	108	149	198	314
(%)	(0.2)	(0.2)	(0.1)	(0.2)	(0.6)	(1.5)	(2.1)	(2.7)	(4.3)
Subtotal	42	26	48	94	277	749	1 870	4 380	8 819
(%)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.2)	(0.6)	(1.4)	(2.9)
No information available						1		1	1
(%)						(4.8)		(4.8)	(4.8)
Total	42	26	48	94	277	750	1 870	4 381	8 820
(%)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.2)	(0.6)	(1.4)	(2.9)

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

exceeded 10% of the entire HD/HDF patient population (Table 16).

Modes of dilution of substitution fluid for HDF

For most of the patients who underwent offline or online HDF, the postdilution or predilution mode was adopted. The percentage of the patients for whom another dilution mode was adopted was very small. For patients who underwent online or offline HDF, the trend of the percentages of patients who adopted the predilution or postdilution mode was similar to that in the previous year. Namely, the postdilution mode was adopted in 89.2% of the patients who underwent offline HDF, whereas the predilution mode was adopted in 90.8% of the patients who underwent online HDF. Among the entire HDF patient population,

TABLE 9. *(Continued)*

Primary disease	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89
Chronic glomerulonephritis	4610	6295	9275	15 384	16 160	15 110	12 257	8708	4308
(%)	(4.6)	(6.3)	(9.3)	(15.5)	(16.2)	(15.2)	(12.3)	(8.8)	(4.3)
Chronic pyelonephritis	190	176	260	411	484	442	363	253	144
(%)	(6.2)	(5.7)	(8.5)	(13.4)	(15.8)	(14.4)	(11.8)	(8.3)	(4.7)
Rapidly progressive glomerulonephritis	64	117	159	301	325	415	390	300	154
(%)	(2.6)	(4.8)	(6.6)	(12.4)	(13.4)	(17.2)	(16.1)	(12.4)	(6.4)
Nephropathy of pregnancy/pregnancy toxemia	88	129	185	374	324	263	147	70	13
(%)	(5.3)	(7.7)	(11.1)	(22.4)	(19.4)	(15.8)	(8.8)	(4.2)	(0.8)
Other nephritides that cannot be classified	93	94	111	153	145	171	140	90	43
(%)	(7.0)	(7.0)	(8.3)	(11.5)	(10.9)	(12.8)	(10.5)	(6.7)	(3.2)
Polycystic kidney	575	892	1271	2002	1818	1553	1116	673	261
(%)	(5.4)	(8.3)	(11.9)	(18.7)	(17.0)	(14.5)	(10.4)	(6.3)	(2.4)
Nephrosclerosis	532	707	1172	2133	2947	3837	4843	5089	3379
(%)	(2.0)	(2.7)	(4.4)	(8.0)	(11.1)	(14.4)	(18.2)	(19.2)	(12.7)
Malignant hypertension	191	223	213	292	316	297	260	233	132
(%)	(7.6)	(8.9)	(8.5)	(11.7)	(12.6)	(11.9)	(10.4)	(9.3)	(5.3)
Diabetic nephropathy	4704	6813	10 136	17 750	20 841	19 312	16 338	10 194	4140
(%)	(4.1)	(5.9)	(8.8)	(15.4)	(18.0)	(16.7)	(14.1)	(8.8)	(3.6)
SLE nephritis	197	225	283	353	288	267	190	101	54
(%)	(8.6)	(9.8)	(12.4)	(15.4)	(12.6)	(11.7)	(8.3)	(4.4)	(2.4)
Amyloidal kidney	17	24	33	67	74	83	72	47	7
(%)	(3.8)	(5.3)	(7.3)	(14.8)	(16.3)	(18.3)	(15.9)	(10.4)	(1.5)
Gouty kidney	45	61	88	158	197	222	163	99	38
(%)	(4.0)	(5.4)	(7.8)	(13.9)	(17.4)	(19.6)	(14.4)	(8.7)	(3.4)
Renal failure due to congenital abnormality of metabolism	22	14	21	29	19	13	4	10	5
(%)	(8.3)	(5.3)	(8.0)	(11.0)	(7.2)	(4.9)	(1.5)	(3.8)	(1.9)
Kidney and urinary tract tuberculosis	1	5	7	27	54	52	28	35	17
(%)	(0.4)	(2.2)	(3.0)	(11.7)	(23.4)	(22.5)	(12.1)	(15.2)	(7.4)
Kidney and urinary tract stone	11	26	47	74	91	108	93	89	37
(%)	(1.8)	(4.3)	(7.8)	(12.3)	(15.2)	(18.0)	(15.5)	(14.8)	(6.2)
Kidney and urinary tract tumor	14	19	34	83	133	143	176	162	56
(%)	(1.6)	(2.2)	(4.0)	(9.7)	(15.5)	(16.6)	(20.5)	(18.9)	(6.5)
Obstructive urinary tract disease	49	43	34	74	88	99	96	80	41
(%)	(6.5)	(5.7)	(4.5)	(9.9)	(11.7)	(13.2)	(12.8)	(10.7)	(5.5)
Myeloma	10	14	11	32	37	44	45	36	24
(%)	(3.7)	(5.2)	(4.1)	(12.0)	(13.9)	(16.5)	(16.9)	(13.5)	(9.0)
Hypoplastic kidney	53	39	26	33	24	33	26	11	9
(%)	(8.5)	(6.2)	(4.2)	(5.3)	(3.8)	(5.3)	(4.2)	(1.8)	(1.4)
Undetermined	939	1214	1834	3091	3628	3989	4133	3590	2191
(%)	(3.5)	(4.5)	(6.8)	(11.5)	(13.5)	(14.9)	(15.4)	(13.4)	(8.2)
Reintroduction after transplantation	247	323	370	357	204	120	71	55	28
(%)	(11.3)	(14.8)	(17.0)	(16.4)	(9.4)	(5.5)	(3.3)	(2.5)	(1.3)
Others	364	402	508	851	918	1047	981	774	426
(%)	(5.0)	(5.5)	(7.0)	(11.7)	(12.7)	(14.4)	(13.5)	(10.7)	(5.9)
Subtotal	13 016	17 855	26 078	44 029	49 115	47 620	41 932	30 699	15 507
(%)	(4.2)	(5.8)	(8.5)	(14.3)	(16.0)	(15.5)	(13.7)	(10.0)	(5.1)
No information available	1			3	3	2	5	3	1
(%)	(4.8)			(14.3)	(14.3)	(9.5)	(23.8)	(14.3)	(4.8)
Total	13 017	17 855	26 078	44 032	49 118	47 622	41 937	30 702	15 508
(%)	(4.2)	(5.8)	(8.5)	(14.3)	(16.0)	(15.5)	(13.7)	(10.0)	(5.1)

72.3% adopted the predilution mode; this increase resulted from the increase in the number of patients who underwent online HDF (Table 17).

Volume of substitution fluid for HDF

The patients who underwent offline and online HDF were compared in terms of the dilution mode and the volume of substitution fluid. In the case of offline HDF, the mean volumes were 7.8 and 9.4 L for the post- and predilution modes, respectively. In the case of online HDF, the mean volumes were 9.2 and 40.6 L for the post- and predilution modes, respectively (Table 18).

Reasons for selecting HDF

In the 2013 survey, the reason for selecting HDF as a dialysis treatment was investigated. The respondents

TABLE 9. *(Continued)*

Primary disease	90–94	≥95	Total	Unspecified	No information on birth date	Total	Mean age	S.D.
Chronic glomerulonephritis	1191	153	99 489	3		99 492	66.17	12.54
(%)	(1.2)	(0.2)	(100.0)					
Chronic pyelonephritis	39	7	3065			3065	64.99	13.96
(%)	(1.3)	(0.2)	(100.0)					
Rapidly progressive glomerulonephritis	30	8	2419			2419	68.53	13.18
(%)	(1.2)	(0.3)	(100.0)					
Nephropathy of pregnancy/pregnancy toxemia	2		1668			1668	63.82	10.05
(%)	(0.1)		(100.0)					
Other nephritides that cannot be classified	16	3	1336			1336	60.20	16.78
(%)	(1.2)	(0.2)	(100.0)					
Polycystic kidney	58	5	10 683			10 683	64.69	11.23
(%)	(0.5)	(0.0)	(100.0)					
Nephrosclerosis	1095	184	26 568	1		26 569	73.84	11.80
(%)	(4.1)	(0.7)	(100.0)					
Malignant hypertension	44	8	2503			2503	63.96	14.86
(%)	(1.8)	(0.3)	(100.0)					
Diabetic nephropathy	822	98	115 480	4		115 484	67.11	11.24
(%)	(0.7)	(0.1)	(100.0)					
SLE nephritis	7	2	2290			2290	60.28	13.73
(%)	(0.3)	(0.1)	(100.0)					
Amyloidal kidney	1		453			453	66.72	11.47
(%)	(0.2)		(100.0)					
Gouty kidney	7	1	1134			1134	67.05	11.41
(%)	(0.6)	(0.1)	(100.0)					
Renal failure due to congenital abnormality of metabolism	1		264			264	48.88	17.32
(%)	(0.4)		(100.0)					
Kidney and urinary tract tuberculosis	5		231			231	72.10	8.89
(%)	(2.2)		(100.0)					
Kidney and urinary tract stone	11	2	600			600	70.56	10.86
(%)	(1.8)	(0.3)	(100.0)					
Kidney and urinary tract tumor	11	6	859			859	72.21	10.91
(%)	(1.3)	(0.7)	(100.0)					
Obstructive urinary tract disease	14	1	750	1		751	63.42	17.21
(%)	(1.9)	(0.1)	(100.0)					
Myeloma	2	2	267			267	70.06	12.40
(%)	(0.7)	(0.7)	(100.0)					
Hypoplastic kidney	2		626			626	43.47	19.03
(%)	(0.3)		(100.0)					
Undetermined	667	113	26 779	1		26 780	69.51	13.12
(%)	(2.5)	(0.4)	(100.0)					
Reintroduction after transplantation	4		2181			2181	55.78	12.61
(%)	(0.2)		(100.0)					
Others	101	13	7247	1		7248	65.21	15.75
(%)	(1.4)	(0.2)	(100.0)					
Subtotal	4130	606	306 892	11		306 903	67.21	12.51
(%)	(1.3)	(0.2)	(100.0)					
No information available			21		1	22	67.00	15.94
(%)			(100.0)					
Total	4130	606	306 913	11	1	306 925	67.21	12.51
(%)	(1.3)	(0.2)	(100.0)					

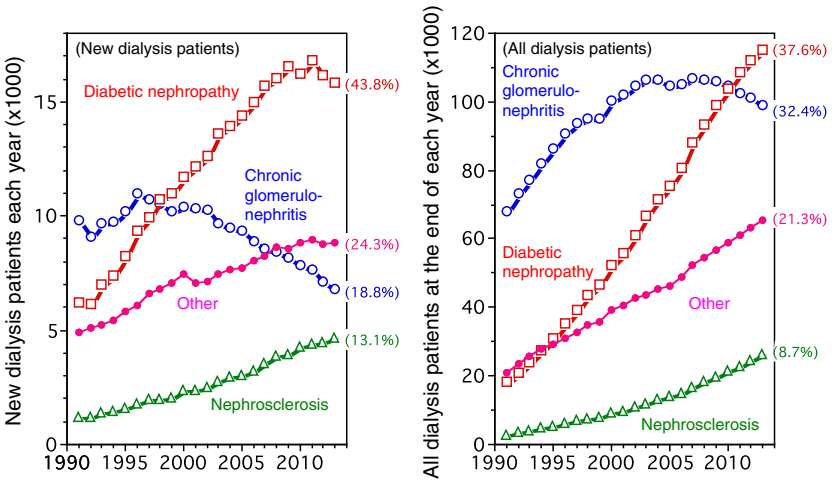

FIG. 3. Changes in numbers of new dialysis patients (left) and all dialysis patients (right) at the end of each year for three leading and other primary diseases.

TABLE 10. *Changes in percentages of new patients started on dialysis (upper) and for all dialysis patients (lower) with various primary diseases at the end of each year*

New patients started on dialysis each year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Diabetic nephropathy	28.4	29.9	30.7	31.9	33.1	33.9	35.7	36.2	36.6	38.1	39.1
Chronic glomerulonephritis	42.2	41.4	40.5	39.4	38.9	36.6	35.0	33.6	32.5	32.4	31.9
Nephrosclerosis	5.9	6.2	6.1	6.3	6.4	6.8	6.7	7.0	7.6	7.6	7.8
Polycystic kidney	2.7	2.6	2.5	2.4	2.5	2.4	2.4	2.2	2.4	2.3	2.4
Rapidly progressive glomerulonephritis	0.7	0.8	0.8	0.8	0.8	1.1	0.9	0.9	1.0	1.0	1.1
SLE nephritis	1.3	1.2	1.2	1.1	1.3	1.0	1.1	1.2	0.9	1.0	0.9
Chronic pyelonephritis	1.6	1.1	1.4	1.2	1.1	1.2	1.1	1.1	1.0	1.1	0.9
Undetermined	3.7	3.3	3.9	4.5	5.0	5.5	5.6	6.1	7.6	9.0	8.4
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Diabetic nephropathy	41.0	41.3	42.0	42.9	43.4	43.3	44.5	43.6	44.3	44.2	43.8
Chronic glomerulonephritis	29.1	28.1	27.4	25.6	23.8	22.8	21.9	21.0	20.2	19.4	18.8
Nephrosclerosis	8.5	8.8	9.0	9.4	10.0	10.6	10.7	11.7	11.8	12.3	13.1
Polycystic kidney	2.3	2.7	2.3	2.4	2.3	2.5	2.3	2.4	2.5	2.5	2.5
Rapidly progressive glomerulonephritis	1.2	1.1	1.1	1.2	1.3	1.2	1.2	1.2	1.3	1.3	1.4
SLE nephritis	0.7	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.7	0.7	0.7
Chronic pyelonephritis	1.0	0.9	1.0	0.8	0.8	0.7	0.7	0.8	0.7	0.8	0.8
Undetermined	8.8	9.3	9.5	9.9	10.2	10.6	10.7	10.7	10.9	11.0	11.3
All dialysis patients at the end of each year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Diabetic nephropathy	17.1	18.2	19.2	20.4	21.6	22.7	24.0	25.1	26.0	27.2	28.1
Chronic glomerulonephritis	60.4	58.8	57.7	56.6	55.4	54.1	52.5	51.1	49.7	49.6	48.2
Nephrosclerosis	3.1	3.4	3.6	3.8	4.0	4.2	4.4	4.5	4.8	5.0	5.1
Polycystic kidney	3.3	3.3	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.3	3.3
Chronic pyelonephritis	2.0	1.9	1.8	1.7	1.6	1.6	1.5	1.5	1.4	1.4	1.3
SLE nephritis	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0
Rapidly progressive glomerulonephritis	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6
Undetermined	2.9	2.9	3.1	3.2	3.6	3.9	4.2	4.4	5.0	5.6	5.9
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Diabetic nephropathy	29.2	30.2	31.4	32.3	33.4	34.2	35.1	35.9	36.7	37.1	37.6
Chronic glomerulonephritis	46.6	45.1	43.6	42.2	40.4	39.0	37.6	36.2	34.8	33.6	32.4
Nephrosclerosis	5.3	5.7	5.9	6.2	6.5	6.8	7.1	7.5	7.9	8.3	8.7
Polycystic kidney	3.3	3.4	3.3	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.5
Chronic pyelonephritis	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.0
SLE nephritis	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7
Rapidly progressive glomerulonephritis	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.8	0.8
Undetermined	6.3	6.4	6.6	7.0	7.4	7.6	7.7	8.0	8.2	8.5	8.7

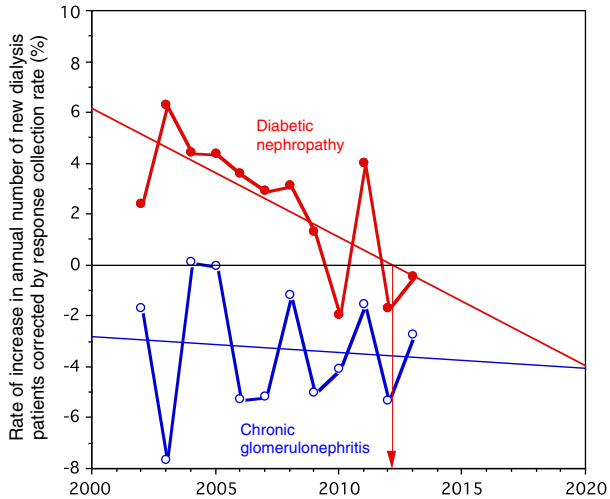

FIG. 4. Changes in rates of increases in annual numbers of new dialysis patients with chronic glomerulonephritis and diabetic nephropathy as primary diseases corrected by response collection rate.

were requested to select only the main reason (i.e., they were not allowed to select multiple choices). In the health insurance system before 2012, diseases for which medical service fees can be covered by the insurance when patients were treated by HDF were limited to dialysis-related amyloidosis and dialysis-induced hypotension (dysdialysis syndrome), which were difficult to treat by conventional dialysis methods. However, this limitation was essentially removed as a result of the revision of the health insurance system in 2012 (10).

Table 19 shows the reasons for selecting HDF for different types of HDF: offline HDF (pre- and postdilution modes), online HDF (pre- and postdilution modes), push/pull HDF, and acetate-free biofiltration (AFBF).

Offline HDF had long been used as a dialysis method since before 2012. The main reasons for selecting offline HDF were the treatment of dialysis-induced hypotension and dialysis-related amyloidosis. There were negligible differences in the percentages of patients with these reasons for the selection of pre- and postdilution modes. The main reasons for selecting online HDF included prevention of complications, treatment of dialysis-induced hypotension and dialysis-related amyloidosis, and improvement of dialysis efficiency. Online HDF in the predilution mode was mainly selected to prevent complications, whereas that in the postdilution mode was selected to treat dialysis-related amyloidosis and dialysis-induced hypotension. Push/pull HDF was selected to improve dialysis efficiency and to treat dialysis-induced hypotension. AFBF was developed to treat dialysis-induced hypotension and, in practice, performed mostly for this purpose.

Comparison between HD and HDF patients

The 2012 report included a table showing the status of patients who underwent HD, offline HDF, or online HDF three times a week for two years or longer (3). Considering the fact that the number of HDF patients increased by approximately 10 000 in

TABLE 11. *Classification of causes of death of new patients who were started on dialysis in 2013 and who died by the end of 2013*

Cause of death	Male	(column %)	Female	(column %)	Subtotal	(column %)	No information available	Total	(column %)
Cardiac failure	350	(22.9)	212	(25.6)	562	(23.8)		562	(23.8)
Cerebrovascular disorder	94	(6.1)	51	(6.2)	145	(6.1)		145	(6.1)
Infectious disease	404	(26.4)	208	(25.2)	612	(26.0)		612	(26.0)
Hemorrhage	33	(2.2)	13	(1.6)	46	(2.0)		46	(2.0)
Malignant tumor	202	(13.2)	83	(10.0)	285	(12.1)		285	(12.1)
Cachexia/Uremia	58	(3.8)	43	(5.2)	101	(4.3)		101	(4.3)
Cardiac infarction	53	(3.5)	17	(2.1)	70	(3.0)		70	(3.0)
Potassium poisoning/ Sudden death	25	(1.6)	11	(1.3)	36	(1.5)		36	(1.5)
Chronic hepatitis/Cirrhosis	25	(1.6)	19	(2.3)	44	(1.9)		44	(1.9)
Suicide/Refusal of treatment (dialysis)	16	(1.0)	5	(0.6)	21	(0.9)		21	(0.9)
Intestinal obstruction	10	(0.7)	5	(0.6)	15	(0.6)		15	(0.6)
Pulmonary thrombus/ Pulmonary embolus	6	(0.4)	4	(0.5)	10	(0.4)		10	(0.4)
Death due to disaster	2	(0.1)	3	(0.4)	5	(0.2)		5	(0.2)
Other causes	142	(9.3)	92	(11.1)	234	(9.9)		234	(9.9)
Unspecified	111	(7.3)	61	(7.4)	172	(7.3)		172	(7.3)
Subtotal	1531	(100.0)	827	(100.0)	2358	(100.0)		2358	(100.0)
No information available	1		1		2			2	
Total	1532		828		2360			2360	

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

TABLE 12. *Classification of causes of death of all dialysis patients who died in 2013*

Cause of death	Male	(column %)	Female	(column %)	Subtotal	(column %)	No information available	Total	(column %)
Cardiac failure	4822	(25.7)	3020	(28.8)	7842	(26.8)		7842	(26.8)
Cerebrovascular disorder	1288	(6.9)	812	(7.7)	2100	(7.2)		2100	(7.2)
Infectious disease	4000	(21.3)	2100	(20.0)	6100	(20.8)		6100	(20.8)
Hemorrhage	283	(1.5)	173	(1.6)	456	(1.6)		456	(1.6)
Malignant tumor	2038	(10.8)	716	(6.8)	2754	(9.4)		2754	(9.4)
Cachexia/Uremia	668	(3.6)	545	(5.2)	1213	(4.1)		1213	(4.1)
Cardiac infarction	854	(4.5)	395	(3.8)	1249	(4.3)		1249	(4.3)
Potassium poisoning/ Sudden death	519	(2.8)	256	(2.4)	775	(2.6)		775	(2.6)
Chronic hepatitis/Cirrhosis	195	(1.0)	93	(0.9)	288	(1.0)		288	(1.0)
Suicide/Refusal of treatment (dialysis)	156	(0.8)	56	(0.5)	212	(0.7)		212	(0.7)
Intestinal obstruction	173	(0.9)	127	(1.2)	300	(1.0)		300	(1.0)
Pulmonary thrombus/ Pulmonary embolus	60	(0.3)	25	(0.2)	85	(0.3)		85	(0.3)
Death due to disaster	118	(0.6)	36	(0.3)	154	(0.5)		154	(0.5)
Other causes	1509	(8.0)	1074	(10.2)	2583	(8.8)		2583	(8.8)
Unspecified	2104	(11.2)	1073	(10.2)	3177	(10.8)		3177	(10.8)
Subtotal	18 787	(100.0)	10 501	(100.0)	29 288	(100.0)		29 288	(100.0)
No information available	9		3		12			12	
Total	18 796		10 504		29 300			29 300	

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

TABLE 13. *Annual changes in leading causes of death (%)*

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Cardiac failure	31.1	29.9	28.2	25.4	24.1	23.9	24.1	24.3	23.2	25.5	25.1
Infectious disease	11.3	12.2	12.6	13.8	14.6	14.9	15.0	16.3	16.6	16.3	15.9
Malignant tumor	7.1	7.4	7.3	7.2	7.7	8.1	7.7	7.6	8.3	8.5	8.5
Cerebrovascular disease	13.6	13.5	14.1	13.5	12.9	12.6	12.1	11.3	11.3	11.6	11.2
Cardiac infarction	5.8	5.7	7.1	7.5	7.4	8.4	7.9	7.4	7.0	7.4	7.4
Others	4.5	4.1	4.5	5.8	6.3	6.7	7.0	7.7	7.9	9.1	9.0
Unspecified	2.5	2.6	2.8	3.2	2.5	3.5	3.9	3.6	8.1	5.7	6.6

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Cardiac failure	25.0	25.1	25.8	24.9	24.0	23.7	23.6	27.0	26.6	27.2	26.8
Infectious disease	18.5	18.8	19.2	19.9	18.9	19.9	20.7	20.3	20.3	20.4	20.8
Malignant tumor	8.5	9.0	9.0	9.2	9.2	9.2	9.4	9.8	9.1	9.1	9.4
Cerebrovascular disease	10.7	10.6	9.8	9.4	8.9	8.6	8.4	8.1	7.7	7.5	7.2
Cardiac infarction	6.2	5.4	5.1	4.4	4.4	4.1	4.0	4.7	4.6	4.5	4.3
Others	9.7	10.3	9.1	9.5	9.7	9.7	10.0	6.6	8.4	8.5	8.8
Unspecified	5.6	6.5	7.3	8.3	10.3	10.9	10.6	10.9	10.8	10.5	10.8

TABLE 14. *Change in annual crude death rate*

Year	Crude death rate (%)	Year	Crude death rate (%)
1992	9.7	2003	9.3
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

2013, a similar table is again given in this report to examine any marked changes in the data of the three patient groups (Table 20).

The results of the 2012 survey indicated that patients who underwent online HDF had a slightly larger physical body and a slightly lower CRP level than the other patient groups. These tendencies were similarly observed in 2013. The dialysis efficiency, the indices of chronic kidney disease-mineral and bone disorder (CKD-MBD), and the Hb level showed no marked differences among the three patient groups in 2013, similarly to the previous year.

TABLE 15. *Cumulative survival rates of new patients started on dialysis 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	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
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	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	0.121	0.111
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	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	
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	0.248	0.231	0.216	0.202	0.187	0.174	0.163	0.151	0.142	0.133	0.124	0.116	0.107		
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	0.244	0.228	0.215	0.203	0.191	0.178	0.168	0.157	0.148	0.139	0.130	0.120			
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	0.230	0.213	0.197	0.184	0.175	0.164	0.154	0.143	0.134	0.125	0.117				
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	0.218	0.203	0.190	0.180	0.168	0.157	0.147	0.138	0.129	0.121					
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	0.225	0.210	0.195	0.184	0.171	0.159	0.149	0.140	0.131						
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	0.222	0.207	0.193	0.181	0.169	0.157	0.145	0.136							
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	0.217	0.202	0.189	0.177	0.165	0.154	0.144								
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	0.212	0.198	0.184	0.171	0.158	0.147									
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	0.268	0.249	0.232	0.215	0.199	0.185	0.172	0.160										
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	0.211	0.197	0.184	0.171											
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	0.210	0.194	0.180												
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	0.209	0.193													
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	0.271	0.249	0.228	0.210														
1998	26 697	0.844	0.765	0.697	0.634	0.573	0.522	0.473	0.431	0.395	0.363	0.332	0.304	0.278	0.256	0.236															
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																
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																	
2001	30 660	0.854	0.777	0.707	0.641	0.585	0.532	0.484	0.441	0.401	0.364	0.331	0.299																		
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																			
2003	32 358	0.859	0.785	0.716	0.653	0.594	0.538	0.490	0.441	0.399	0.362																				
2004	33 458	0.865	0.790	0.723	0.660	0.600	0.544	0.492	0.445	0.402																					
2005	34 534	0.861	0.789	0.721	0.656	0.596	0.538	0.484	0.437																						
2006	35 960	0.870	0.798	0.729	0.666	0.605	0.546	0.494																							
2007	36 711	0.866	0.795	0.726	0.658	0.595	0.538																								
2008	37 787	0.866	0.796	0.727	0.660	0.598																									
2009	38 313	0.872	0.797	0.727	0.663																										
2010	38 213	0.876	0.803	0.731																											
2011	37 946	0.872	0.797																												
2012	36 591	0.875																													

TABLE 16. *Change in number of HDF patients*

Dialysis method		2009	2010	2011	2012	2013
Facility HD		253 807	262 973	270 072	268 275	264 211
HDF	off-line HDF	9299	9421	8573	7157	7149
	on-line HDF	6852	4829	4890	14 069	23 536
	p/p HDF	237	159	145	109	263
	AFBF	465	458	507	390	423
HDF sub total		16 853	14 867	14 115	21 725	31 371
HD·HDF total		270 660	277 840	284 187	290 000	295 582

TABLE 18. *Modes of dilution and volumes of substitution fluid for offline and online HDF*

		Postdilution	Predilution
Off-line HDF	Number of patients	5214	580
	Mean volumes of substitution fluid per session (L)	7.9	9.4
	S.D.	2.4	4.7
On-line HDF	Number of patients	1439	19 244
	Mean volumes of substitution fluid per session (L)	9.2	40.6
	S.D.	4.5	15.8

Current status of dialysate quality control

Measurement of endotoxin level in dialysate

Among 4235 facilities that had at least one bedside console, 4167 facilities (98.4%) provided data on the frequency of measurement of endotoxin level in the dialysate and 4007 facilities (94.6%) provided data on the endotoxin level in the dialysate.

The JSDT guidelines on dialysate quality control standards recommend that the endotoxin level in the dialysate should be measured at least once a month. The percentage of the facilities that satisfied this recommendation was 77.7%, a slight increase from the previous year (76.3%) (Table 21).

According to the JSDT guidelines on dialysate quality control standards, the use of an ultrapure dialysate (endotoxin level, <0.001 EU/mL) is recommended for all dialysis methods, and the use of a standard dialysate (endotoxin level, <0.05 EU/mL) should be the minimum necessary measure to ensure the safety of dialysis (11). Endotoxin levels <0.001 and <0.05 EU/mL were achieved in 73.9 and 95.1% of the 4007 facilities, respectively. These percentages were higher than those in the previous year (70.7 and 94.5%).

Measurement of bacterial count in dialysate

Among 4235 facilities that had at least one bedside console, 4137 facilities (97.7%) provided data on the frequency of measurement of bacterial count in the dialysate, 3830 facilities (90.4%) provided data on the bacterial count in the dialysate, 3724 facilities (87.9%) provided data on the media used for the cultivation of bacteria in the dialysate, and 3854 facilities (91.0%) provided data on the sample volume for the measurement of bacterial count in the dialysate (Tables 22 and 23).

According to the JSDT guidelines on dialysate quality control standards, the use of an ultrapure dialysate (bacterial count, <0.1 cfu/mL) is recommended for all dialysis methods, and the use of a standard dialysate (bacterial count, <100 cfu/mL) should be the minimum necessary measure (11). Bacterial counts <0.1 and <100 cfu/mL were achieved in 67.1 and 98.8% of the facilities that provided data on the bacterial count in the dialysate, respectively (Table 22). An ultrapure dialysate should satisfy both an endotoxin level <0.001 EU/mL and a bacterial count <0.1 cfu/mL. However, the percentage of the facilities that satisfied the bacterial count <0.1 cfu/mL (67.1%) was approximately 7% lower than that of the facilities that satisfied the endotoxin level <0.001 EU/mL (73.9%), indicating the need for the improvement of dialysate quality control.

Reasoner's No. 2 agar (R2A) and tryptone glucose extract agar (TGEA) are recommended for the cultivation of bacteria in the dialysate. The survey results

TABLE 17. *Modes of dilution for different types of HDF*

	Postdilution	Predilution	Pre- and postdilution	Other dilution mode	Sub total	Unspecified	No information available	Total
Off-line HDF	580	5214	47	5	5846	0	1303	7149
(%)	(9.9)	(89.2)	(0.8)	(0.1)	(100.0)			
On-line HDF	19 244	1439	7	507	21 197	1	2338	23 536
(%)	(90.8)	(6.8)	(0.0)	(2.4)	(100.0)			
P/p HDF	0	0	0	211	211	0	52	263
(%)	(0.0)	(0.0)	(0.0)	(100.0)	(100.0)			
AFBF	1	163	1	0	165	0	258	423
(%)	(0.6)	(98.8)	(0.6)	(0.0)	(100.0)			
Total	19 825	6816	55	723	27 419	1	3951	31 371
(%)	(72.3)	(24.9)	(0.2)	(2.6)	(100.0)			

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

TABLE 19. *Reasons for selecting HDF*

Reasons for selecting HDF	Off-line HDF (predilution)		Off-line HDF (postdilution)		On-line HDF (predilution)		On-line HDF (postdilution)		Push/pull HDF		AFBF*	
	Number of patients	(column %)	Number of patients	(column %)	Number of patients	(column %)	Number of patients	(column %)	Number of patients	(column %)	Number of patients	(column %)
Dialysis amyloidosis	104	(22.1)	843	(19.7)	2354	(14.4)	170	(15.4)	12	(6.1)	4	(2.5)
Bone or joint symptoms caused by other than dialysis amyloidosis	16	(3.4)	80	(1.9)	372	(2.3)	41	(3.7)	7	(3.5)	3	(1.9)
Dialysis-induced hypotension	209	(44.4)	1986	(46.5)	2812	(17.2)	243	(22.0)	55	(27.8)	129	(82.2)
Dialysis-induced pruritus	25	(5.3)	257	(6.0)	1165	(7.1)	64	(5.8)	33	(16.7)	4	(2.5)
Skin pigmentation	0	(0.0)	8	(0.2)	32	(0.2)	1	(0.1)	3	(1.5)	0	(0.0)
Sleep disorder	2	(0.4)	4	(0.1)	68	(0.4)	1	(0.1)	0	(0.0)	0	(0.0)
Restless legs syndrome	13	(2.8)	144	(3.4)	543	(3.3)	38	(3.4)	2	(1.0)	1	(0.6)
Easy stimulability	9	(1.9)	72	(1.7)	188	(1.2)	30	(2.7)	6	(3.0)	1	(0.6)
Malnutrition	1	(0.2)	34	(0.8)	77	(0.5)	13	(1.2)	0	(0.0)	1	(0.6)
Prevention of complications	26	(5.5)	212	(5.0)	5025	(30.8)	111	(10.0)	8	(4.0)	6	(3.8)
Dialysis efficiency	35	(7.4)	371	(8.7)	2932	(18.0)	194	(17.5)	67	(33.8)	3	(1.9)
Others	26	(5.5)	184	(4.3)	612	(3.8)	189	(17.1)	4	(2.0)	5	(3.2)
Unknown	5	(1.1)	78	(1.8)	125	(0.8)	12	(1.1)	1	(0.5)	0	(0.0)
Sub total	471	(100.0)	4273	(100.0)	16 305	(100.0)	1107	(100.0)	198	(100.0)	157	(100.0)
No information available	109		941		2939		332		65		266	
Total	580		5214		19 244		1439		263		423	

*AFBF: Acetate-free bio filtration

showed that either of these media was used by 85.9% of the facilities that responded to questions regarding the media used for the cultivation of bacteria. At least 10 mL of a dialysate sample is required to measure a bacterial count of 0.1 cfu/mL, which is the maximum allowable count to maintain an ultrapure dialysate (11). At least 10 mL of the dialysate sample was used for the measurement of bacterial count by 77.0% of the facilities that responded to questions regarding the volume of the sample.

Installation of ETRFs

Among the 4235 facilities that had at least one bedside console, 4230 (99.9%) responded to questions regarding the installation of ETRFs. Among these 4230 facilities, 95.4% had at least one bedside console equipped with an ETRF (Table 24).

The 4230 facilities that responded to the questions regarding the installation of ETRFs had a total of 128 150 bedside consoles, 86.0% of which were equipped with an ETRF. The percentage of bedside consoles equipped with an ETRF increased by 2.6% from the previous year (83.4%) (Table 25) (3).

Theoretically, an ultrapure dialysate can be achieved by using an ETRF. If facilities that have bedside consoles equipped with an ETRF cannot achieve an endotoxin level <0.001 EU/mL or a bacterial count <0.1 cfu/mL, these facilities may have problems, such as a high contamination level of raw water, a high risk of secondary contamination, contamination of ETRFs, or contamination during sampling. Such facilities need to optimize their method of controlling dialysate quality. The percentages of facilities that did not achieve an endotoxin level <0.001 EU/mL or a bacterial count <0.1 cfu/mL despite having bedside consoles equipped with an ETRF were 23.8 and 30.6%, respectively (Tables 26 and 27). A standard dialysate should have an endotoxin level <0.050 EU/mL and a bacterial count <100 cfu/mL. Among the facilities that had bedside consoles equipped with an ETRF, 4.2% did not achieve the endotoxin level and 0.9% did not achieve the bacterial count. In contrast, 63.3 and 56.0% of the facilities that had no bedside consoles equipped with an ETRF satisfied the endotoxin level and bacterial count of an ultrapure dialysate, respectively. These results suggest that the technology for purifying the dialysate has advanced to ensure the purification in the entire dialysate supply system. On the other hand, data suggest that the dialysate can be contaminated by the erroneous handling of ETRFs in some cases.

Endotoxin level and bacterial count in dialysate

According to the JSDT guidelines on dialysate quality control standards, the use of an ultrapure

TABLE 20. *Comparison between HD and HDF patients*

			Off-line HDF		On-line HDF	
		Facility HD	Postdilution	Predilution	Postdilution	Predilution
Basic background items	Number of patients	182 721	4720	520	1244	16 358
	Male	114 549	2745	314	760	10 153
	Male (%)	62.7	58.2	60.4	61.1	62.1
	Percentage of diabetes	36.9	27.6	26.2	26.4	28.3
	Age *	67.40 ± 12.20	65.2 ± 11.9	64.8 ± 12.0	64.4 ± 12.3	63.6 ± 12.2
	Dialysis vintage (years) *	8.81 ± 6.88	13.9 ± 9.6	14.1 ± 9.3	12.4 ± 9.1	11.4 ± 8.6
	Post dialysis body weight (male) *	59.2 ± 11.89	59.4 ± 11.9	59.4 ± 12.3	61.0 ± 11.9	61.2 ± 12.1
	Post dialysis body weight (female) *	47.8 ± 10.30	47.2 ± 9.5	46.9 ± 9.9	48.0 ± 10.3	48.9 ± 9.9
Items related to urea kinetics	dialysis time (minute) *	241.2 ± 30.0	247.7 ± 29.2	247.4 ± 28.2	244.1 ± 30.9	250.5 ± 30.5
	Blood flow rate (mL/min) *	206.8 ± 34.1	211.3 ± 36.4	211.0 ± 35.4	221.5 ± 39.1	230.8 ± 42.9
	Kt/V (male) *	1.39 ± 0.25	1.43 ± 0.26	1.41 ± 0.25	1.43 ± 0.28	1.46 ± 0.28
	Kt/V (female) *	1.61 ± 0.31	1.67 ± 0.31	1.62 ± 0.28	1.69 ± 0.31	1.72 ± 0.33
	normalized protein catabolic rate (male) *	0.86 ± 0.17	0.87 ± 0.17	0.85 ± 0.17	0.86 ± 0.18	0.88 ± 0.17
	normalized protein catabolic rate (female) *	0.89 ± 0.19	0.90 ± 0.18	0.91 ± 0.19	0.91 ± 0.19	0.92 ± 0.18
Items related to nutrition	Serum albumin (g/dL) *	3.62 ± 0.42	3.58 ± 0.44	3.57 ± 0.46	3.59 ± 0.40	3.66 ± 0.36
	Serum CRP level (mg/dL) *	0.63 ± 1.88	0.76 ± 2.12	0.68 ± 1.91	0.51 ± 1.37	0.50 ± 1.59
	Predialysis serum creatinine (male) *	11.10 ± 2.81	11.20 ± 2.86	11.25 ± 2.79	11.43 ± 2.79	11.68 ± 2.70
	Predialysis serum creatinine (female) *	9.21 ± 2.36	9.19 ± 2.18	9.39 ± 2.20	9.46 ± 2.18	9.74 ± 2.15
	Percent creatinine generation rate *	99.19 ± 26.09	99.17 ± 25.01	99.05 ± 24.90	100.50 ± 24.62	103.44 ± 23.62
Items related to CKD-MBD	Predialysis serum calcium (mg/dL) *	9.26 ± 0.76	9.33 ± 0.84	9.32 ± 0.78	9.29 ± 0.76	9.23 ± 0.75
	Predialysis serum phosphorus (mg/dL) *	5.25 ± 1.45	5.26 ± 1.48	5.28 ± 1.54	5.36 ± 1.52	5.45 ± 1.44
	Intact PTH level (pg/mL) *	169.9 ± 164.1	168.3 ± 158.9	182.3 ± 213.8	178.0 ± 149.8	176.5 ± 168.3
	Predialysis serum total cholesterol (mg/dL) *	155.7 ± 35.2	157.5 ± 36.0	153.0 ± 38.4	165.6 ± 38.5	160.3 ± 34.7
Items related to anemia	Predialysis hemoglobin (g/dL) *	10.69 ± 1.23	10.68 ± 1.27	10.79 ± 1.27	10.90 ± 1.29	10.84 ± 1.19

Only patients who had undergone dialysis three times per week for 2 years or more were targeted. The objective patients' number is different between each item because the number of patients who had necessary data for tabulation is different between each item. *: mean ± S.D.

dialysate is recommended for all dialysis methods. As mentioned above, an ultrapure dialysate is defined as having an endotoxin level <0.001 EU/mL (lower than the detection limit) and a bacterial count <0.1 cfu/mL (11). Among the 4235 facilities that had at least one bedside console, 3821 provided data on both the endotoxin level and bacterial count in the dialysate, among which, 2325 satisfied the above standards for an ultrapure dialysate. They accounted for 60.8% of the facilities that responded to the questions and 54.9% of all the facilities, which showed yearly increases (Table 28).

Change in status of dialysate quality control

In the early 2000s, bacteriological contamination of the dialysate was considered as an important factor affecting the quality of dialysis treatment. Moreover, a concern on the high possibility of bacterial contamination of multipatient dialysate supply systems widely adopted in Japan was raised by overseas researchers. In response to this, the survey of the endotoxin level and bacterial count in the dialysate started in 2006. The results were used as the basis for revising the JSDT dialysate quality control standards in 2008 and setting additional points given to facilities that appropriately control the dialysate quality in 2010 and 2012 (10–12). Such a large-scale survey on the dialysate quality has been carried out only in Japan. With the above historical background, how the status of bacteriological contamination of the dialysate changed between 2006 and 2013 is reviewed below (3,6,9,13–16).

According to the JSDT guidelines on dialysate quality control standards, the endotoxin level and bacterial count in the dialysate should be measured

TABLE 21. *Frequencies of endotoxin level measurement and measured endotoxin levels in dialysate (EU/mL) (for facilities with the number of bedside consoles ≥1)*

Endotoxin concentration in dialysate (EU/mL)	None	Every day	Every week	Every 2 weeks	Every month	Several times per year	Once a year	Subtotal	Unspecified	No information available	Total
<0.001		17	116	201	2117	277	233	2961	2		2963
(%)		(0.6)	(3.9)	(6.8)	(71.5)	(9.4)	(7.9)	(100.0)			
0.001≦0.01		3	22	27	413	96	46	607			607
(%)		(0.5)	(3.6)	(4.4)	(68.0)	(15.8)	(7.6)	(100.0)			
0.01≦0.05		1	10	5	157	39	29	241	1		242
(%)		(0.4)	(4.1)	(2.1)	(65.1)	(16.2)	(12.0)	(100.0)			
0.05≦0.1		2	2	4	55	15	5	83			83
(%)		(2.4)	(2.4)	(4.8)	(66.3)	(18.1)	(6.0)	(100.0)			
0.1≦0.25				4	40	8	9	61			61
(%)				(6.6)	(65.6)	(13.1)	(14.8)	(100.0)			
0.25≦0.5				1	16	6	4	27	2		29
(%)				(3.7)	(59.3)	(22.2)	(14.8)	(100.0)			
≥0.5				2	17	1	2	22			22
(%)				(9.1)	(77.3)	(4.5)	(9.1)	(100.0)			
Subtotal		23	150	244	2815	442	328	4002	5		4007
(%)		(0.6)	(3.7)	(6.1)	(70.3)	(11.0)	(8.2)	(100.0)			
Unspecified	73			1	4	8	7	93	55		148
(%)	(78.5)			(1.1)	(4.3)	(8.6)	(7.5)	(100.0)			
No information available	71				1			72	5	3	80
(%)	(98.6)				(1.4)			(100.0)			
Total	144	23	150	245	2820	450	335	4167	65	3	4235
(%)	(3.5)	(0.6)	(3.6)	(5.9)	(67.7)	(10.8)	(8.0)	(100.0)			

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

TABLE 22. *Frequencies of bacterial count measurement and measured bacterial count in dialysate (cfu/mL) (for facilities with the number of bedside consoles ≥1)*

Bacterial counts in dialysate (cfu/mL)	None	Every day	Every week	Every two week	Every month	Several times per year	Once a year	Subtotal	Unspecified	No information available	Total
<0.1		11	91	179	1794	248	242	2565	5		2570
(%)		(0.4)	(3.5)	(7.0)	(69.9)	(9.7)	(9.4)	(100.0)			
0.1~		1	16	34	395	60	45	551	1		552
(%)		(0.2)	(2.9)	(6.2)	(71.7)	(10.9)	(8.2)	(100.0)			
1~		1	9	20	325	63	38	456	1		457
(%)		(0.2)	(2.0)	(4.4)	(71.3)	(13.8)	(8.3)	(100.0)			
10~			1	9	142	23	30	205			205
(%)			(0.5)	(4.4)	(69.3)	(11.2)	(14.6)	(100.0)			
100～		1	3	2	32	8		46			46
(%)		(2.2)	(6.5)	(4.3)	(69.6)	(17.4)		(100.0)			
Subtotal		14	120	244	2688	402	355	3823	7		3830
(%)		(0.4)	(3.1)	(6.4)	(70.3)	(10.5)	(9.3)	(100.0)			
Unspecified	149			1	23	13	6	192	81		273
(%)	(77.6)			(0.5)	(12.0)	(6.8)	(3.1)	(100.0)			
No information available	121				1			122	6	4	132
(%)	(99.2)				(0.8)			(100.0)			
Total	270	14	120	245	2712	415	361	4137	94	4	4235
(%)	(6.5)	(0.3)	(2.9)	(5.9)	(65.6)	(10.0)	(8.7)	(100.0)			

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

at least once a month, the use of an ultrapure dialysate is recommended for all dialysis methods, and the use of a standard dialysate should be the minimum necessary measure.

The percentage of facilities that measured the endotoxin level in the dialysate at least once a month was 36.0% in 2009, increased to 70.6% in 2010 because of the revision of the medical service fees, and continued to gradually increase to 77.7% in 2013 (Table 29). The measured endotoxin level in the dialysate yearly decreased; 73.9% of the facilities achieved the endotoxin level of an ultrapure dialysate (<0.001 EU/mL) and 95.1% of the facilities achieved the endotoxin level of a standard

TABLE 23. *Types of medium used for cultivation of bacteria in dialysate and volumes of dialysate samples for measurement of bacterial count (for facilities with the number of bedside consoles ≥1)*

Volume of sample for measurement of bacterial count in dialysate (ml)	General agar medium	R2A medium †	TGEA medium‡	Blood agar medium	TSA medium§	Other media	Subtotal	Unspecified	No information available	Total
<1	44	183	28	2	3	10	270	24	1	295
(%)	(16.3)	(67.8)	(10.4)	(0.7)	(1.1)	(3.7)	(100.0)			
1 ≦ 10	79	408	32	7	4	13	543	45	2	590
(%)	(14.5)	(75.1)	(5.9)	(1.3)	(0.7)	(2.4)	(100.0)			
10 ≦ 50	83	672	299	3	7	86	1150	31	1	1182
(%)	(7.2)	(58.4)	(26.0)	(0.3)	(0.6)	(7.5)	(100.0)			
50 ≦ 100	42	610	547	3	8	79	1289	21		1310
(%)	(3.3)	(47.3)	(42.4)	(0.2)	(0.6)	(6.1)	(100.0)			
100 ≦ 500	25	257	134		5	20	441	6	1	448
(%)	(5.7)	(58.3)	(30.4)		(1.1)	(4.5)	(100.0)			
500≦ 1000		8	5				13	1		14
(%)		(61.5)	(38.5)				(100.0)			
1000 ≦ 10 000		5	5			1	11	1		12
(%)		(45.5)	(45.5)			(9.1)	(100.0)			
≥ 10 000		1	1			1	3			3
(%)		(33.3)	(33.3)			(33.3)	(100.0)			
Subtotal	273	2144	1051	15	27	210	3720	129	5	3854
(%)	(7.3)	(57.6)	(28.3)	(0.4)	(0.7)	(5.6)	(100.0)			
Unspecified		4					4	246		250
(%)		(100.0)					(100.0)			
No information available									131	131
(%)										
Total	273	2148	1051	15	27	210	3724	375	136	4235
(%)	(7.3)	(57.7)	(28.2)	(0.4)	(0.7)	(5.6)	(100.0)			

†R2A medium: Reasoner's No. 2 agar medium. ‡TGEA medium: Tryptone glucose extract agar medium. §TSA medium: Trypticase soy agar medium. Values in parentheses under each figure represent the percentage relative to the total in each row.

TABLE 24. *Numbers of facilities that used or did not use ETRF (%) (for facilities with the number of bedside consoles ≥1)*

	With ETRF	Without ETRF	Subtotal	No information available	Total
Number of facilities	4037	193	4230	5	4235
(%)	(95.4)	(4.6)	(100.0)		

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

dialysate (<0.050 EU/mL) (Table 30). In the 2008 survey, the measurement unit for the endotoxin level in the dialysate was changed from EU/L to EU/mL in accordance with international standards. However, many errors resulting from the misunderstanding of the measurement unit were found in the responses. Therefore, the measured endotoxin level in the dialysate obtained in the 2008 survey was excluded from the tabulation targets here.

TABLE 25. *Numbers of bedside consoles equipped with and without ETRF in different facilities classified by status of ETRF installation (for facilities with the number of bedside consoles ≥1 that responded to corresponding questions)*

	Facility status of ETRF installation								
Numbers of bedside consoles	More than one bedside console with ETRF in the facility	(column %)	No bedside consoles with ETRF in the facility	(column %)	Subtotal	(column %)	No information available	Total	(column %)
Number of bedside consoles with ETRF	110 218	(88.8)	0	(0.0)	110 218	(86.1)	0	110 218	(86.0)
Number of bedside consoles without ETRF	13 944	(11.2)	3906	(100.0)	17 850	(13.9)	82	17 932	(14.0)
Total	124 162	(100.0)	3906	(100.0)	128 068	(100.0)	82	128 150	(100.0)

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

TABLE 26. *Measured endotoxin levels in dialysate (EU/mL) in facilities that used and did not use ETRF during sampling of dialysate (for facilities with the number of bedside consoles ≥1)*

With or without ETRF when the dialysate 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	420	130	64	19	18	10	3	664	65	21	750
(%)	(63.3)	(19.6)	(9.6)	(2.9)	(2.7)	(1.5)	(0.5)	(100.0)			
With ETRF	2522	472	177	62	43	17	17	3310	30	2	3342
(%)	(76.2)	(14.3)	(5.3)	(1.9)	(1.3)	(0.5)	(0.5)	(100.0)			
Subtotal	2942	602	241	81	61	27	20	3974	95	23	4092
(%)	(74.0)	(15.1)	(6.1)	(2.0)	(1.5)	(0.7)	(0.5)	(100.0)			
Unspecified	20	5	1	2		2	2	32	52	7	91
(%)	(62.5)	(15.6)	(3.1)	(6.3)		(6.3)	(6.3)	(100.0)			
No information available	1							1	1	50	52
(%)	(100.0)							(100.0)			
Total	2963	607	242	83	61	29	22	4007	148	80	4235
(%)	(73.9)	(15.1)	(6.0)	(2.1)	(1.5)	(0.7)	(0.5)	(100.0)			

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

TABLE 27. *Measured bacterial counts in dialysate (cfu/mL) in facilities that used and did not use ETRF during sampling of dialysate (for facilities with the number of bedside consoles ≥1)*

With or without ETRF when the dialysate sampled	<0.1	0.1~	1~	10~	100~	Subtotal	Unspecified	No information available	Total
Without ETRF	349	102	104	53	15	623	95	32	750
(%)	(56.0)	(16.4)	(16.7)	(8.5)	(2.4)	(100.0)			
With ETRF	2205	445	349	150	30	3179	121	42	3342
(%)	(69.4)	(14.0)	(11.0)	(4.7)	(0.9)	(100.0)			
Subtotal	2554	547	453	203	45	3802	216	74	4092
(%)	(67.2)	(14.4)	(11.9)	(5.3)	(1.2)	(100.0)			
Unspecified	15	5	4	2	1	27	56	8	91
(%)	(55.6)	(18.5)	(14.8)	(7.4)	(3.7)	(100.0)			
No information available	1					1	1	50	52
(%)	(100.0)					(100.0)			
Total	2570	552	457	205	46	3830	273	132	4235
(%)	(67.1)	(14.4)	(11.9)	(5.4)	(1.2)	(100.0)			

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

The measurement of the bacterial count in the dialysate was not included in the JSDT guidelines on dialysate quality control standards in 2005 (17). Owing to the revision of the guidelines in 2008, it was recommended to measure the bacterial count at least once a month similarly to the endotoxin level (11). In 2007 or before, only 10–19% of the facilities measured the bacterial count at least once a month. In 2010, however, the percentage of such facilities rapidly increased to 67.8% because of the revision of the medical service fees in the year and it gradually increased to reach 74.7% in 2013 (Table 31) (12). The percentage of facilities that satisfied the bacterial count of an ultrapure dialysate (<0.1 cfu/mL) gradually increased to reach 67.1% in 2013. The percentage of facilities that satisfied the bacterial count of a standard dialysate (<100 cfu/mL) was 98.8% (Table 32).

Items associated with diabetes

In accordance with the aging of dialysis patients and the change in the lifestyle of the general population, an increasing number of dialysis patients who did not have diabetic nephropathy as the primary disease developed diabetes, and the number of dialysis patients with a history of diabetes also increased. The development and a history of diabetes are risk factors for various diseases such as heart and blood vessel diseases. In 2013, the history of diabetes was added to the basic survey items to identify patients who have a potential risk factor for diabetes in addition to diabetic nephropathy.

The explanation for the question regarding the history of diabetes given in the manual for the questionnaire used in this survey is as follows.

TABLE 28. *Measured endotoxin levels (EU/mL) and bacterial counts (cfu/mL) in dialysate in different facilities (for facilities with the number of bedside consoles ≥1)*

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	2325	176	36	15	6	1	6	2565	4	1	2570
(%)	(90.6)	(6.9)	(1.4)	(0.6)	(0.2)	(0.0)	(0.2)	(100.0)			
0.1~	292	196	36	16	5		3	548	3	1	552
(%)	(53.3)	(35.8)	(6.6)	(2.9)	(0.9)		(0.5)	(100.0)			
1~	168	142	85	24	27	5	6	457			457
(%)	(36.8)	(31.1)	(18.6)	(5.3)	(5.9)	(1.1)	(1.3)	(100.0)			
10~	67	49	52	15	11	8	3	205			205
(%)	(32.7)	(23.9)	(25.4)	(7.3)	(5.4)	(3.9)	(1.5)	(100.0)			
100~	10	6	9	5	4	8	4	46			46
(%)	(21.7)	(13.0)	(19.6)	(10.9)	(8.7)	(17.4)	(8.7)	(100.0)			
Subtotal	2862	569	218	75	53	22	22	3821	7	2	3830
(%)	(74.9)	(14.9)	(5.7)	(2.0)	(1.4)	(0.6)	(0.6)	(100.0)			
Unspecified	72	26	18	5	6	5		132	138	3	273
(%)	(54.5)	(19.7)	(13.6)	(3.8)	(4.5)	(3.8)		(100.0)			
No information available	29	12	6	3	2	2		54	3	75	132
(%)	(53.7)	(22.2)	(11.1)	(5.6)	(3.7)	(3.7)		(100.0)			
Total	2963	607	242	83	61	29	22	4007	148	80	4235
(%)	(73.9)	(15.1)	(6.0)	(2.1)	(1.5)	(0.7)	(0.5)	(100.0)			

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

TABLE 29. *Change in frequency of measurement of endotoxin levels in dialysate*

Frequency of measurement (per month)	2006	2007	2008	2009	2010	2011	2012	2013
≥1	953	1153	1253	1373	2810	2914	3141	3238
(%)	(27.3)	(31.5)	(33.1)	(36.0)	(70.6)	(71.9)	(76.3)	(77.7)
<1	2535	2511	2531	2436	1170	1137	977	929
(%)	(72.7)	(68.5)	(66.9)	(64.0)	(29.4)	(28.1)	(23.7)	(22.3)
Subtotal	3488	3664	3784	3809	3980	4051	4118	4167
(%)	(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
No information available	312	179	53	48	52	27	8	3
Total	3985	4052	4081	4050	4124	4177	4203	4235

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

TABLE 30. *Change in endotoxin levels in dialysate*

Endotoxin levels in dialysate (EU/mL)	2006	2007	2008	2009	2010	2011	2012	2013
<0.001	817	1688	—	1865	2343	2549	2787	2963
(%)	(29.8)	(53.0)	—	(56.1)	(62.1)	(66.0)	(70.7)	(73.9)
0.001≦0.05	1627	1295	—	933	1115	1042	938	849
(%)	(59.2)	(40.6)	—	(28.1)	(29.6)	(27.0)	(23.8)	(21.2)
≥0.05	302	203	—	527	314	271	216	195
(%)	(11.0)	(6.4)	—	(15.8)	(8.3)	(7.0)	(5.5)	(4.9)
合計	2746	3186	—	3325	3772	3862	3941	4007
(%)	(100.0)	(100.0)	—	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
不明	-	215	—	253	105	112	197	148
記載なし	1239	651	—	472	247	203	65	80
総計	3985	4052	—	4050	4124	4177	4203	4235

※The measured endotoxin level in the dialysate obtained in the 2008 survey was excluded from the tabulation targets because of errors resulting from the misunderstanding of the measurement unit.

Please indicate whether the patient has been diagnosed as having diabetes by the end of December 2013 (not limited to the period between January and December 2013). If the patient has been diagnosed as having diabetes including the period before the start of

TABLE 31. *Change in frequency of measurement of bacterial count in dialysate*

Frequency of measurement (per month)	2006	2007	2008	2009	2010	2011	2012	2013
≥1	371	580	751	934	2649	2794	3018	3091
(%)	(11.5)	(16.9)	(20.8)	(25.8)	(67.8)	(70.0)	(73.7)	(74.7)
<1	2857	2861	2856	2693	1260	1196	1077	1046
(%)	(88.5)	(83.1)	(79.2)	(74.2)	(32.2)	(30.0)	(26.3)	(25.3)
Subtotal	3228	3441	3607	3627	3909	3990	4095	4137
(%)	(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
No information available	371	199	56	56	57	28	8	4
Total	3985	4052	4081	4050	4124	4177	4203	4235

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

TABLE 32. *Change in bacterial count in dialysate*

Bacterial counts (cfu/mL)	2006	2007	2008	2009	2010	2011	2012	2013
<0.1	508	750	915	1123	1819	2017	2397	2570
(%)	(48.4)	(47.9)	(50.7)	(54.5)	(53.1)	(56.4)	(63.8)	(67.1)
0.1≦100	509	775	847	901	1542	1498	1305	1214
(Column %)	(48.5)	(49.5)	(46.9)	(43.7)	(45.0)	(41.9)	(34.7)	(31.7)
≥100	32	40	43	38	62	62	55	46
(%)	(3.1)	(2.6)	(2.4)	(1.8)	(1.8)	(1.7)	(1.5)	(1.2)
Subtotal	1049	1565	1805	2062	3423	3577	3757	3830
(%)	(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
No information available	900	1935	1701	1494	485	373	126	132
Total	3985	4052	4081	4050	4124	4177	4203	4235

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

TABLE 33. *Primary diseases of patients with and without history of diabetes (for all dialysis patients)*

Primary disease	Without diabetes	With diabetes	Total	Unspecified	No information available	Total
Chronic glomerulonephritis	71 685	7036	78 721	114	20657	99 492
(%)	(91.1)	(8.9)	(100.0)			
Chronic pyelonephritis	2190	229	2419	3	643	3065
(%)	(90.5)	(9.5)	(100.0)			
Rapidly progressive glomerulonephritis	1558	347	1905	2	512	2419
(%)	(81.8)	(18.2)	(100.0)			
Nephropathy of pregnancy/ pregnancy toxemia	1263	78	1341	3	324	1668
(%)	(94.2)	(5.8)	(100.0)			
Other nephritides that cannot be classified	899	111	1010	5	321	1336
(%)	(89.0)	(11.0)	(100.0)			
Polycystic kidney	8013	518	8531	15	2137	10 683
(%)	(93.9)	(6.1)	(100.0)			
Nephrosclerosis	18754	2797	21 551	40	4978	26 569
(%)	(87.0)	(13.0)	(100.0)			
Malignant hypertension	1790	175	1965	5	533	2503
(%)	(91.1)	(8.9)	(100.0)			
Diabetic nephropathy	37	111 703	111 740		3744	115 484
(%)	(0.0)	(100.0)	(100.0)			
SLE nephritis	1596	215	1811	5	474	2290
(%)	(88.1)	(11.9)	(100.0)			
Amyloidal kidney	302	43	345		108	453
(%)	(87.5)	(12.5)	(100.0)			
Gouty kidney	859	75	934		200	1134
(%)	(92.0)	(8.0)	(100.0)			
Renal failure due to congenital abnormality of metabolism	198	17	215		49	264
(%)	(92.1)	(7.9)	(100.0)			

(Continues)

Table 33. (Continued)

Primary disease	Without diabetes	With diabetes	Total	Unspecified	No information available	Total
Kidney and urinary tract tuberculosis	169	10	179		52	231
(%)	(94.4)	(5.6)	(100.0)			
Kidney and urinary tract stone	423	48	471	1	128	600
(%)	(89.8)	(10.2)	(100.0)			
Kidney and urinary tract tumor	615	79	694		165	859
(%)	(88.6)	(11.4)	(100.0)			
Obstructive urinary tract desease	555	58	613		138	751
(%)	(90.5)	(9.5)	(100.0)			
Myeloma	185	24	209		58	267
(%)	(88.5)	(11.5)	(100.0)			
Hypoplastic kidney	499	25	524		102	626
(%)	(95.2)	(4.8)	(100.0)			
Undetermined	17 391	3250	20 641	74	6065	26 780
(%)	(84.3)	(15.7)	(100.0)			
Reintroduction after transplantation	1526	245	1771	1	409	2181
(%)	(86.2)	(13.8)	(100.0)			
Others	4539	1037	5576	7	1665	7248
(%)	(81.4)	(18.6)	(100.0)			
Subtotal	135 046	128 120	263 166	275	43 462	306 903
(%)	(51.3)	(48.7)	(100.0)			
No information available	2	2	4		18	22
(%)	(50.0)	(50.0)	(100.0)			
Total	135 048	128 122	263 170	275	43 480	306 925
(%)	(51.3)	(48.7)	(100.0)			

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

TABLE 34. *Glycemic control indices of patients with diabetes*

Glycemic control index	HbA1c alone	Glycoalbumin alone	Both of HbA1c and glycoalbumin	Subtotal	No information available	Total
Number of patients	41 396	23 865	23 738	88 999	41 837	130 836
(%)	(46.5)	(26.8)	(26.7)	(100.0)		

*Patients with diabetes are defined as those who satisfy either of the following two conditions:
□ Patients who answered "Yes" to the question regarding the history of diabetes.
□ Patients who answered "Yes" to at least one of the three questions regarding the use or nonuse of insulin, DPP4 inhibitor, and other oral diabetes drugs.

TABLE 35. *HbA1c levels of patients with diabetes*

HbA1c (%)	<3.0	3.0～	3.5～	4.0～	4.5～	5.0～	5.5～	6.0～	6.5～	7.0～	7.5～	8.0～	
Number of patients	13	16	135	1104	5120	10 922	13 705	12 226	8715	5500	3233	1800	
(%)	(0.0)	(0.0)	(0.2)	(1.7)	(7.9)	(16.8)	(21.0)	(18.8)	(13.4)	(8.4)	(5.0)	(2.8)	
HbA1c (%)	8.5～	9.0～	9.5～	10.0～	10.5～	11.0～	11.5～	12.0～	Subtotal	No information available	Total	Mean	S.D.
Number of patients	1096	574	354	202	146	78	50	145	65 134	65 702	130 836	6.19	1.16
(%)	(1.7)	(0.9)	(0.5)	(0.3)	(0.2)	(0.1)	(0.1)	(0.2)	(100.0)				

*Patients with diabetes are defined as those who satisfy either of the following two conditions:
□ Patients who answered "Yes" to the question regarding the history of diabetes.
□ Patients who answered "Yes" to at least one of the three questions regarding the use or nonuse of insulin, DPP4 inhibitor, and other oral diabetes drugs

dialysis, please select "B: Yes". (It is not required to consider the current status of glycemic control.)

In addition, the following note was given in the example for this question within the above manual.

TABLE 36. *Glycoalbumin levels of patients with diabetes*

Glycoalbumin (%)	<10	10～	12～	14～	16～	18～	20～	22～	24～	26～	28～
Number of patients	0	227	1299	4179	7485	9232	8096	6066	3978	2443	1505
(%)	(0.0)	(0.5)	(2.7)	(8.8)	(15.7)	(19.4)	(17.0)	(12.7)	(8.4)	(5.1)	(3.2)

Glycoalbumin (%)	30～	32～	34～	36～	38～	40～	Subtotal	No information available	Total	Mean	S.D.
Number of patients	1022	714	402	290	210	455	47 603	83 233	130 836	21.20	5.33
(%)	(2.1)	(1.5)	(0.8)	(0.6)	(0.4)	(1.0)	(100.0)				

*Patients with diabetes are defined as those who satisfy either of the following two conditions:
□ Patients who answered "Yes" to the question regarding the history of diabetes.
□ Patients who answered "Yes" to at least one of the three questions regarding the use or nonuse of insulin, DPP4 inhibitor, and other oral diabetes drugs

If the patient is registered as a patient with diabetic nephropathy as the primary disease, "B: Yes" is already described. If the patient has a history of diabetes, please select "B: Yes" regardless of the primary disease.

The description, "*If the patient is registered as a patient with diabetic nephropathy as the primary disease*, "*B*: *Yes*" *is already described*," means that "B: Yes" is already printed in the box for the diabetes history in the sheet for patients who are registered as having diabetic nephropathy as the primary disease in the 2012 or earlier survey (for the survey using electronic media; i.e., "B" is already input to the corresponding cell in the Excel spreadsheet). Therefore, respondents were required to strikethrough the printed characters if they needed to select a choice other than "B: Yes" for the patients registered as having diabetic nephropathy as the primary disease.

Patients with a history of diabetes

Table 33 shows the number of patients with and without a history of diabetes for different primary diseases. Almost all the patients who answered diabetic nephropathy as the primary disease answered that they had a history of diabetes. However, 37 patients with diabetic nephropathy as the primary disease answered that they had no history of diabetes. These patients are considered to have made a mistake in the answer to the questions regarding the primary disease or the history of diabetes. To answer "No" to the question regarding the history of diabetes for patients registered as having diabetic nephropathy as the primary disease in the 2012 or earlier survey, respondents were required to strikethrough the printed "B:

TABLE 37. *Use or nonuse of insulin for patients with diabetes*

	Use or nonuse of insulin					
	Nonuse	Use	Subtotal	Unspecified	No information available	Total
Number of patients	64 355	31 713	96 068	674	34 094	130 836
(%)	(67.0)	(33.0)	(100.0)			

*Patients with diabetes are defined as those who satisfy either of the following two conditions:
□ Patients who answered "Yes" to the question regarding the history of diabetes.
□ Patients who answered "Yes" to at least one of the three questions regarding the use or nonuse of insulin, DPP4 inhibitor, and other oral diabetes drugs

TABLE 38. *Use or nonuse of DPP4 inhibitor for patients with diabetes*

	Use or nonuse of DPP4 inhibitor					
	Nonuse	Use	Subtotal	Unspecified	No information available	Total
Number of patients	67 438	25 697	93 135	1030	36 671	130 836
(%)	(72.4)	(27.6)	(100.0)			

*Patients with diabetes are defined as those who satisfy either of the following two conditions:
□ Patients who answered "Yes" to the question regarding the history of diabetes.
□ Patients who answered "Yes" to at least one of the three questions regarding the use or nonuse of insulin, DPP4 inhibitor, and other oral diabetes drugs

TABLE 39. *Use or nonuse of other oral diabetes drugs for patients with diabetes*

	Use or nonuse of other oral diabetes drugs					
	Nonuse	Use	Subtotal	Unspecified	No information available	Total
Number of patients	73 224	19 390	92 614	1148	37 074	130 836
(%)	(79.1)	(20.9)	(100.0)			

*Patients with diabetes are defined as those who satisfy either of the following two conditions:
□ Patients who answered "Yes" to the question regarding the history of diabetes.
□ Patients who answered "Yes" to at least one of the three questions regarding the use or nonuse of insulin, DPP4 inhibitor, and other oral diabetes drugs

Yes" in the sheet before selecting their correct answer, as explained above. Hence, there was little possibility that the respondents answered "No history" for the patients registered as having diabetic nephropathy as the primary disease. Therefore, the above 37 patients were considered to have been newly registered in this survey (new patients started on dialysis in 2013 or patients who were unregistered in the previous survey for some reason and newly registered in this survey).

Among the 128 122 patients with a history of diabetes, 16 417 (12.8%) had a primary disease other than diabetic nephropathy. Among the 151 426 patients who had a primary disease other than diabetic nephropathy, 16 417 (10.8%) had a history of diabetes. The percentages of patients with a history of diabetes for the primary diseases other than diabetic nephropathy were as follows: 18.2% for rapidly progressive glomerulonephritis, 13.8% for the restart of dialysis, 13.0% for nephrosclerosis, and 12.5% for amyloid kidney.

As above, it was clarified in this survey that many patients had a history of diabetes among those who did not have diabetic nephropathy as the primary disease. The history of diabetes should be considered as a factor in future epidemiological analysis of the presence or absence of diabetes.

Current status of measurement of glycemic control index and use of diabetes drugs

The JSDT guidelines "Management of Diabetic Patients on Hemodialysis 2012" recommend that glycoalbumin level, instead of HbA1c level, should be used as a glycemic control index for dialysis patients (18). In this section, the relationships of the presence or absence of diabetes with the glycemic control index and diabetes drugs are examined on the basis of the tabulated results. Patients with diabetes are defined as those who satisfy either of the following two conditions:

- Patients who answered "Yes" to the question regarding the history of diabetes
- Patients who answered "Yes" to at least one of the three questions regarding the use or nonuse of insulin, DPP4 inhibitor, and other oral diabetes drugs

Thus, the presence or absence of diabetes was judged by considering the use of diabetes drugs in addition to the history of diabetes. Note that patients with diabetes are different from those with a history of diabetes.

Table 34 shows the glycemic control indices of 88 999 patients who provided valid answers to the questions regarding HbA1c or glycoalbumin level among 130 836 patients with diabetes. On the survey date at the end of 2013, approximately one year had passed since the publication of the above mentioned JSDT guidelines. Among the 88 999 patients, 26.8% used the glycoalbumin level as a glycemic control index. However, 46.5% still used the HbA1c level alone.

Table 35 shows the HbA1c levels of 65 134 patients with diabetes who provided a valid answer to the question regarding the HbA1c level. The mean HbA1c level of the patients was 6.19%, and the HbA1c level was controlled to less than 7.0% in 79.8% of the patients.

Table 36 shows the glycoalbumin levels of 47 603 patients with diabetes who provided a valid answer to the question regarding the glycoalbumin levels. The mean glycoalbumin level of the patients was 21.20%, and the glycoalbumin levels were controlled to less than 20 and 24% in 47.1 and 76.8% of the patients, respectively.

Most of the oral hypoglycemic drugs including sulfonylurea are contraindicated for patients who undergo maintenance dialysis. Therefore, insulin injection has been basically adopted in the glycemic control of such patients conventionally. Table 37 shows the numbers of patients who used or did not use insulin among the 96 068 patients with diabetes who provided a valid answer to the question regarding the use or nonuse of insulin. The result indicates that 33.0% of the patients with diabetes who underwent maintenance dialysis at the end of 2013 used insulin as a diabetes drug.

TABLE 40. *Current status of PD + HD for different main dialysis methods (for all dialysis patients)*

				Main dialysis method*								
				Facility HD	HDF	Hemo-filtration	Hemo-adsorption	Home HD	PD	Total	(Percentage relative to subtotal in column)	(Percentage relative to total in column)
Combined use of PD and another method	Patients who did not undergo PD (Non-PD patients)	Non-PD + non-catheter patients		263 861	31 336	108	1734	456	0	297 495	(99.9)	(96.9)
		(Percentage relative to total in row)		(88.7)	(10.5)	(0.0)	(0.6)	(0.2)	(0.0)	(100.0)		
		Non-PD + catheter patients**		256	19	0	2	1	0	278	(0.1)	(0.1)
		(Percentage relative to total in row)		(92.1)	(6.8)	(0.0)	(0.7)	(0.4)	(0.0)	(100.0)		
		Total number of non-PD patients		264 117	31 355	108	1736	457	0	297 773	(100.0)	(97.0)
		(Percentage relative to total in row)		(88.7)	(10.5)	(0.0)	(0.6)	(0.2)	(0.0)	(100.0)		
	Patients who underwent PD (PD patients)***	PD only		0	0	0	0	0	7324	7324	(80.3)	(2.4)
		(Percentage relative to total in row)		(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(100.0)	(100.0)		
		Patients who underwent PD and another method (PD + HD patients)	PD + HD once a week	0	0	0	0	0	1503	1503	(16.5)	(0.5)
			(Percentage relative to total in row)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(100.0)	(100.0)		
			PD + HD twice a week	35	4	0	0	0	134	173	(1.9)	(0.1)
			(Percentage relative to total in row)	(20.2)	(2.3)	(0.0)	(0.0)	(0.0)	(77.5)	(100.0)		
			PD + HD three times a week	27	5	0	0	0	2	34	(0.4)	(0.0)
			(Percentage relative to total in row)	(79.4)	(14.7)	(0.0)	(0.0)	(0.0)	(5.9)	(100.0)		
			PD + HD four times a week	0	0	0	0	0	0	0	(0.0)	(0.0)
			(Percentage relative to total in row)									
			PD + HD at other frequencies	8	4	0	2	1	72	87	(1.0)	(0.0)
			(Percentage relative to total in row)	(9.2)	(4.6)	(0.0)	(2.3)	(1.1)	(82.8)	(100.0)		
			Total number of PD + HD patients	70	13	0	2	1	1711	1797	(19.7)	(0.6)
			(Percentage relative to total in row)	(3.9)	(0.7)	(0.0)	(0.1)	(0.1)	(95.2)	(100.0)		
		Total number of PD patients		70	13	0	2	1	9035	9121	(100.0)	(3.0)
		(Percentage relative to total in row)		(0.8)	(0.1)	(0.0)	(0.0)	(0.0)	(99.1)	(100.0)		
	Total number of non-PD and PD patients			264 187	31 368	108	1738	458	9035	306 894		(100.0)
	(Percentage relative to total in row)			(86.1)	(10.2)	(0.0)	(0.6)	(0.1)	(2.9)	(100.0)		
	Unspecified			21	2	0	1	1	2	27		
	(Percentage relative to total in row)			(77.8)	(7.4)	(0.0)	(3.7)	(3.7)	(7.4)	(100.0)		
	No information available			3	1	0	0	0	0	4		
	(Percentage relative to total in row)			(75.0)	(25.0)	(0.0)	(0.0)	(0.0)	(0.0)	(100.0)		
Total				264 211	31 371	108	1739	459	9037	306 925		
(Percentage relative to total in row)				(86.1)	(10.2)	(0.0)	(0.6)	(0.1)	(2.9)	(100.0)		

*: Main dialysis methods are classified on the basis of the classification codes for dialysis methods that have conventionally been used in the annual survey. **: 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. ***: 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. 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.

TABLE 41. *Current status of PD + HD for different PD vintages (year)*

Combined use of PD and another method	PD vintage (year)							Subtotal	No information available	Total	Mean	S.D.
	<1	1〜	2〜	4〜	8〜	10〜	15〜					
Non-PD + non-catheter patients									297 495	297 495		
(%)										(96.9)		
PD only	1182	1073	1197	902	119	82	31	4586	2738	7324	2.82	2.79
(%)	(96.3)	(91.0)	(84.1)	(68.5)	(52.0)	(41.6)	(40.8)	(81.2)	(0.9)	(2.4)		
Non-PD + catheter patients				1				1	277	278	5.00	
(%)				(0.1)				(0.0)		(0.1)		
PD + HD once a week	40	91	186	353	86	88	35	879	624	1503	5.87	4.14
(%)	(3.3)	(7.7)	(13.1)	(26.8)	(37.6)	(44.7)	(46.1)	(15.6)	(0.2)	(0.5)		
PD + HD twice a week	2	4	19	44	16	15	7	107	66	173	7.18	4.03
(%)	(0.2)	(0.3)	(1.3)	(3.3)	(7.0)	(7.6)	(9.2)	(1.9)	(0.0)	(0.1)		
PD + HD three times a week	1	1	4	1	2	3		12	22	34	5.85	3.90
(%)	(0.1)	(0.1)	(0.3)	(0.1)	(0.9)	(1.5)		(0.2)	(0.0)	(0.0)		
PD + HD four times a week												
(%)												
PD + HD at other frequencies	3	9	17	16	6	9	3	63	24	87	5.92	4.68
(%)	(0.2)	(0.8)	(1.2)	(1.2)	(2.6)	(4.6)	(3.9)	(1.1)	(0.0)	(0.0)		
Unspecified		1						1	26	27	1.00	
(%)		(0.1)						(0.0)	(0.0)	(0.0)		
Subtotal	1228	1179	1423	1317	229	197	76	5649	301 272	306 921	3.42	3.34
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)		
No information available									4	4		
Total	1228	1179	1423	1317	229	197	76	5649	301 276	306 925	3.42	3.34

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

Since 2009, a DPP4 inhibitor has become clinically available as an oral hypoglycemic drug for dialysis patients. Table 38 shows the numbers of patients who used or did not use the DPP4 inhibitor among the 93 135 patients with diabetes who provided a valid answer to the question regarding the use or nonuse of DPP4 inhibitor. It was clarified that 27.6% of the patients with diabetes used the DPP4 inhibitor.

Table 39 shows the numbers of patients who used or did not use an oral diabetes drug other than the DPP4 inhibitor. The other oral diabetes drugs include an α-glucosidase inhibitor. The result indicates that the other oral diabetes drugs were used in 20.9% of the 92 614 patients who provided a valid answer to the question regarding the use or nonuse of the other oral diabetes drugs.

Items associated with PD

The results of the facility survey shown in Table 1 revealed that the number of PD patients was 9392 at the end of 2013. Moreover, the number of patients who had a peritoneal catheter for PD but underwent a non-PD method (most of whom are considered to undergo only peritoneal lavage) was 292. The number of new patients who were started on PD in 2013 but introduced to another method in the same year was 174.

The detailed results of the survey items associated with PD are reported separately from this report. Therefore, only a basic summary of the results is included in this report.

Current status of PD + HD for different main dialysis methods

Table 40 shows the current status of PD + HD and the main dialysis method, obtained from the patient survey of all the target facilities. The main dialysis methods are categorized on the basis of the classification codes for dialysis methods that have conventionally been used in the patient survey.

Among the 306 894 patients who provided valid answers to questions regarding the current status of PD + HD in the patient survey (excluding patients who answered "unspecified" and provided no information), 297 773 (97.0%) underwent a non-PD method alone such as HD (i.e., non-PD patients)

and 9121 (3.0%) underwent PD alone or with another method such as HD.

Among the 297 773 patients who answered "non-PD method only" to questions regarding the current status of PD + HD, 278 patients had a peritoneal catheter for PD (i.e., non-PD + catheter patients). Most of these patients were introduced to HD from PD but did not have their PD catheter removed. There was also one non-PD + catheter patient among the 458 patients who underwent HD at home.

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 the JSDT Statistical Survey Committee does not intend to standardize the above definition.

The number of patients who answered "PD only" to questions regarding the current status of PD + HD was 7324, which was 2.4% of the 306 894 patients who provided valid answers to the above questions and 80.3% of the 9121 patients who underwent PD alone or with another method. Moreover, the number of patients who answered "PD + HD" was 1797, which was 0.6% of the above mentioned 306 894 patients and 19.7% of the above mentioned 9121 patients.

Among the 1797 patients who answered "PD + HD", 1503 (83.6%) underwent a non-PD method such as HD once a week; 173 (9.6%) underwent a non-PD method twice a week; 34 (1.9%) underwent a non-PD method three times a week; and none of the patients underwent a non-PD method four times a week. There were also 87 patients (4.8%) who answered "PD + HD" in forms other than those mentioned above. Although the number of PD + HD patients in 2013 (1797) was similar to that in the previous year (1788), the percentage of patients who underwent a non-PD method at least twice a week decreased and that of patients who underwent a non-PD method once a week increased in 2013 (in 2012: once a week, 79.9%; twice a week, 12.2%; three times a week, 3.1%).

The main dialysis methods of the 1797 patients who answered "PD + HD" varied from facility HD to PD (shaded area in Table 40). In this survey, the selection of the classification code for the main dialysis method for these patients was left to the subjective discretion of the respondents. Therefore, the patient distribution of the main dialysis methods among the 1797 PD + HD or HDF patients, as determined in this survey (shaded area in the table), strongly depended on the subjective discretion of the respondents.

In this survey report on the current status of PD + HD, patients who underwent PD in some form were tentatively classified and counted as patients who underwent PD in the analysis of the survey data. Note that the JSDT Statistical Survey Committee does not intend to standardize the above definition.

Incidentally, the main dialysis methods (surveyed on the basis of the conventional classification codes) and the current status of PD + HD were separately surveyed. Therefore, there would be contradicting responses in these two survey items. For example, some patients would answer "PD" as the main dialysis method but answer "non-PD method only" to questions regarding the current status of PD + HD. For facilities that responded to the questionnaires using the electronic medium, such contradicting responses were avoided because a macro that raised a warning to potentially contradictory responses was incorporated into the Excel spreadsheet. However, this method was not applicable to facilities that used the paper medium only. Therefore, the staff of the JSDT Statistical Survey Committee Office manually checked each of the responses on the collected survey sheets and corrected any contradictory responses by directly asking the target facilities.

Current status of PD + HD or HDF for different PD vintages

The survey of the PD vintage of PD patients started at the end of 2009. The target patients were only those who underwent PD as of the survey date.

Table 41 shows the current status of PD + HD for different PD vintages. The percentage of PD + HD patients increased with PD vintage: <1 year, 3.7%; ≥1–<2 years, 8.9%; ≥2–<4 years, 15.9%; ≥4–<8 years, 31.4%; ≥8–<10 years, 48.0%; ≥10–<15 years, 58.4%; and ≥15 years, 59.2%.

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Peritoneal Dialysis Registry With 2013 Survey Report

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Abstract: Since 2009, the peritoneal dialysis (PD) registry has been carried out as part of the annual nationwide survey conducted by the Statistical Survey Committee of the Japanese Society for Dialysis Therapy with the cooperation of the Japanese Society for Peritoneal Dialysis. In this study, the current status of PD patients is reported on the basis of the results of the survey conducted at the end of 2013. The subjects were PD patients who lived in Japan and participated in the 2013 survey. Descriptive analysis was performed for various items including the current status of the combined use of PD and another dialysis method such as hemodialysis (HD) or hemodiafiltration (HDF), the method of exchanging dialysate, the use of an automated peritoneal dialysis (APD) machine, and the incidences of peritonitis and catheter exit-site infection. From the results of the facility survey in 2013, the number of PD patients was 9392, a decrease of 122 from that in 2012. Among the entire dialysis patient population, 3.0% were PD patients, a decrease of 0.1%. Among the studied patients, 292 had a peritoneal catheter and underwent peritoneal lavage, 174 were started on PD in 2013 but introduced to other blood purification methods in 2013, and 1920 underwent both PD and another dialysis method such as HD or HDF. The percentage of patients who underwent PD and another dialysis method increased with the number of years on PD: <1 year, 3.5%; 1 to < 2 years, 8.4%; 2 to < 4 years, 15.3%; 4 to < 6 years, 27.1%; 6 to < 8 years, 39.3%; 8 to < 10 years, 47.1%; and ≥ 10 years, 57.5%. The percentage of PD patients for whom the dialysate was completely manually exchanged was 31.6%, whereas the percentages of PD patients who used a bag-exchange device based on ultraviolet-light irradiation and that based on thermal sterile joint systems were 52.1 and 14.9%, respectively. The mean incidence of peritonitis was 0.22 per patient per year (once per 54.5 patients per month). The mean incidence of catheter exit-site infection was 0.34 per patient per year (once per 35.3 patients per month). **Key Words:** Catheter exit-site infection, Dialysate exchange method, Peritoneal dialysis registry, Peritonitis.

The Japanese Society for Dialysis Therapy (JSDT) has been conducting an annual statistical survey on the current status of regular dialysis treatment in Japan at the end of each year since 1968. Since 1983, survey items related to all dialysis patients treated in dialysis facilities that participated in the surveys have been included, and the obtained data have been registered in an electronic database (1).

In the 2009 annual survey, JSDT started the peritoneal dialysis (PD) registry survey of patients who underwent PD in cooperation with the Japanese Society for Peritoneal Dialysis (2). The targets of the PD registry survey include facilities that offer PD alone, which were not targeted in the conventional annual statistical surveys. The results of the PD registry survey have been reported annually in the sections "Current status of PD treatment" and "Items associated with PD" of the "Overview of Regular Dialysis Treatment in Japan" compiled by the Subcommittee of Statistical Analysis of the Statistical Survey Committee, JSDT. In 2012, the results of the PD registry survey were separated from the above overview and independently summarized in the PD registry survey report.

Here, the data obtained from the 2013 PD registry survey are summarized in terms of the following six items:

I Current status of PD patients
II Urine output, volume of water removed by PD, and total volume of water removed
III Dialysate/plasma creatinine (D/P Cr) ratio in peritoneal equilibration test (PET)

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IV Kt/V for residual renal function (residual renal Kt/V), Kt/V for PD (PD Kt/V), and total Kt/V
V Peritonitis and catheter exit-site infections
VI Encapsulating peritoneal sclerosis (EPS)

PATIENTS AND METHODS

Methods

This survey was conducted by sending questionnaires to individual dialysis facilities. A total of 4325 facilities participating in this survey were either member facilities of JSDT, nonmember facilities offering regular hemodialysis (HD), or nonmember facilities offering PD but not HD as of 31 December 2013. The number of participating facilities increased by 46 from the previous year (4279 facilities) (3). Among the 4325 facilities, 1012 treated PD patients. Universal serial bus (USB) memory devices that stored electronic spreadsheets in Microsoft Excel or paper questionnaires were sent to and collected from the individual dialysis facilities mainly by postal mail; for some facilities, the questionnaires were sent and collected by fax. In the 2013 survey, two sets of questionnaires were used. One was for the facility survey, which included items on individual dialysis facilities, such as the numbers of patients and staff members. The other was for the patient survey, which included items on individual dialysis patients, such as their demographic background, treatment conditions, and outcome of treatment. For details of these surveys, refer to "Overview of Regular Dialysis Treatment in Japan (as of 31 December 2013)" (4).

The deadline for acceptance of responses was the end of January 2014. The acceptance of responses after this deadline ended on 28 April 2014 for the preparation of "Illustrated Overview of Regular Dialysis Treatment in Japan" (hereafter referred to as the Illustrated Report) and on 1 September 2014 for the preparation of the "Overview of Regular Dialysis Treatment in Japan: the CD-ROM Report" (hereafter referred to as the CD-ROM Report) (4,5). For the CD-ROM Report, the number of facilities that responded to the facility survey was 4268 (98.7%), and the number of those that responded to both the facility and patient surveys was 4177 (96.6%). Moreover, the number of facilities that completed the questionnaires using the electronic medium was 3698 (86.6%), which was higher than that in the 2012 survey (3654 facilities, 86.2%). This increase contributed to the accurate and simplified analysis of survey data. Note that this report is based on the data tabulated for the CD-ROM Report (5).

SURVEY ITEMS

The 2013 survey included the following survey items. For the items included in the previous surveys, refer to the members-only pages of the JSDT website (http://www.jsdt.or.jp/).

1. Facility survey items
   - Name of facility, contact numbers (telephone and fax), name of representative (doctor), and name of respondent
   - Year and month when the facility started offering dialysis treatment
   - Number of bedside consoles, total number of patients who can simultaneously receive dialysis, and maximum number of admissible patients
   - Number of full-time and part-time workers engaged in dialysis treatment (*e.g.*, doctors, nurses, clinical engineers, nutritionists, and case workers)
   - Number of full-time dialysis doctors, presence or absence of part-time dialysis doctors
   - Number of outpatients and inpatients who underwent dialysis (daytime dialysis, nighttime dialysis, home HD, and PD)
   - Total number of patients who underwent dialysis at the end of 2013
   - Number of new patients who were started on dialysis in 2013 and number of dialysis patients who died in 2013
   - Number of patients who underwent HD or hemodiafiltration (HDF) and did not undergo PD despite having a catheter for PD (underwent only peritoneal lavage), number of patients who underwent both PD and HD or HDF, and number of new patients who were started on PD in 2013 but introduced to other blood purification methods in the same year
   - Current status of dialysate quality control (details not shown)
2. Patient survey items
   - Pseudonym of patients
   - Gender and date of birth
   - Year and month of start of dialysis and year and month of transfer from another hospital
   - Primary disease
   - Prefecture where the patient lives
   - Outcome data (year and month of transfer, death, change in dialysis method, and transplantation)
   - History of comorbidity (*e.g.*, myocardial infarction, cerebral hemorrhage, cerebral

infarction, quadruple amputation, femoral neck fracture, and EPS)
- Use or nonuse of antihypertensive drugs and smoking habit
- Dialysis method, current status of combined use of PD and HD or HDF, history of PD, and number of renal transplantations
- Frequency of dialysis per week, duration of one session of dialysis (min/session), blood flow rate (mL/min) (for patients who underwent blood purification by extracorporeal circulation)
- Method of diluting HDF solution, volume of substitution fluid per HDF session (L), and reason for selecting HDF* (for patients who underwent HDF)
- Height and predialysis and postdialysis body weights
- Predialysis and postdialysis serum blood urea nitrogen (BUN) (mg/dL) and creatinine (mg/dL) levels
- Predialysis albumin (g/dL), C-reactive protein (CRP) (mg/dL), calcium (mg/dL), phosphorus (mg/dL), and blood hemoglobin (g/dL) levels, and parathyroid hormone (PTH) (pg/mL) levels, and the measurement method of PTH
- Hemoglobin A1c,* glycoalbumin,* total cholesterol,* and high-density lipoprotein cholesterol (HDL-C) level,* predialysis systolic blood pressure,* predialysis diastolic blood pressure,* predialysis pulse,* use or nonuse of insulin,* use or nonuse of dipeptidyl peptidase-4 (DPP4) inhibitor,* and use or nonuse of other orally administered medicines*

*USB-only survey items

3. USB-only survey items

Details of PD were surveyed as USB-only survey items separately from the abovementioned questionnaires for the facility and patient surveys. The following are the USB-only survey items associated with PD.

- PD vintage (months)
- Number of months when PD was performed in 2013
- Performance or nonperformance of PET
- PET-derived four-hour dialysate/plasma creatinine ratio (PET D/P Cr ratio)
- Type of PD solution
- Volume of PD solution used per day
- Remaining renal function (daily urine output)
- Mean volume of water removed per day
- Residual renal Kt/V and PD Kt/V
- Use or nonuse of automated peritoneal dialysis (APD) machine
- Number of hours of PD per day
- Method of PD solution exchange
- Frequency of peritonitis in 2013
- Frequency of catheter exit-site infections in 2013

RESULTS AND DISCUSSION

Current status of PD patients

Number of patients (obtained from facility survey)

Table 1 shows a summary of the results for PD at the end of 2013 obtained from the facility survey. According to the facility survey, the number of PD patients was 9392 at the end of 2013, a decrease of 122 from the previous year. The percentage of PD patients among the entire dialysis patient population was 3.0%, a decrease of 0.1% from the previous year. The number of patients who underwent a non-PD method, although they had a catheter for PD (most of whom are considered to have undergone only peritoneal lavage), was 292 (a decrease of 55 from the previous year). The number of new patients who were started on PD in 2013 but introduced to other methods in the same year was 174 (a decrease of 1 from the previous year). Considering all the patients listed above, the total number of PD patients was 9858 in 2013. The number of patients who underwent both PD and another dialysis method such as HD or HDF was 1920 (a decrease of 12 from the previous year).

Current status of combined use of PD + HD(F) with respect to PD vintage (obtained from patient survey)

To the questions regarding PD vintage and current status of PD + HD(F), 5613 patients responded. The percentage of patients who underwent PD + HD(F) increased with PD vintage [<1 year, 3.5%; 1 to

TABLE 1. *Number of PD patients at the end of 2013*

	Number of patients
PD patients	9392
Patients with a catheter for PD such as those who underwent only peritoneal lavage	292
New patients who were started on PD in 2012 but introduced to other methods in the same year	174
Patients who underwent PD + HD(F)	1920

< 2 years, 8.4%; 2 to < 4 years, 15.3%; 4 to < 6 years, 29.3%; 6 to < 8 years, 39.3%; 8 to < 10 years, 47.1%; and ≥10 years, 57.5% (Table 2)]. Regarding the frequency of HD(F), the majority of the PD patients underwent HD(F) once a week (nearly 80%: Table 2).

Method of PD solution exchange (obtained from patient survey)

To the questions regarding the method of PD solution exchange, 4437 of the PD-only patients responded. The number of PD patients who performed completely manual dialysate exchange was 1404 (31.6%). The number of PD patients who used a double-bag system with ultraviolet-light irradiation was 2312 (52.1%) and the number of those who used the same system but with a sterile connecting device was 660 (14.9%) (Table 3).

Use or nonuse of APD machine with respect to PD vintage (obtained from patient survey)

Among the PD-only patients, 4389 responded to the questions regarding their PD vintage and use or nonuse of an APD machine. The percentages of PD-only patients who used an APD machine with respect to PD vintage were as follows: <1 year, 45.3%; 1 to < 2 years, 46.2%; 2 to < 4 years, 43.1%; 4 to < 6 years, 44.3%; 6 to < 8 years, 30.1%; 8 to < 10 years, 36.2%; and ≥10 years, 34.2% (Table 4).

Number of hours of PD session per day with respect to PD vintage (obtained from patient survey)

Among the PD-only patients, 4120 responded to the questions regarding their PD vintage and number of hours of PD session per day. The percentages of patients who underwent PD the whole day (24 h) with respect to PD vintage were as follows: <1 year, 40.4%; 1 to < 2 years, 49.7%; 2 to < 4 years, 59.3%; 4 to < 6 years, 62.0%; 6 to < 8 years, 71.6%; 8 to < 10 years, 67.9%; and ≥10 years, 74.0% (Table 5).

Urine output, volume of water removed by PD, and total volume of water removed (obtained from patient survey)

Urine output with respect to PD vintage

To the questions regarding urine output and PF vintage, 3664 of the PD-only patients responded. The mean urine output of the PD patients was 748.20 mL/day. The urine output decreased with increasing PD vintage [<1 year, 1002.7 mL/day; 1 to < 2 years, 860.5 mL/day; 2 to < 4 years, 696.8 mL/day; 4 to < 6 years, 528.9 mL/day; 6 to < 8 years, 388.9 mL/

TABLE 2. *Current status of combined use of PD + HD(F) in patients with respect to PD vintage*

PD vintage	<1 year	1 to < 2 years	2 to < 4 years	4 to < 6 years	6 to < 8 years	8 to < 10 years	≥10 years	Subtotal	No information available	Total	Mean	SD
PD only (%)	1182 (96.5)	1073 (91.6)	1197 (84.7)	636 (72.9)	266 (60.7)	119 (52.9)	113 (42.5)	4586 (81.7)	2738 (80.0)	7324 (81.1)	2.82	2.79
PD + HD(F) once a week (%)	40 (3.3)	91 (7.8)	186 (13.2)	210 (24.1)	143 (32.6)	86 (38.2)	123 (46.2)	879 (15.7)	624 (18.2)	1503 (16.6)	5.87	4.14
PD + HD(F) twice a week (%)	1 (0.1)	2 (0.2)	14 (1.0)	16 (1.8)	24 (5.5)	15 (6.7)	18 (6.8)	90 (1.6)	44 (1.3)	134 (1.5)	7.37	3.85
PD + HD(F) three times a week (%)			1 (0.1)					1 (0.0)	1 (0.0)	2 (0.0)	3.25	
PD + HD(F) at other frequencies (%)	2 (0.2)	6 (0.5)	16 (1.1)	11 (1.3)	5 (1.1)	5 (2.2)	12 (4.5)	57 (1.0)	15 (0.4)	72 (0.8)	6.27	4.68
Total (%)	1225 (100.0)	1172 (100.0)	1414 (100.0)	873 (100.0)	438 (100.0)	225 (100.0)	266 (100.0)	5613 (100.0)	3422 (100.0)	9035 (100.0)	3.41	3.33

TABLE 3. *Method of PD solution exchange in PD-only patients*

Method of PD solution exchange	Completely manual exchange	Double-bag system with ultraviolet-light irradiation	Double-bag system with sterile connecting device	Double-bag system (methods other than those on the left columns, including semimanual methods)	Subtotal	Unspecified	No information available	Total
Number of patients (%)	1404 (31.6)	2312 (52.1)	660 (14.9)	61 (1.4)	4437 (100.0)	83	2804	7324

TABLE 4. *Use or nonuse of APD machine in PD-only patients with respect to PD vintage*

PD vintage	Use	Nonuse	Subtotal	Unspecified	No information available	Total
<1 year (%)	612 (54.7)	506 (45.3)	1118 (100.0)	1	63	1182
1 to < 2 years (%)	554 (53.8)	475 (46.2)	1029 (100.0)	2	42	1073
2 to < 4 years (%)	662 (56.9)	501 (43.1)	1163 (100.0)	3	31	1197
4 to < 6 years (%)	336 (55.7)	267 (44.3)	603 (100.0)	3	30	636
6 to < 8 years (%)	174 (69.9)	75 (30.1)	249 (100.0)	2	15	266
8 to < 10 years (%)	74 (63.8)	42 (36.2)	116 (100.0)		3	119
≥10 years (%)	73 (65.8)	38 (34.2)	111 (100.0)		2	113
Subtotal (%)	2485 (56.6)	1904 (43.4)	4389 (100.0)	11	186	4586
No information available (%)	115 (68.5)	53 (31.5)	168 (100.0)		2570	2738
Total (%)	2600 (57.1)	1957 (42.9)	4557 (100.0)	11	2756	7324
Mean	2.98	2.64	2.83	3.63	2.54	2.82
SD	2.92	2.64	2.81	2.08	2.43	2.79

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

TABLE 5. *Hours of PD session (h) per day in PD-only patients with respect to PD vintage*

PD vintage	1 to < 5 h	5 to < 9 h	9 to < 13 h	13 to < 18 h	18 to < 24 h	24 h	Subtotal	No information available	Total	Mean	SD
<1 year (%)	49 (4.7)	288 (27.6)	171 (16.4)	83 (7.9)	32 (3.1)	422 (40.4)	1045 (100.0)	137	1182	15.42	7.67
1 to < 2 years (%)	25 (2.6)	204 (21.3)	137 (14.3)	73 (7.6)	43 (4.5)	477 (49.7)	959 (100.0)	114	1073	17.13	7.48
2 to < 4 years (%)	22 (2.0)	153 (14.0)	144 (13.2)	78 (7.1)	48 (4.4)	649 (59.3)	1094 (100.0)	103	1197	18.65	7.03
4 to < 6 years (%)	13 (2.3)	82 (14.2)	62 (10.7)	35 (6.1)	27 (4.7)	358 (62.0)	577 (100.0)	59	636	19.01	7.00
6 to < 8 years (%)	8 (3.4)	14 (6.0)	24 (10.3)	11 (4.7)	9 (3.9)	166 (71.6)	232 (100.0)	34	266	20.22	6.58
8 to < 10 years (%)	2 (1.8)	11 (10.1)	11 (10.1)	8 (7.3)	3 (2.8)	74 (67.9)	109 (100.0)	10	119	19.83	6.58
≥10 years (%)	1 (1.0)	8 (7.7)	10 (9.6)	7 (6.7)	1 (1.0)	77 (74.0)	104 (100.0)	9	113	20.60	6.12
Subtotal (%)	120 (2.9)	760 (18.4)	559 (13.6)	295 (7.2)	163 (4.0)	2223 (54.0)	4120 (100.0)	466	4586	17.69	7.41
No information available (%)	1 (0.7)	7 (4.8)	19 (13.1)	9 (6.2)	7 (4.8)	102 (70.3)	145 (100.0)	2593	2738	20.62	5.68
Total (%)	121 (2.8)	767 (18.0)	578 (13.6)	304 (7.1)	170 (4.0)	2325 (54.5)	4265 (100.0)	3059	7324	17.79	7.38
Mean	2.25	2.01	2.41	2.61	2.68	3.32	2.85	2.63	2.82		
SD	2.27	2.16	2.41	2.73	2.10	3.08	2.81	2.62	2.79		

day; 8 to < 10 years, 360.5 mL/day; and ≥10 years, 171.6 mL/day (Table 6)].

Volume of water removed by PD with respect to PD vintage

To the questions regarding the volume of water removed by PD with respect to PD vintage, 3922 of the PD-only patients responded. The mean volume of water removed by PD was 611.3 mL/day. The volumes of water removed by PD with respect to PD vintage were as follows: <1 year, 434.0 mL/day; 1 to < 2 years, 542.2 mL/day; 2 to < 4 years, 654.7 mL/day; 4 to < 6 years, 753.1 mL/day; 6 to < 8 years, 905.5 mL/day; 8 to < 10 years, 818.3 mL/day; and ≥10 years, 864.9 mL/day (Table 7).

PET (obtained from patient survey)

Performance or nonperformance of PET

To the questions regarding the performance or nonperformance of PET, 4499 of the PD-only patients responded. Among these patients, 1970 (43.8%) underwent a standard PET and 1066 (23.7%) underwent a fast PET; that is, a total of 3036 (67.5%) underwent PET (Table 8).

PET D/P Cr ratio and type of PD solution used

To the questions regarding the type of PD solution used, 4540 of the PD-only patients responded. Among these patients, 2803 (61.7%) used 1.5 or 2.5% dextrose and only 14 (0.31%) used 4.25% dextrose. The total number of

TABLE 6. *Urine output in PD-only patients with respect to PD vintage*

PD vintage	<100 mL/day	100 to < 400 mL/day	400 to < 800 mL/day	800 to < 1200 mL/day	1200 to < 1600 mL/day	≥1600 mL/day	Subtotal	No information available	Total	Mean	SD
<1 year (%)	35 (3.9)	69 (7.7)	190 (21.2)	287 (32.0)	194 (21.6)	123 (13.7)	898 (100.0)	284	1182	1002.74	545.41
1 to < 2 years (%)	48 (5.5)	133 (15.2)	225 (25.8)	236 (27.0)	136 (15.6)	95 (10.9)	873 (100.0)	200	1073	860.52	566.11
2 to < 4 years (%)	137 (13.9)	189 (19.1)	262 (26.5)	217 (22.0)	108 (10.9)	74 (7.5)	987 (100.0)	210	1197	696.75	551.64
4 to < 6 years (%)	119 (23.3)	118 (23.1)	132 (25.8)	82 (16.0)	37 (7.2)	23 (4.5)	511 (100.0)	125	636	528.92	512.40
6 to < 8 years (%)	80 (38.8)	43(20.9)	43 (20.9)	21 (10.2)	15 (7.3)	4 (1.9)	206 (100.0)	60	266	388.93	468.83
8 to < 10 years (%)	45 (44.6)	21 (20.8)	14 (13.9)	13 (12.9)	5 (5.0)	3 (3.0)	101 (100.0)	18	119	360.47	490.56
≥10 years (%)	62 (70.5)	12 (13.6)	6 (6.8)	5 (5.7)	1 (1.1)	2(2.3)	88 (100.0)	25	113	171.59	376.11
Subtotal (%)	526 (14.4)	585 (16.0)	872 (23.8)	861 (23.5)	496 (13.5)	324 (8.8)	3664 (100.0)	922	4586	748.17	579.26
No information available (%)	10 (17.2)	7 (12.1)	20 (34.5)	8 (13.8)	9 (15.5)	4 (6.9)	58 (100.0)	2680	2738	688.66	624.15
Total(%)	536 (14.4)	592 (15.9)	892 (24.0)	869 (23.3)	505 (13.6)	328 (8.8)	3722 (100.0)	3602	7324	747.24	579.94
Mean	5.50	3.40	2.61	2.05	1.85	1.80	2.85	2.74	2.82		
SD	4.12	2.64	2.10	1.96	1.79	1.75	2.77	2.89	2.79		

TABLE 7. *Volume of water removed by PD in PD-only patients with respect to PD vintage*

PD vintage	<−1000 mL/day	−1000 to < 0 mL/day	0 to < 1000 mL/day	1000 to < 2000 mL/day	2000 to < 3000 mL/day	3000 to < 4000 mL/day	≥4000 mL/day	Subtotal	No information available	Total	Mean	SD
<1 year (%)	2 (0.2)	84 (8.6)	774 (79.3)	109 (11.2)	7 (0.7)			976 (100.0)	206	1182	434.01	464.31
1 to < 2 years (%)	3 (0.3)	62 (6.8)	684 (74.9)	154 (16.9)	10 (1.1)			913 (100.0)	160	1073	542.16	488.24
2 to < 4 years (%)	2 (0.2)	49 (4.6)	749 (70.6)	244 (23.0)	15 (1.4)	2 (0.2)		1061 (100.0)	136.00	1197	654.66	498.86
4 to < 6 years (%)		15 (2.8)	348 (64.2)	169 (31.2)	9 (1.7)	1 (0.2)		542 (100.0)	94	636	753.09	511.60
6 to < 8 years (%)		3 (1.3)	126 (55.5)	93 (41.0)	4 (1.8)	1 (0.4)		227 (100.0)	39	266	905.52	493.92
8 to < 10 years (%)		1 (1.0)	63 (60.6)	39 (37.5)	1 (1.0)			104 (100.0)	15	119	818.33	422.48
≥10 years (%)		2 (2.0)	47 (47.5)	49 (49.5)	1 (1.0)			99 (100.0)	14	113	864.91	439.76
Subtotal (%)	7 (0.2)	216 (5.5)	2791 (71.2)	857 (21.9)	47 (1.2)	4(0.1)		3922 (100.0)	664	4586	611.33	505.99
No information available (%)		1(1.3)	55 (72.4)	19 (25.0)	1 (1.3)			76 (100.0)	2662	2738	693.42	482.96
Total (%)	7 (0.2)	217 (5.4)	2846 (71.2)	876 (21.9)	48 (1.2)	4 (0.1)		3998 (100.0)	3326	7324	612.89	505.62
Mean	1.55	1.76	2.58	4.02	3.16	4.31		2.86	2.63	2.82		
SD	0.88	1.73	2.55	3.42	2.40	2.45		2.80	2.72	2.79		

TABLE 8. *Performance or nonperformance of PET in PD-only patients*

Performance or nonperformance of PET	Not performed	PET performed	Fast PET only	Subtotal	Unspecified	No information available	Total
Number of patients (%)	1463 (32.5)	1970 (43.8)	1066 (23.7)	4499 (100.0)	57	2768	7324

patients who used icodextrin was 1728 (38.1%). Table 9 shows a summary of PET D/P Cr ratios for the different PD solutions used. The percentage of patients who used icodextrin increased with PET D/P Cr ratio [<0.5, 25.0%; 0.5 to < 0.65, 31.8%; 0.65 to < 0.81, 43.1%; and ≥0.81, 57.1% (Table 9)].

Residual renal Kt/V, PD Kt/V, and total Kt/V (obtained from patient survey)

Residual renal Kt/V with respect to PD vintage

To the questions regarding residual renal Kt/V, 2154 of the PD-only patients responded. The mean residual renal Kt/V was 0.60. Residual renal Kt/V

TABLE 9. *PET D/P Cr ratio and type of PD solution used in PD-only patients*

Type of PD solution used	<0.5	0.5 to < 0.65	0.65 to < 0.81	≥0.81 ≥ 0.81	Subtotal	No information available	Total	Mean	SD
1.5% dextrose only (%)	136 (12.2)	478 (42.8)	407 (36.5)	95 (8.5)	1116 (100.0)	912	2028	0.63	0.13
1.5 and 2.5% dextrose (%)	24 (7.6)	131 (41.3)	137 (43.2)	25 (7.9)	317 (100.0)	292	609	0.65	0.12
2.5% dextrose only (%)	5 (6.7)	18 (24.0)	42 (56.0)	10 (13.3)	75 (100.0)	91	166	0.69	0.12
4.25% dextrose only (without icodextrin) (%)	(0.0)	1 (33.3)	1 (33.3)	1 (33.3)	3 (100.0)	6	9	0.74	0.19
Icodextrin only (without dextrose) (%)	1 (5.9)	6 (35.3)	5 (29.4)	5 (29.4)	17 (100.0)	22	39	0.68	0.15
1.5% dextrose + icodextrin (%)	27 (4.7)	158 (27.3)	264 (45.7)	129 (22.3)	578 (100.0)	446	1024	0.70	0.13
1.5 and 2.5% dextrose + icodextrin (%)	13 (5.9)	79 (35.6)	108 (48.6)	22 (9.9)	222 (100.0)	168	390	0.67	0.12
2.5% dextrose + icodextrin (%)	14 (9.6)	47 (32.2)	67 (45.9)	18 (12.3)	146 (100.0)	124	270	0.66	0.13
4.25% dextrose + icodextrin (%)	(0.0)	1 (50.0)	1 (50.0)	(0.0)	2 (100.0)	3	5	0.64	0.08
Subtotal (%)	220 (8.9)	919 (37.1)	1032 (41.7)	305 (12.3)	2476 (100.0)	2064 (43.2)	4540 (62.0)	0.66	0.13
Unspecified	7 (14.6)	23 (47.9)	16 (33.3)	2 (4.2)	48 (100.0)	8	56	0.61	0.11
No information available	2 (8.0)	12 (48.0)	9 (36.0)	2 (8.0)	25 (100.0)	2703	2728	0.62	0.13
Total	229 (9.0)	954 (37.4)	1057 (41.5)	309 (12.1)	2549 (100.0)	4775	7324	0.66	0.13

decreased with increasing PD vintage [<1 year, 0.84; 1 to < 2 years, 0.75; 2 to < 4 years, 0.56; 4 to < 6 years, 0.49; 6 to < 8 years, 0.26; 8 to < 10 years, 0.23; and ≥10 years, 0.16 (Table 10)].

PD Kt/V with respect to PD vintage

To the questions regarding PD Kt/V, 2545 of the PD-only patients responded. The mean PD Kt/V was 1.28. The PD Kt/V values with respect to PD vintage were as follows: <1 year, 1.12; 1 to < 2 years, 1.22; 2 to < 4 years, 1.31; 4 to < 6 years, 1.44; 6 to < 8 years, 1.36; 8 to < 10 years, 1.23; and ≥10 years, 1.31 (Table 11).

Total Kt/V with respect to PD vintage

Among the PD-only patients, 1750 responded to all questions regarding residual renal Kt/V, PD Kt/V, and PD vintage. For these patients, the mean total Kt/V was 1.86. The total Kt/V values with respect to PD vintage were as follows: <1 year, 1.87; 1 to < 2 years, 1.88; 2 to < 4 years, 1.85; 4 to < 6 years, 1.92; 6 to < 8 years, 1.72; 8 to < 10 years, 1.75; and ≥10 years, 1.79 (Table 12).

Peritonitis and catheter exit-site infections (obtained from patient survey)

Peritonitis is defined as a white blood cell count of ≥100/μL (neutrophils, ≥50%) in a waste PD solution. A catheter exit-site infection is defined by the presence of purulent drainage from the exit site. The rates of peritonitis and catheter exit-site infections were calculated using the following formulae.

Peritonitis rates in entire PD patient population in Japan and individual patients

The peritonitis rate in the entire PD patient population in Japan was calculated using the following formula.

> "Peritonitis rate in entire PD patient population (number of peritonitis episodes per year per patient)" = ("Total number of peritonitis episodes in 2013 in all patients" ÷ "Total number of months when PD was performed in 2013 in all patients") × 12

According to the International Society for Peritoneal Dialysis (ISPD) guidelines (Peritoneal Dialysis-Related Infections Recommendations: 2010 Update) (6), "the center's peritonitis rate should be no more than one episode every 18 months (0.67/year at risk)".

The peritonitis rate in individual patients was calculated using the following formula.

> "Peritonitis rate in individual patients (number of peritonitis episodes per year per patient)" = ("Total number of peritonitis episodes in 2013 in individual patients" ÷ "Total number of months when PD was performed in 2013 in individual patients") × 12

To the questions regarding peritonitis, 4256 of the PD-only patients responded. The mean peritonitis rate in the entire dialysis patient population was 0.22 per patient per year (once per 54.5 patients per

TABLE 10. *Residual renal Kt/V in PD-only patients with respect to PD vintage*

PD vintage	<0.1	0.1 to < 0.4	0.4 to < 0.8	0.8 to < 1.2	1.2 to < 1.7	1.7 to < 2.0	2.0 to < 2.4	≥2.4	Subtotal	Unspecified	Total	Mean	SD
<1 year (%)	17 (4.2)	59 (14.4)	108 (26.4)	127 (31.1)	70 (17.1)	14 (3.4)	8 (2.0)	6 (1.5)	409 (100.0)	773	1182	0.86	0.59
1 to < 2 years (%)	27 (6.0)	92 (20.5)	112 (24.9)	115 (25.6)	69 (15.4)	20 (4.5)	6 (1.3)	8 (1.8)	449 (100.0)	624	1073	0.79	0.60
2 to < 4 years (%)	62 (12.0)	149 (28.8)	143 (27.6)	91 (17.6)	44 (8.5)	14 (2.7)	7 (1.4)	8 (1.5)	518 (100.0)	679	1197	0.60	0.57
4 to < 6 years (%)	54 (21.2)	83 (32.5)	58 (22.7)	22 (8.6)	15 (5.9)	10 (3.9)	7 (2.7)	6 (2.4)	255 (100.0)	381	636	0.58	0.86
6 to < 8 years (%)	41 (40.2)	31 (30.4)	19 (18.6)	6 (5.9)	4 (3.9)	(0.0)	1 (1.0)	(0.0)	102 (100.0)	164	266	0.27	0.38
8 to < 10 years (%)	14 (37.8)	13 (35.1)	7 (18.9)	1 (2.7)	(0.0)	(0.0)	1 (2.7)	1 (2.7)	37 (100.0)	82	119	0.33	0.61
≥10 years (%)	21 (80.8)	2 (7.7)	2 (7.7)	(0.0)	1 (3.8)	(0.0)	(0.0)	(0.0)	26 (100.0)	87	113	0.10	0.30
Subtotal (%)	236 (13.1)	429 (23.9)	449 (25.0)	362 (20.2)	203 (11.3)	58 (3.2)	30 (1.7)	29 (1.6)	1796 (100.0)	2790	4586	0.67	0.64
No information available (%)	9 (25.0)	11	8 (22.2)	5 (13.9)	2 (5.6)	1 (2.8)	(0.0)	(0.0)	36 (100.0)	2702	2738	0.43	0.43
Total (%)	245 (13.4)	440 (24.0)	457 (24.9)	367 (20.0)	205 (11.2)	59 (3.2)	30 (1.6)	29 (1.6)	1832 (100.0)	5492	7324	0.67	0.64
Mean	5.04	3.13	2.50	1.74	1.80	2.08	2.71	2.55	2.74	2.88	2.82		
SD	3.66	2.12	1.97	1.42	1.57	1.48	2.23	1.99	2.40	3.02	2.79		

TABLE 11. *PD Kt/V in PD-only patients with respect to PD vintage*

PD vintage	<0.1	0.1 to < 0.4	0.4 to < 0.8	0.8 to < 1.2	1.2 to < 1.7	1.7 to < 2.0	2.0 to < 2.4	≥2.4	Subtotal	Unspecified	Total	Mean	SD
<1 year (%)	2 (0.4)	40 (8.6)	72 (15.4)	160 (34.3)	125 (26.8)	38 (8.1)	14 (3.0)	16 (3.4)	467 (100.0)	715	1182	1.12	0.61
1 to < 2 years (%)	3 (0.6)	43 (8.5)	61 (12.1)	139 (27.5)	169 (33.4)	42 (8.3)	30 (5.9)	19 (3.8)	506 (100.0)	567	1073	1.21	0.66
2 to < 4 years %)		58 (9.7)	42 (7.0)	125 (20.9)	201 (33.6)	98 (16.4)	48 (8.0)	27 (4.5)	599 (100.0)	598	1197	1.32	0.66
4 to < 6 years (%)	2 (0.7)	18 (5.9)	18 (5.9)	41 (13.4)	118 (38.4)	62 (20.2)	28 (9.1)	20 (6.5)	307 (100.0)	329	636	1.47	0.68
6 to < 8 years (%)		12 (9.8)	9 (7.3)	9 (7.3)	45 (36.6)	28 (22.8)	15 (12.2)	5 (4.1)	123 (100.0)	143	266	1.43	0.66
8 to < 10 years (%)		6 (11.5)	11 (21.2)	7 (13.5)	9 (17.3)	10 (19.2)	3 (5.8)	6 (11.5)	52 (100.0)	67	119	1.32	0.80
≥10 years (%)		2 (6.3)	2 (6.3)	2 (6.3)	9 (28.1)	9 (28.1)	5 (15.6)	3 (9.4)	32 (100.0)	81	113	1.60	0.65
Subtotal (%)	7 (0.3)	179 (8.6)	215 (10.3)	483 (23.2)	676 (32.4)	287 (13.8)	143 (6.9)	96 (4.6)	2086 (100.0)	2500	4586	1.28	0.67
No information available (%)	(0.0)	1 (1.3)	4 (5.3)	13 (17.1)	20	28 (36.8)	7 (9.2)	3 (3.9)	76 (100.0)	2662	2738	1.55	0.49
Total (%)	7 (0.3)	180 (8.3)	219 (10.1)	496 (22.9)	696 (32.2)	315 (14.6)	150 (6.9)	99 (4.6)	2162 (100.0)	5162	7324	1.29	0.66
Mean	2.39	2.84	2.30	2.03	2.90	3.72	3.67	3.51	2.82	2.82	2.82		
SD	2.10	2.53	2.35	1.85	2.32	2.81	2.94	3.01	2.47	3.03	2.79		

TABLE 12. *Total Kt/V in PD-only patients with respect to PD vintage*

PD vintage	<0.1	0.1 to < 0.4	0.4 to < 0.8	0.8 to < 1.2	1.2 to < 1.7	1.7 to < 2.0	2.0 to < 2.4	2.0 to < 2.4	≥2.8	Subtotal	Unspecified	Total	Mean	SD
<1 year (%)	1 (0.2)	9 (2.2)	13 (3.2)	16 (4.0)	91 (22.6)	115 (28.6)	91 (22.6)	39 (9.7)	27 (6.7)	402 (100.0)	780	1182	1.87	0.75
1 to < 2 years (%)	1 (0.2)	15 (3.4)	9 (2.0)	20 (4.5)	100 (22.7)	109 (24.7)	109 (24.7)	44 (10.0)	34 (7.7)	441 (100.0)	632	1073	1.88	0.72
2 to < 4 years (%)	(0.0)	19 (3.7)	18 (3.5)	18 (3.5)	112 (22.0)	136 (26.7)	119 (23.4)	51 (10.0)	36 (7.1)	509 (100.0)	688	1197	1.85	0.72
4 to < 6 years (%)	1 (0.4)	4 (1.7)	7 (2.9)	8 (3.3)	58 (24.3)	59 (24.7)	55 (23.0)	20 (8.4)	27 (11.3)	239 (100.0)	397	636	1.92	0.77
6 to < 8 years (%)		3 (3.0)	9 (9.0)	2 (2.0)	26 (26.0)	28 (28.0)	20 (20.0)	8 (8.0)	4 (4.0)	100 (100.0)	166	266	1.72	0.65
8 to < 10 years (%)		3 (8.6)	3 (8.6)	1 (2.9)	9 (25.7)	10 (28.6)	4 (11.4)	3 (8.6)	2 (5.7)	35 (100.0)	84	119	1.75	1.12
≥10 years (%)		1 (4.2)		1 (4.2)	7 (29.2)	5 (20.8)	7 (29.2)	3 (12.5)		24 (100.0)	89	113	1.79	0.54
Subtotal (%)	3 (0.2)	54 (3.1)	59 (3.4)	66 (3.8)	403 (23.0)	462 (26.4)	405 (23.1)	168 (9.6)	130 (7.4)	1750 (100.0)	2836	4586	1.86	0.74
No information available (%)			1 (2.8)	2 (5.6)	15 (41.7)	9 (25.0)	6 (16.7)	2 (5.6)	1 (2.8)	36 (100.0)	2702	2738	1.68	0.45
Total (%)	3 (0.2)	54 (3.0)	60 (3.4)	68 (3.8)	418 (23.4)	471 (26.4)	411 (23.0)	170 (9.5)	131 (7.3)	1786 (100.0)	5538	7324	1.86	0.73
Mean	2.25	3.08	3.39	2.38	2.81	2.67	2.70	2.58	2.56	2.72	2.89	2.82		
SD	2.25	3.11	2.46	2.02	2.47	2.42	2.39	2.22	1.93	2.39	3.01	2.79		

month). This was much lower than the value specified in the ISPD guidelines.

The number of patients who did not develop peritonitis in 2013 was 3692 (86.7%). The number of patients with a peritonitis rate of 1.0 to < 2.0 was 404 (9.5%) and that with a peritonitis rate of ≥2.0 was 160 (3.8%) (Table 13).

Peritonitis rate in facilities

The peritonitis rate in a facility was calculated using the following formula.

"Peritonitis rate in a facility (number of peritonitis episodes per year per patient)" = ("Total number of peritonitis episodes in 2013 in all patients in the facility" ÷ "Total number of months when PD was performed in 2013 in all patients in the facility") × 12

On the basis of the valid responses obtained from 244 facilities, the mean peritonitis rate in a facility was calculated to be 0.21 per patient per year (once per 57.1 patients per month) (Table 14).

Catheter exit-site infection rates in entire PD patient population and individual patients

The catheter exit-site infection rate in the entire PD patient population was calculated using the following formula.

"Catheter exit-site infection rate in entire PD patient population (number of infections per year per patient)" = ("Total number of infections in 2013 in all patients" ÷ "Total number of months when PD was performed in 2013 in all patients") × 12

The catheter exit-site infection rate in individual patients was calculated using the following formula.

"Catheter exit-site infection rate in individual patients (number of infections per year per patient)" = ("Total number of infections in 2013 in individual patients" ÷ "Total number of months when PD was performed in 2013 in individual patients") × 12

To the questions regarding catheter exit-site infections, 4225 of the PD-only patients responded. The mean catheter exit-site infection rate in the entire dialysis patient population was 0.34 per patient per year (once per 35.3 patients per month).

The number of patients who did not develop catheter exit-site infections in 2013 was 3473 (82.2%). The number of patients with a catheter exit-site infection rate of 1.0 to < 2.0 was 463 (11.0%) and that

TABLE 13. *Peritonitis rate in individual PD-only patients*

Peritonitis rate (episodes per year per patient)	0	1.0 to < 2.0	2.0 to < 3.0	3.0 to < 4.0	4.0 to < 5.0	≥5.0	Subtotal	Unspecified	No information available	Total	Mean
Number of patients (%)	3692 (86.7)	404 (9.5)	98 (2.3)	33 (0.8)	13 (0.3)	16 (0.4)	4256 (100.0)	57	3011	7324	0.22

The peritonitis rate in individual patients (per patient per year) is represented by "0" because the rates less than 1.0 should be regarded as "0".

TABLE 14. *Peritonitis rate in PD-only patients in facilities*

Peritonitis rate (episodes per year per facility)	0~	1.0~	2.0~	3.0~	4.0~	5.0~	Subtotal	No information available	Total	Mean
Number of facilities (%)	218 (89.3)	21 (8.6)	2 (0.8)	3 (1.2)	0 (0.0)	0 (0.0)	244 (100.0)	252	496	0.21

Peritonitis rate in a facility (number of peritonitis episodes per year per facility)" = ("Total number of peritonitis episodes in 2013 in all patients in the facility" ÷ "Total number of months when PD was performed in 2013 in all patients in the facility") × 12

with a catheter exit-site infection rate of ≥2.0 was 289 (6.8%) (Table 15).

Catheter exit-site infection rate in facilities

The catheter exit-site infection rate in a facility was calculated using the following formula.

> "Catheter exit-site infection rate in a facility (number of infections per year per patient)" = ("Total number of infections in 2013 in all patients in the facility" ÷ "Total number of months when PD was performed in 2013 in all patients in the facility") × 12

On the basis of the valid responses obtained from 271 facilities, the mean catheter exit-site infection rate in a facility was calculated to be 0.41 per patient per year (once per 29.3 patients per month) (Table 16).

EPS (obtained from patient survey)

Percentage of patients with histories of PD and EPS

Items associated with EPS were surveyed in all dialysis patients including HD patients. Among the 13,113 patients who had undergone PD and responded to the questions regarding their history

TABLE 15. *Catheter exit-site infection rate in individual PD-only patients*

Catheter exit-site infection rate (episodes per year per patient)	0	1.0 to < 2.0	2.0 to < 3.0	3.0 to < 4.0	4.0 to < 5.0	≥5.0	Subtotal	Unspecified	No information available	Total	Mean
Number of patients (%)	3473 (82.2)	463 (11.0)	157 (3.7)	57 (1.3)	35 (0.8)	40 (0.9)	4225 (100.0)	84	3015	7324	0.34

The catheter exit-site infection rate in individual patients (per patient per year) is represented by "0" because the rates less than 1.0 should be regarded as "0".

TABLE 16. *Catheter exit-site infection rate in PD-only patients in facilities*

Catheter exit-site infection rate (episodes per year per facility)	0~	1.0~	2.0~	3.0~	4.0~	5.0~	Subtotal	No information available	Total	Mean
Number of facilities (%)	206 (75.9)	41 (15.2)	14 (5.2)	3 (1.1)	2 (0.7)	5 (1.9)	271 (100.0)	224	495	0.41

Catheter exit-site infection rate in a facility (number of infections per year per facility)" = ("Total number of infections in 2013 in all patients in the facility" ÷ "Total number of months when PD was performed in 2013 in all patients in the facility") × 12

TABLE 17. *Percentage of PD patients with history of EPS*

Treatment method	No	Yes (with detachment surgery and use of steroids)	Yes (with detachment surgery and without use of steroids)	Yes (without detachment surgery and with use of steroids)	Yes (without detachment surgery or use of steroids)	Subtotal	Unspecified	No information available No information available	Total
Facility HD (%)	5357 (90.7)	429 (7.3)	21 (0.4)	64 (1.1)	37 (0.6)	5908 (100.0)	172	703	6783
HDF (%)	1077 (90.7)	82 (6.9)	7 (0.6)	9 (0.8)	12 (1.0)	1187 (100.0)	24	110	1321
Hemofiltration (%)	1 (50.0)	1 (50.0)				2 (100.0)		3	5
Hemoadsorption (%)	55 (87.3)	6 (9.5)	1 (1.6)	1 (1.6)		63 (100.0)	5	7	75
Home HD (%)	69 (97.2)	2 (2.8)				71 (100.0)	1	7	79
PD (%)	5832 (99.1)	34 (0.6)		11 (0.2)	5 (0.1)	5882 (100.0)	65	3090	9037
Subtotal (%)	12391 (94.5)	554 (4.2)	29 (0.2)	85 (0.6)	54 (0.4)	13113 (100.0)	267	3920	17300
No information available (%)									
Total (%)	12391 (94.5)	554 (4.2)	29 (0.2)	85 (0.6)	54 (0.4)	13113 (100.0)	267	3920	17300

TABLE 18. *History of EPS in patients with respect to PD vintage*

History of EPS	<1 year	1 to < 2 years	2 to < 4 years	4 to < 6 years	6 to < 8 years	8 to < 10 years	≥10 years ≥ 10 years	Subtotal	No information available	Total	Mean	SD
No (%)	1090 (22.0)	1040 (21.0)	1250 (25.3)	772 (15.6)	366 (7.4)	199 (4.0)	228 (4.6)	4945 (100.0)	7446	12391	3.38	3.31
Yes (with detachment surgery and use of steroids) (%)	4 (17.4)	6 (26.1)	6 (26.1)	2 (8.7)	2 (8.7)	(0.0)	3 (13.0)	23 (100.0)	531	554	4.39	5.03
Yes (with detachment surgery and without use of steroids) (%)									29	29		
Yes (without detachment surgery and with use of steroids) (%)			3 (27.3)	3 (27.3)	3 (27.3)	1 (9.1)	1 (9.1)	11 (100.0)	74	85	5.29	2.63
Yes (without detachment surgery or use of steroids) (%)			(0.0)	2 (50.0)	1 (25.0)	(0.0)	1 (25.0)	4 (100.0)	50	54	7.58	5.16
Subtotal (%)	1094 (22.0)	1046 (21.0)	1259 (25.3)	779 (15.6)	372 (7.5)	200 (4.0)	233 (4.7)	4983 (100.0)	8130	13113	3.39	3.32
Unspecified	7 (13.0)	14 (25.9)	7 (13.0)	10 (18.5)	6 (11.1)	3 (5.6)	7 (13.0)	54 (100.0)	213	267	5.08	5.36
No information available	127 (20.8)	119 (19.5)	156 (25.6)	86 (14.1)	64 (10.5)	26 (4.3)	32 (5.2)	610 (100.0)	3310	3920	3.54	3.22
Total	1228 (21.7)	1179 (20.9)	1422 (25.2)	875 (15.5)	442 (7.8)	229 (4.1)	272 (4.8)	5647 (100.0)	11 653	17300	3.42	3.34

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

of EPS, 722 (5.5%) had a history of EPS. Among these 722 patients, 583 (80.7%) had undergone detachment surgery (Table 17).

History of EPS with respect to PD vintage

Responses to the questions regarding PD vintage and EPS history were obtained from 4983 patients. The percentages of patients with a history of EPS who had undergone PD for <10 years were low (<1 year, 0.37%; 1 to < 2 years, 0.57%; 2 to < 4 years, 0.71%; 4 to < 6 years, 0.90%; 6 to < 8 years, 1.61%; and 8 to < 10 years, 0.50%). However, the percentage of such patients who had undergone PD for ≥10 years was higher (2.14%) (Table 18).

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